# Annual Groundwater Monitoring Report

DTE Electric Company
Sibley Quarry Coal Combustion Residual Landfill

801 Fort Street
Trenton, Michigan

January 2018

# Annual Groundwater Monitoring Report

## DTE Electric Company
## Sibley Quarry Coal Combustion Residual Landfill

*801 Fort Street*
*Trenton, Michigan*

January 2018

*Prepared For*
*DTE Electric Company*


Graham Crockford, C.P.G
Senior Project Geologist

David B. McKenzie, P.E.
Senior Project Engineer





1540 Eisenhower Place, Ann Arbor, MI 48108 ● 734.971.7080 Phone ● 734.971.9022 Fax
www.TRCsolutions.com

# Table of Contents



## List of Tables



## List of Figures

## List of Appendices

# 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) Sibley Quarry Landfill (SQLF) 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 SQLF 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 September 2017 semiannual groundwater monitoring event for the SQLF 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 boron, chloride, sulfate and TDS in one or more compliance wells for the September 2017 monitoring event. This is the initial detection monitoring event; therefore, it is the initial identification of any potential SSIs over background levels. Based on the hydrogeology at the Site, with the SQLF continuously being dewatered since before CCR disposal began, maintaining a continuous inward hydraulic gradient, it is not possible for the uppermost aquifer to have been affected by CCR disposal 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 SSIs over background limits noted during the September 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. 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.

# 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) Sibley Quarry Landfill Coal Combustion Residual Landfill (SQLF) 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 SQLF 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 September 2017 semiannual groundwater monitoring event for the SQLF 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 Sibley Quarry Coal Combustion Residual Landfill* (QAPP) (TRC, August 2016; revised March 2017) and statistically evaluated per the *Groundwater Statistical Evaluation Plan – DTE Electric Company Sibley Quarry Coal Combustion Residual Landfill* (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 SQLF is located in Section 7, Township 4 South, Range 11 East, at 801 Fort Street (a.k.a. 502 Quarry Road) in Trenton, Wayne County, Michigan (Figure 1). The SQLF is located about two miles north of the DTE Electric Trenton Power Plant. The SQLF is bounded mostly by Fort Street to the west, Sibley Road to the north, the former Detroit and Toledo Shore Line Railroad and West Jefferson to the east, and the former Vulcan Mold & Iron Company (now owned by Danou Enterprises) and the DTE Electric Jefferson Substation to the south.

The SQLF is a licensed Type III solid waste disposal facility owned and operated by DTE Electric. The disposal facility currently receives the majority of CCR from the Trenton Channel and River Rouge Power Plants. In addition, a small amount of CCR is also received from the Monroe Power Plant. The SQLF is operated under the current operating license number 9394 in accordance with Michigan Part 115 of the Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994, as amended.

## 1.3 Geology/Hydrogeology

The SQLF CCR unit is located approximately one-half mile west of the Detroit River. The Sibley quarry was originally developed to mine limestone beginning in the mid-1800s and was mined to over 300 feet below ground surface (ft bgs) in some areas before becoming inactive. In 1951, Detroit Edison (now DTE Electric) acquired Sibley Quarry and began to manage CCR in the SQLF. As part of normal operations, beginning in 1951, the SQLF has been continuously dewatered to approximately 300 ft bgs maintaining a water level in the bottom of the quarry by pumping an average of approximately 1.5 million gallons per day.

The SQLF resides in an area characterized by near surface deposits of glacio-lacustrine clay and silt units on top of thick strata of dolomite and limestone bedrock. The SQLF is located in an area where the Dundee Formation (mostly limestone) and the Detroit River Group (limestone, dolostone and some sandstone) underlie the unconsolidated glacial drift and are the uppermost aquifer. At SQLF, the Dundee Formation is overlain by anywhere from less than 15 feet to more than 70 feet of unconsolidated material, most of which is clay-rich soil with some fill. The top of the Dundee Formation limestone/dolostone bedrock was encountered at depths ranging from 16.5 to 74.5 ft bgs and, including the underlying Detroit River Group limestone/dolostone/ sandstone, extended to depths ranging from 235 to over 310 ft bgs. The underlying Sylvania Sandstone was encountered at depths ranging from 235 to 300 ft bgs in some locations at the SQLF.

As expected, data show that groundwater levels are significantly lower within the bedrock in monitoring wells that are the closest to the quarry where significant pumping is, with water levels ranging from 120 to more than 210 ft bgs. Groundwater flow is consistently inward toward the base of the quarry due to continuous pumping at the quarry that hydraulically controls groundwater flow. The pumped water from the quarry is managed in accordance with a National Pollution Discharge Elimination System (NPDES) permit. Quarry dewatering results in all the perimeter uppermost aquifer CCR monitoring wells being upgradient of the SQLF CCR unit.

Because the uppermost aquifer is in an area where pumping has been performed continuously before CCR disposal began, and will be continued to be dewatered, a continuous inward hydraulic gradient is maintained. As a result, the uppermost aquifer perimeter monitoring

wells cannot have been affected by the SQLF CCR unit operations to date, nor could they be in the future under current pumping conditions. Given that groundwater flow is inward toward the quarry, all of the perimeter monitoring wells in the groundwater monitoring system are located in an up gradient position relative to the landfill; therefore, monitoring of the SQLF CCR unit using interwell statistical methods (upgradient to downgradient) is not possible. Instead, based on these hydrogeologic conditions, intrawell statistical approaches are the appropriate method to evaluate groundwater data statistically. Consequently, intrawell statistical tests are being used during detection monitoring as outlined in the Stats Plan.

# Section 2
# Groundwater Monitoring

## 2.1 Monitoring Well Network

A groundwater monitoring system has been established for the SQLF CCR unit as detailed in the *Groundwater Monitoring System Summary Report – DTE Electric Company Sibley Quarry Coal Combustion Residual Landfill* (GWMS Report) (TRC, October 2017). The detection monitoring well network for the SQLF CCR unit currently consists of eight monitoring wells that are screened in the uppermost aquifer. The monitoring well locations are shown on Figure 2.

As discussed above and in the Stats Plan, intrawell statistical methods for the SQLF were selected because the uppermost aquifer is in an area where pumping has been performed continuously since before CCR disposal began, and will be continued to be dewatered, resulting in a maintained continuous inward hydraulic gradient. Given that groundwater flow is inward under pumping conditions toward the quarry, all of the perimeter monitoring wells in the groundwater monitoring system are located in an up gradient position relative to the landfill. Therefore, monitoring of the SQLF CCR unit using interwell statistical methods (upgradient to downgradient) is not possible. This also supports that the aquifer is unaffected by the CCR unit, where, as a result of the continuously maintained inward gradient, groundwater within the uppermost aquifer cannot have been affected by the SQLF CCR unit operations to date, nor could they be in the future under current pumping conditions.

An intrawell statistical approach requires that each of the monitoring 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-101 through MW-107 and MW-108A are located around the perimeter of the SQLF and provide data on both background and perimeter groundwater quality that has not been affected by the CCR unit (total of eight background/compliance monitoring wells).

## 2.2 Background Sampling

Background groundwater monitoring was conducted at the SQLF CCR unit from August 2016 through August 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 eight monitoring wells installed for the SQLF CCR unit, in addition to one supplemental

background sampling event for select parameters from a subset of monitoring wells. The additional data were collected in August 2017 in order to extend the background data set and confirm analytical results from MW-102 (chloride, fluoride and sulfate), MW-106 (Appendix III and IV CCR parameters, without radium), and MW-107 (fluoride). 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 September 20 and 21, 2017, by TRC personnel and samples were analyzed by TestAmerica in accordance with the QAPP. Static water elevation data were collected at all eight monitoring well locations. Groundwater samples were collected from the eight detection monitoring wells for the Appendix III indicator parameters and field parameters. A summary of the groundwater data collected during the September 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

Groundwater elevation data collected during the most recent background sampling events showed that groundwater within the uppermost aquifer flows radially into the quarry as a result of continuous pumping/dewatering at the Site. Groundwater potentiometric surface elevations measured across the Site during the September 2017 sampling event are provided on 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 Site during this event is estimated at 0.085 ft/ft. Resulting in an estimated average seepage velocity of approximately 5.8 ft/day or 2,100 ft/year for this event, using the average hydraulic conductivity of 6.8 ft/day (TRC, 2017) and an assumed effective porosity of 0.1.

Given that groundwater flow is maintained inward toward the quarry, all of the perimeter monitoring wells in the groundwater monitoring system are located in an up gradient position relative to the landfill. Therefore, there is no potential for groundwater to migrate away from the SQLF 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 eight established detection monitoring wells (MW-101 through MW-107 and MW-108A). 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 SQLF 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-101 through MW-107 and MW-108A) were compared to their respective statistical background limits calculated from the background data collected from each individual well (i.e., monitoring data from MW-101 is compared to the background limit developed using the background dataset from MW-101, and so forth). The comparisons are presented on Table 4.

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

- Boron at MW-106;
- Chloride at MW-106 and MW-108A;
- Sulfate at MW-105; and
- TDS at MW-108A.

There were no SSIs compared to background for calcium, fluoride or pH.

# Section 4
# Conclusions and Recommendations

Potential SSIs over background limits were noted for boron, chloride, sulfate and TDS in one or more compliance wells during the September 2017 monitoring event. This is the initial detection monitoring event; therefore, it is the initial identification of any potential SSIs over background levels. As discussed above, and in the GWMS Report, because the uppermost aquifer is in an area where pumping has been performed continuously since before CCR disposal began and will be continued to be dewatered, a continuous inward hydraulic gradient is maintained. As a result, the uppermost aquifer perimeter monitoring wells cannot have been affected by the SQLF CCR unit operations to date, nor could they be in the future under current pumping conditions. 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 being drawn inward toward the SQLF.

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 SSIs over background limits noted for the September 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 SSIs are 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 SQLF is scheduled for the second calendar quarter of 2018.

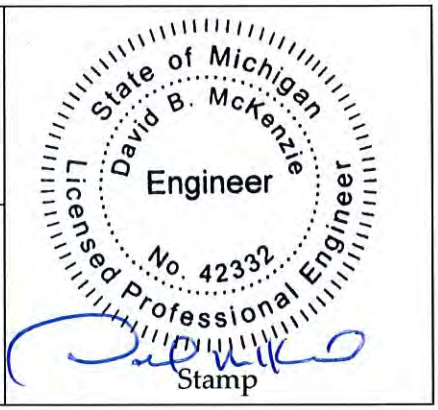
# Section 5
# Groundwater Monitoring Report Certification

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**
**Sibley Quarry Coal Combustion Residual Landfill**
**Trenton, Michigan**

**CERTIFICATION**

I hereby certify that the annual groundwater and corrective action report presented within this document for the SQLF 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:<br>David B. McKenzie, P.E. | Expiration Date:<br>October 31, 2019 |  <br>Stamp |
| Company:<br>TRC Engineers Michigan, Inc. | Date:<br>1/30/18 | |

# Section 6
# References

TRC Environmental Corporation. August 2016; Revised March 2017. CCR Groundwater Monitoring and Quality Assurance Project Plan – DTE Electric Company – Sibley Quarry Coal Combustion Residual Landfill, 801 Fort Street, Trenton, Michigan. Prepared for DTE Electric Company.

TRC Environmental Corporation. October 2017. Groundwater Monitoring System Summary Report – Sibley Quarry Coal Combustion Residual Landfill, 801 Fort Street, Trenton, Michigan. Prepared for DTE Electric Company.

TRC Environmental Corporation. October 2017. Groundwater Statistical Evaluation Plan – DTE Electric Company Sibley Quarry Coal Combustion Residual Landfill, 801 Fort Street, Trenton, Michigan. Prepared for DTE Electric Company.

# Tables

Table 1
Summary of Groundwater Elevation Data – September 2017
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Well ID | MW-101 | | MW-102 | | MW-103 | | MW-104 | | MW-105 | | MW-106 | | MW-107 | | MW-108A | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Installed | 7/14/2015 | | 7/16/2015 | | 7/15/2015 | | 7/16/2015 | | 3/30/2016 | | 3/28/2016 | | 4/6/2016 | | 1/24/2017 | |
| TOC Elevation | 617.67 | | 615.03 | | 607.23 | | 608.39 | | 593.28 | | 606.75 | | 610.03 | | 594.06 | |
| Geologic Unit of Screened Interval | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Sandstone Bedrock | |
| Bottom of Open Hole Elevation | 295.2 | | 342.6 | | 294.7 | | 296.0 | | 290.7 | | 304.0 | | 336.5 | | 290.5 | |
| Unit | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft |
| Measurement Date | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation |
| 9/20/2017 | 178.34 | 439.33 | 210.28 | 404.75 | 179.26 | 427.97 | 120.82 | 487.57 | 23.22 | 570.06 | 186.47 | 420.28 | 156.85 | 453.18 | 55.13 | 538.93 |

**Notes:**

Elevations are reported in feet realative to the national geodetic vertical datum of 1929.

ft BTOC - feet below top of casing

NM - Not Measured

Table 2
Summary of Groundwater Analytical Data – September 2017
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| | Sample Location: | MW-101 | MW-102 | MW-103 | MW-104 | MW-105 | MW-106 | MW-107 | MW-108A |
|---|---|---|---|---|---|---|---|---|---|
| | Sample Date: | 9/20/2017 | 9/20/2017 | 9/20/2017 | 9/20/2017 | 9/21/2017 | 9/20/2017 | 9/20/2017 | 9/21/2017 |
| Constituent | Unit | | | | | | | | |
| **Appendix III** | | | | | | | | | |
| Boron | ug/L | 280 | 130 | 760 | 760 | 2,500 | 1,000 | 1,500 | 1,400 |
| Calcium | ug/L | 230,000 | 260,000 | 560,000 | 470,000 | 700,000 | 560,000 | 1,300,000 | 420,000 |
| Chloride | mg/L | 120 | 170 | 150 | 250 | 4,300 | 140 | 20,000 | 2,100 |
| Fluoride | mg/L | 2.0 | 1.8 | 1.9 | 1.9 | < 2.5 | 1.9 | <2.4 | < 1.3 |
| pH, Field | SU | 7.0 | 6.8 | 6.8 | 6.9 | 6.9 | 6.8 | 6.7 | 6.8 |
| Sulfate | mg/L | 670 | 700 | 1,900 | 1,900 | 2,200 | 1,900 | 3,400 | 1,100 |
| Total Dissolved Solids | mg/L | 1,400 | 1,500 | 3,200 | 3,000 | 8,400 | 3,100 | 27,000 | 5,000 |

**Notes:**

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NC - no criteria.

All metals were analyzed as total unless otherwise specified.

Table 3
Summary of Field Data – September 2017
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, 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-101 | 9/20/2017 | 0.14 | -178.2 | 7.0 | 1,824 | 13.07 | 20.2 |
| MW-102 | 9/20/2017 | 0.42 | -108.7 | 6.8 | 2,097 | 15.04 | 0.26 |
| MW-103 | 9/20/2017 | 0.18 | -335.4 | 6.8 | 3,577 | 13.05 | 0.82 |
| MW-104 | 9/20/2017 | 0.12 | -285.4 | 6.9 | 3,426 | 13.76 | 0.84 |
| MW-105 | 9/21/2017 | 0.18 | -137.7 | 6.9 | 13,805 | 14.02 | 0.48 |
| MW-106 | 9/20/2017 | 0.49 | -319.2 | 6.8 | 3,414 | 15.83 | 3.60 |
| MW-107 | 9/20/2017 | 0.51 | -298.2 | 6.7 | 50,326 | 16.81 | 1.56 |
| MW-108A | 9/21/2017 | 0.36 | 28.1 | 6.8 | 7,572 | 13.85 | 4.87 |

**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 – September 2017
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-101 | | MW-102 | | MW-103 | | MW-104 | | MW-105 | | MW-106 | | MW-107 | | MW-108A | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 9/20/2017 | | 9/20/2017 | | 9/20/2017 | | 9/20/2017 | | 9/21/2017 | | 9/20/2017 | | 9/20/2017 | | 9/21/2017 | |
| Constituent | Unit | Data | PL | Data | PL | Data | PL | Data | PL | Data | PL | Data | PL | Data | PL | Data | PL |
| **Appendix III** | | | | | | | | | | | | | | | | | |
| Boron | ug/L | 280 | 280 | 130 | 200 | 760 | 810 | 760 | 970 | 2,500 | 2,600 | **1,000** | 810 | 1,500 | 1,500 | 1,400 | 1,400 |
| Calcium | ug/L | 230,000 | 270,000 | 260,000 | 310,000 | 560,000 | 630,000 | 470,000 | 530,000 | 700,000 | 830,000 | 560,000 | 650,000 | 1,300,000 | 1,500,000 | 420,000 | 470,000 |
| Chloride | mg/L | 120 | 200 | 170 | 270 | 150 | 160 | 250 | 800 | 4,300 | 4,800 | **140** | 130 | 20,000 | 21,000 | **2,100** | 1,900 |
| Fluoride | mg/L | 2.0 | 2.1 | 1.8 | 1.9 | 1.9 | 2.1 | 1.9 | 2.8 | < 2.5 | 5.8 | 1.9 | 3.0 | <2.4 | 2.5 | < 1.3 | 2.5 |
| pH, Field | SU | 7.0 | 6.8 - 7.8 | 6.8 | 6.5 - 7.6 | 6.8 | 6.7 - 7.6 | 6.9 | 6.8 - 7.9 | 6.9 | 6.6 - 7.9 | 6.8 | 6.5 - 7.6 | 6.7 | 6.5 - 7.6 | 6.8 | 6.7 - 6.9 |
| Sulfate | mg/L | 670 | 740 | 700 | 770 | 1,900 | 2,100 | 1,900 | 1,900 | **2,200** | 2,000 | 1,900 | 2,100 | 3,400 | 3,800 | 1,100 | 1,100 |
| Total Dissolved Solids | mg/L | 1,400 | 1,400 | 1,500 | 1,800 | 3,200 | 3,700 | 3,000 | 4,100 | 8,400 | 9,700 | 3,100 | 3,200 | 27,000 | 41,000 | **5,000** | 4,900 |

**Notes:**

ug/L - micrograms per liter.

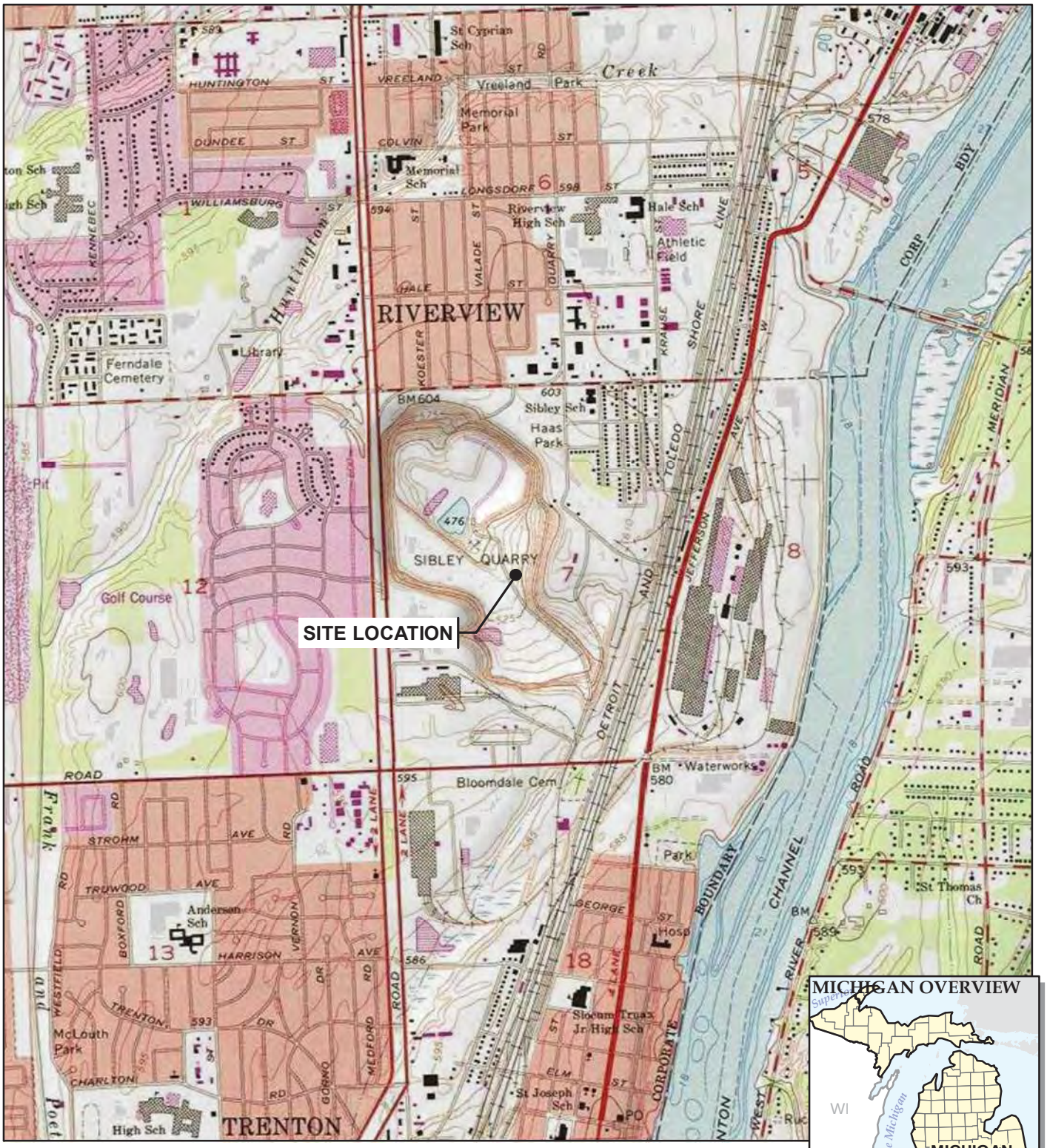
mg/L - milligrams per liter.

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**
**SIBLEY QUARRY LANDFILL**
**801 FORT STREET**
**TRENTON, MICHIGAN**

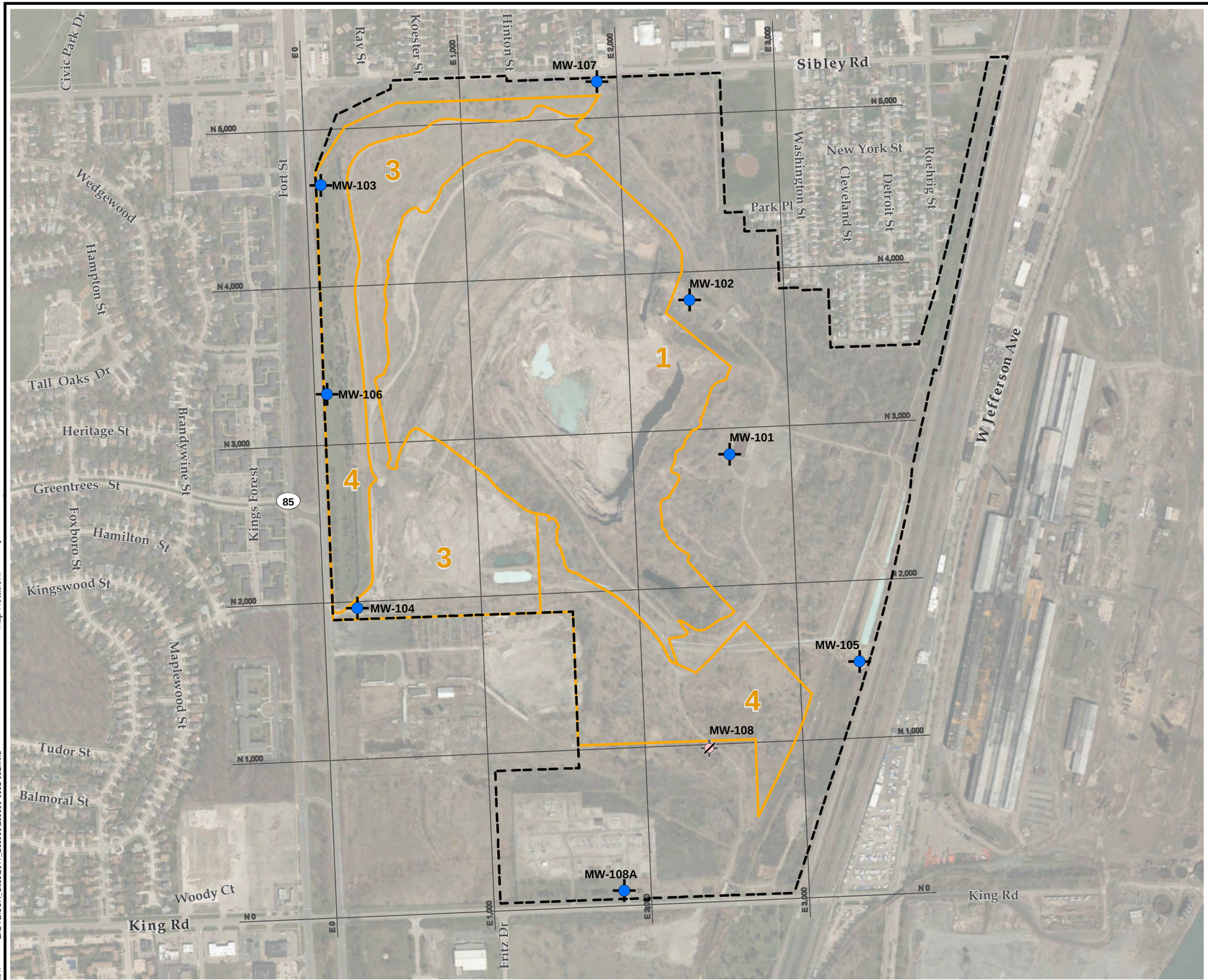
TITLE:

## SITE LOCATION MAP

| | |
|---|---|
| DRAWN BY: | J. PAPEZ |
| CHECKED BY: | S HOLMSTROM |
| APPROVED BY: | V. BUENING |
| DATE: | OCTOBER 2017 |
| PROJ. NO.: | 265996.0002 |
| FILE: | 265996-SLMMB.mxd |

**FIGURE 1**

E:\DTE\CCR_Sites\2017_265996\265996-SLMMB.mxd -- Saved By: BDEEGAN on 10/12/2017, 09:36:23 AM




## LEGEND

- MONITORING WELLS
- DECOMMISSIONED MONITORING WELL
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 FILL AREA DESIGNATION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANUARY 2017.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY LANDFILL**
**801 FORT STREET**
**TRENTON, MICHIGAN**

TITLE:
# MONITORING NETWORK AND SITE PLAN

| | | | |
|---|---|---|---|
| DRAWN BY: | SUEMNICHT R | PROJ NO.: | 254222.0002 |
| CHECKED BY: | S HOLMSTROM | | |
| APPROVED BY: | BUENING V | | **FIGURE 2** |
| DATE: | JANUARY 2018 | | |

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

FILE NO.: 265996-0002-002.mxd

Plot Date: 1/16/2018, 11:31:11 AM by SMAJOR -- LAYOUT: ANSI B (11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS


## LEGEND

- MONITORING
- DECOMMISSIONED MONITORING WELL
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANURARY 2017.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP SEPTEMBER 2017

| | | | |
|---|---|---|---|
| DRAWN BY: | S. MAJOR | PROJ NO.: | 265996.0002 |
| 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.: 265996-0002-013.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/15/2018, 09:50:15 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-013.mxd

# Appendix A
# Background Data

Table 1
Groundwater Elevation Summary
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Well ID | MW-101 | | MW-102 | | MW-103 | | MW-104 | | MW-105 | | MW-106 | | MW-107 | | MW-108 [(1)] | | MW-108A | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Installed | 7/14/2015 | | 7/16/2015 | | 7/15/2015 | | 7/16/2015 | | 3/30/2016 | | 3/28/2016 | | 4/6/2016 | | 3/29/2016 | | 1/24/2017 | |
| TOC Elevation | 617.67 | | 615.03 | | 607.23 | | 608.39 | | 593.28 | | 606.75 | | 610.03 | | 602.96 | | 594.06 | |
| Geologic Unit of Screened Interval | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Limestone Bedrock | | Sandstone Bedrock | |
| Bottom of Open Hole Elevation | 295.2 | | 342.6 | | 294.7 | | 296.0 | | 290.7 | | 304.0 | | 336.5 | | 300.2 | | 290.5 | |
| Unit | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft | ft BTOC | ft |
| Measurement Date | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation | Depth to Water | GW Elevation |
| 8/10/2016 | 178.59 | 439.08 | 210.10 | 404.93 | 178.00 | 429.23 | 117.20 | 491.19 | 22.36 | 570.92 | 115.45 | 491.30 | 156.81 | 453.22 | 83.50 | 519.46 | Not installed | |
| 9/28/2016 | 178.25 | 439.42 | 211.08 | 403.95 | 180.40 | 426.83 | 73.92 | 534.47 | 22.50 | 570.78 | 190.50 | 416.25 | 156.70 | 453.33 | 83.40 | 519.56 | | |
| 11/16/2016 | 178.30 | 439.37 | 210.38 | 404.65 | 180.10 | 427.13 | 120.15 | 488.24 | 22.00 | 571.28 | 190.78 | 415.97 | 156.80 | 453.23 | 83.35 | 519.61 | | |
| 1/18/2017 | 178.34 | 439.33 | 206.64 | 408.39 | 178.68 | 428.55 | 119.80 | 488.59 | 21.08 | 572.20 | 190.46 | 416.29 | 156.96 | 453.07 | 81.40 | 521.56 | | |
| 2/1/2017 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | Decommissioned | | 55.10 | 538.96 |
| 3/8/2017 | 178.21 | 439.46 | 208.53 | 406.50 | 177.49 | 429.74 | 120.54 | 487.85 | 21.35 | 571.93 | 190.01 | 416.74 | 156.56 | 453.47 | | | 55.18 | 538.88 |
| 4/4/2017 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | | | 55.10 | 538.96 |
| 4/24/2017 | 178.10 | 439.57 | 208.71 | 406.32 | 180.18 | 427.05 | 120.85 | 487.54 | 20.58 | 572.70 | 189.60 | 417.15 | 156.86 | 453.17 | | | 55.11 | 538.95 |
| 5/16/2017 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | | | 55.12 | 538.94 |
| 6/14/2017 | 178.33 | 439.34 | 209.57 | 405.46 | 175.08 | 432.15 | 120.80 | 487.59 | 22.55 | 570.73 | 188.88 | 417.87 | 156.80 | 453.23 | | | 55.13 | 538.93 |
| 7/6/2017 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | | | 55.10 | 538.96 |
| 7/19/2017 | 178.40 | 439.27 | 209.98 | 405.05 | 179.85 | 427.38 | 120.91 | 487.48 | 22.63 | 570.65 | 188.32 | 418.43 | 157.00 | 453.03 | | | 55.13 | 538.93 |

**Notes:**

Elevations are reported in feet realative to the national geodetic vertical datum of 1929.

ft BTOC - feet below top of casing

NM - Not Measured

1) MW-108 was decomissioned on 1/25/2017.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-101 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/10/2016 | 9/29/2016 | 11/16/2016 | 1/19/2017 | 3/9/2017 | 4/24/2017 | 6/15/2017 | 7/20/2017 |
| Constituent | Unit | | | | | | | | |
| **Appendix III** | | | | | | | | | |
| Boron | ug/L | 230 | 200 | 240 | 220 | 240 | 260 | 250 | 270 |
| Calcium | ug/L | 270,000 | 220,000 | 220,000 | 220,000 | 210,000 | 230,000 | 210,000 | 230,000 |
| Chloride | mg/L | 95 | 97 | 160 | 31 | 150 | 170 | 140 | 130 |
| Fluoride | mg/L | 1.6 | 1.8 | 1.8 | 0.34 | 1.6 | 1.9 | 1.9 | 1.9 |
| pH | SU | 7.0 | 7.1 | 7.2 | 7.0 | 7.0 | 7.0 | 7.2 | 7.1 |
| Sulfate | mg/L | 680 | 680 | 560 | 110 | 580 | 480 | 540 | 590 |
| Total Dissolved Solids | mg/L | 1,400 | 1,300 | 1,200 | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 |
| **Appendix IV** | | | | | | | | | |
| Antimony | ug/L | 2.1 | < 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 |
| Barium | ug/L | 17 | 22 | 32 | 32 | 26 | 33 | 28 | 21 |
| Beryllium | ug/L | < 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 |
| Chromium | ug/L | < 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 |
| Fluoride | mg/L | 1.6 | 1.8 | 1.8 | 0.34 | 1.6 | 1.9 | 1.9 | 1.9 |
| Lead | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Lithium | ug/L | 18 | 18 | 20 | 21 | 20 | 20 | 18 | 21 |
| Mercury | ug/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Molybdenum | ug/L | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| Radium-226 | pCi/L | 1.87 | 1.43 | 1.21 | 1.21 | 1.57 | 1.40 | 1.35 | 1.25 |
| Radium-226/228 | pCi/L | 1.89 | 1.12 | 1.56 | 1.31 | 1.82 | 1.78 | 1.46 | 1.69 |
| Radium-228 | pCi/L | < 0.450 | < 0.622 | < 0.356 | < 0.404 | < 0.347 | < 0.383 | < 0.332 | 0.445 |
| Selenium | ug/L | < 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 |

**Notes:**
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-102 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/11/2016 | 9/29/2016 | 9/29/2016 | 11/16/2016 | 1/19/2017 | 3/9/2017 | 4/24/2017 | 6/15/2017 | 7/19/2017 | 8/24/2017 |
| Constituent | Unit | | | Field Dup | | | | | | | |
| **Appendix III** | | | | | | | | | | | |
| Boron | ug/L | 94 | 83 | 87 | 130 | 140 | 130 | 150 | 150 | 130 | NA |
| Calcium | ug/L | 300,000 | 270,000 | 280,000 | 280,000 | 230,000 | 230,000 | 260,000 | 270,000 | 270,000 | NA |
| Chloride | mg/L | 160 | 120 | 130 | 160 | 230 | 220 | 260 | 190 | 170 | 150 |
| Fluoride | mg/L | 1.5 | 1.6 | 1.6 | 1.5 | 1.1 | 1.2 | 1.5 | 1.7 | 1.8 | 1.5 |
| pH | SU | 6.9 | 7.0 | 6.9 | 7.0 | 6.9 | 7.2 | 7.0 | 6.9 | 6.9 | NA |
| Sulfate | mg/L | 680 | 610 | 670 | 660 | 410 | 520 | 450 | 610 | 650 | 620 |
| Total Dissolved Solids | mg/L | 1,700 | 1,500 | 1,500 | 1,500 | 1,300 | 1,600 | 1,500 | 1,600 | 1,600 | NA |
| **Appendix IV** | | | | | | | | | | | |
| Antimony | ug/L | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | NA |
| Arsenic | ug/L | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | NA |
| Barium | ug/L | 8.5 | 6.6 | 6.5 | 8.2 | 30 | 17 | 46 | 18 | 10 | NA |
| Beryllium | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Cadmium | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Chromium | ug/L | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | NA |
| Cobalt | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Fluoride | mg/L | 1.5 | 1.6 | 1.6 | 1.5 | 1.1 | 1.2 | 1.5 | 1.7 | 1.8 | 1.5 |
| Lead | ug/L | < 1.0 | 4.7 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Lithium | ug/L | 20 | 19 | 24 | 21 | 18 | 19 | 21 | 22 | 25 | NA |
| Mercury | ug/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | NA |
| Molybdenum | ug/L | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | 20 | 11 | < 10 | NA |
| Radium-226 | pCi/L | 2.14 | 2.43 | 2.43 | 2.50 | 1.49 | 1.91 | 1.44 | 2.23 | 1.83 | NA |
| Radium-226/228 | pCi/L | 2.48 | 2.50 | 2.69 | 2.67 | 1.84 | 1.88 | 1.64 | 2.27 | 2.28 | NA |
| Radium-228 | pCi/L | < 0.429 | < 0.406 | < 0.463 | < 0.368 | < 0.684 | < 0.323 | < 0.405 | < 0.303 | 0.443 | NA |
| Selenium | ug/L | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | NA |
| Thallium | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | NA |

**Notes:**
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-103 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/11/2016 | 9/28/2016 | 11/17/2016 | 1/18/2017 | 3/8/2017 | 4/24/2017 | 6/14/2017 | 7/19/2017 |
| Constituent | Unit | | | | | | | | |
| **Appendix III** | | | | | | | | | |
| Boron | ug/L | 640 | 610 | 740 | 690 | 700 | 700 | 780 | 740 |
| Calcium | ug/L | 600,000 | 600,000 | 590,000 | 590,000 | 570,000 | 580,000 | 630,000 | 590,000 |
| Chloride | mg/L | 150 | 130 | 150 | 150 | 140 | 140 | 140 | 150 |
| Fluoride | mg/L | 1.6 | 1.7 | 1.5 | 1.6 | 1.5 | 1.9 | 1.9 | 2.0 |
| pH | SU | 6.9 | 7.0 | 7.1 | 7.1 | 7.0 | 7.1 | 7.0 | 7.1 |
| Sulfate | mg/L | 1,900 | 2,100 | 2,000 | 2,000 | 2,000 | 1,800 | 1,900 | 2,000 |
| Total Dissolved Solids | mg/L | 3,400 | 3,200 | 3,200 | 3,200 | 3,600 | 2,900 | 3,000 | 3,300 |
| **Appendix IV** | | | | | | | | | |
| Antimony | ug/L | < 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 |
| Barium | ug/L | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Beryllium | ug/L | < 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 |
| Chromium | ug/L | < 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 |
| Fluoride | mg/L | 1.6 | 1.7 | 1.5 | 1.6 | 1.5 | 1.9 | 1.9 | 2.0 |
| Lead | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Lithium | ug/L | 54 | 50 | 56 | 53 | 54 | 58 | 55 | 58 |
| Mercury | ug/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Molybdenum | ug/L | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| Radium-226 | pCi/L | 16.1 | 14.8 | 12.5 | 13.4 | 12.2 | 10.7 | 12.3 | 12.5 |
| Radium-226/228 | pCi/L | 16.2 | 14.7 | 13.3 | 13.3 | 12.1 | 10.6 | 12.4 | 12.8 |
| Radium-228 | pCi/L | < 0.484 | < 0.381 | 0.861 | < 0.651 | < 0.353 | < 0.365 | < 0.314 | < 0.420 |
| Selenium | ug/L | < 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 |

**Notes:**
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-104 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/11/2016 | 9/29/2016 | 11/17/2016 | 1/18/2017 | 3/8/2017 | 4/24/2017 | 6/14/2017 | 7/19/2017 | 7/19/2017 |
| Constituent | Unit | | | | | | | | | Field Dup |
| **Appendix III** | | | | | | | | | | |
| Boron | ug/L | 680 | 650 | 950 | 900 | 710 | 700 | 740 | 730 | 740 |
| Calcium | ug/L | 500,000 | 450,000 | 520,000 | 500,000 | 480,000 | 500,000 | 500,000 | 490,000 | 480,000 |
| Chloride | mg/L | 330 | 300 | 600 | 690 | 250 | 220 | 220 | 240 | 240 |
| Fluoride | mg/L | 2.7 | 1.5 | 1.2 | 1.3 | 1.3 | 1.8 | 1.8 | 1.8 | 1.8 |
| pH | SU | 7.1 | 7.2 | 7.3 | 7.2 | 7.2 | 7.1 | 7.1 | 7.3 | 7.3 |
| Sulfate | mg/L | 1,700 | 1,800 | 1,800 | 1,800 | 1,800 | 1,700 | 1,700 | 1,800 | 1,800 |
| Total Dissolved Solids | mg/L | 3,300 | 2,700 | 3,800 | 3,800 | 3,300 | 2,700 | 2,900 | 3,000 | 3,000 |
| **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 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Barium | ug/L | 7.2 | 7.7 | 9.5 | 9.6 | 7.2 | 7.4 | 7.3 | 7.0 | 6.9 |
| 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 | < 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 |
| Fluoride | mg/L | 2.7 | 1.5 | 1.2 | 1.3 | 1.3 | 1.8 | 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 |
| Lithium | ug/L | 55 | 53 | 77 | 78 | 54 | 57 | 51 | 57 | 58 |
| Mercury | ug/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Molybdenum | ug/L | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| Radium-226 | pCi/L | 0.836 | 0.787 | 0.491 | 0.682 | 0.620 | 0.556 | 0.607 | 0.486 | 0.502 |
| Radium-226/228 | pCi/L | 0.814 | 0.935 | 0.739 | 0.671 | 0.473 | 0.560 | < 0.399 | 0.726 | 0.600 |
| Radium-228 | pCi/L | < 0.428 | < 0.396 | < 0.391 | < 0.511 | < 0.368 | < 0.351 | < 0.399 | < 0.344 | < 0.395 |
| 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.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-105 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/10/2016 | 9/28/2016 | 11/16/2016 | 11/16/2016 | 1/19/2017 | 1/19/2017 | 3/8/2017 | 3/8/2017 | 4/24/2017 | 4/24/2017 | 6/14/2017 | 6/14/2017 | 7/20/2017 |
| Constituent | Unit | | | | Field Dup | | Field Dup | | Field Dup | | Field Dup | | Field Dup | |
| **Appendix III** | | | | | | | | | | | | | | |
| Boron | ug/L | 2,500 | 2,200 | 2,400 | 2,300 | 2,000 | 2,000 | 2,000 | 1,900 | 1,900 | 1,900 | 2,200 | 2,300 | 2,400 |
| Calcium | ug/L | 800,000 | 740,000 | 700,000 | 670,000 | 680,000 | 640,000 | 680,000 | 650,000 | 620,000 | 660,000 | 770,000 | 730,000 | 730,000 |
| Chloride | mg/L | 4,300 | 4,500 | 4,000 | 4,000 | 3,700 | 3,700 | 3,700 | 3,400 | 2,800 | 2,900 | 3,500 | 3,600 | 3,900 |
| Fluoride | mg/L | 5.8 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 |
| pH | SU | 7.0 | 7.1 | 7.0 | 7.1 | 7.0 | 7.1 | 7.0 | 7.0 | 7.0 | 6.9 | 6.8 | 6.9 | 7.0 |
| Sulfate | mg/L | 2,000 | 1,900 | 1,900 | 2,000 | 1,800 | 1,800 | 1,800 | 1,700 | 1,500 | 1,600 | 1,900 | 1,900 | 2,000 |
| Total Dissolved Solids | mg/L | 9,100 | 9,500 | 7,900 | 8,200 | 8,200 | 8,000 | 8,500 | 8,600 | 7,600 | 7,600 | 8,300 | 8,400 | 8,400 |
| **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 | 40 | 43 | 41 | 40 | 40 | 39 | 36 | 36 | 35 | 34 | 38 | 38 | 39 |
| 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 | 1.2 | 1.1 | 1.1 | 1.1 | < 1.0 |
| Fluoride | mg/L | 5.8 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 |
| 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 | 370 | 230 | 240 | 250 | 240 | 250 | 220 | 220 | 220 | 220 | 240 | 240 | 290 |
| 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 | 40 | 40 | 30 | 31 | 26 | 27 | 23 | 24 | 24 | 25 | 28 | 28 | 31 |
| Radium-226 | pCi/L | 2.14 | 2.30 | 1.40 | 1.64 | 0.971 | 0.771 | 0.948 | 1.10 | 0.878 | 0.829 | 1.45 | 1.11 | 1.54 |
| Radium-226/228 | pCi/L | 2.76 | 3.05 | 1.97 | 2.09 | 1.50 | 1.82 | 1.10 | 1.55 | 1.24 | 1.02 | 1.75 | 1.48 | 2.47 |
| Radium-228 | pCi/L | 0.615 | 0.746 | 0.564 | < 0.527 | < 0.607 | 1.05 | < 0.364 | 0.459 | < 0.401 | < 0.371 | < 0.310 | < 0.409 | 0.927 |
| 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.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-106 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/11/2016 | 9/28/2016 | 11/17/2016 | 1/18/2017 | 3/9/2017 | 4/24/2017 | 6/14/2017 | 7/19/2017 | 8/24/2017 |
| Constituent | Unit | | | | | | | | | |
| **Appendix III** | | | | | | | | | | |
| Boron | ug/L | 580 | 610 | 750 | 670 | 650 | 670 | 710 | 790 | 680 |
| Calcium | ug/L | 560,000 | 570,000 | 620,000 | 600,000 | 580,000 | 600,000 | 620,000 | 570,000 | 510,000 |
| Chloride | mg/L | 120 | 100 | 120 | 110 | 110 | 110 | 110 | 120 | 110 |
| Fluoride | mg/L | 3.0 | 1.7 | 1.6 | 1.5 | 1.4 | 1.8 | 1.8 | 1.9 | 1.8 |
| pH | SU | 6.9 | 7.1 | 7.1 | 7.3 | 7.0 | 7.3 | 7.1 | 7.3 | 7.0 |
| Sulfate | mg/L | 1,900 | 2,000 | 2,000 | 2,100 | 2,000 | 1,800 | 1,900 | 1,900 | 2,000 |
| Total Dissolved Solids | mg/L | 3,100 | 3,100 | 3,200 | 3,200 | 3,100 | 6,100 | 3,100 | 3,000 | 2,800 |
| **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 | 78 | 68 | 350 | 32 | 330 | 480 | 2,000 | 42 |
| Barium | ug/L | < 5.0 | 6.1 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | 5.0 | 13 | < 5.0 |
| 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 | < 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 |
| Fluoride | mg/L | 3.0 | 1.7 | 1.6 | 1.5 | 1.4 | 1.8 | 1.8 | 1.9 | 1.8 |
| Lead | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Lithium | ug/L | 47 | 51 | 47 | 51 | 48 | 52 | 49 | 61 | 41 |
| Mercury | ug/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Molybdenum | ug/L | < 10 | 38 | 25 | 19 | < 10 | 11 | 22 | 120 | < 10 |
| Radium-226 | pCi/L | 17.8 | 18.7 | 15.0 | 13.9 | 13.1 | 12.4 | 13.4 | 11.9 | NA |
| Radium-226/228 | pCi/L | 17.8 | 18.7 | 15.4 | 14.3 | 13.3 | 12.8 | 13.3 | 12.6 | NA |
| Radium-228 | pCi/L | < 0.387 | < 0.422 | < 0.411 | < 0.509 | < 0.376 | 0.356 | < 0.388 | 0.638 | NA |
| 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.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-107 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 8/10/2016 | 8/10/2016 | 9/29/2016 | 11/16/2016 | 1/18/2017 | 3/9/2017 | 4/26/2017 | 6/15/2017 | 7/19/2017 | 8/24/2017 |
| Constituent | Unit | | Field Dup | | | | | | | | |
| **Appendix III** | | | | | | | | | | | |
| Boron | ug/L | 1,200 | 1,200 | 1,100 | 1,300 | 1,300 | 1,200 | 1,300 | 1,400 | 1,400 | NA |
| Calcium | ug/L | 1,300,000 | 1,300,000 | 1,200,000 | 1,300,000 | 1,200,000 | 1,300,000 | 1,400,000 | 1,400,000 | 1,400,000 | NA |
| Chloride | mg/L | 19,000 | 19,000 | 18,000 | 18,000 | 18,000 | 16,000 | 19,000 | 17,000 | 20,000 | NA |
| Fluoride | mg/L | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | 2.1 | <2.4 | <2.4 | 2.3 |
| pH | SU | 7.0 | 7.1 | 7.1 | 7.1 | 7.3 | 6.9 | 7.0 | 6.9 | 7.0 | NA |
| Sulfate | mg/L | 3,100 | 3,000 | 3,100 | 3,200 | 3,300 | 2,900 | 3,200 | 3,800 | 3,400 | NA |
| Total Dissolved Solids | mg/L | 21,000 | 25,000 | 19,000 | 19,000 | 27,000 | 31,000 | 34,000 | 31,000 | 36,000 | NA |
| **Appendix IV** | | | | | | | | | | | |
| Antimony | ug/L | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 10 | < 2.0 | < 2.0 | < 2.0 | NA |
| Arsenic | ug/L | < 5.0 | 5.7 | < 5.0 | < 5.0 | < 5.0 | < 25 | 5.6 | 6.4 | 5.7 | NA |
| Barium | ug/L | 10 | 10 | 9.1 | 9.1 | 9.5 | < 25 | 8.6 | 9.8 | 7.9 | NA |
| Beryllium | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 5.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Cadmium | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 5.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Chromium | ug/L | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 10 | < 2.0 | < 2.0 | < 2.0 | NA |
| Cobalt | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 5.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Fluoride | mg/L | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | 2.1 | <2.4 | <2.4 | 2.3 |
| Lead | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 5.0 | < 1.0 | < 1.0 | < 1.0 | NA |
| Lithium | ug/L | 200 | 140 | 120 | 180 | 210 | 180 | 210 | 190 | 230 | NA |
| Mercury | ug/L | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | < 0.20 | NA |
| Molybdenum | ug/L | < 10 | < 10 | < 10 | < 10 | < 10 | < 50 | 16 | < 10 | < 10 | NA |
| Radium-226 | pCi/L | 54.7 | 52.7 | 51.8 | 46.8 | 41.6 | 49.9 | 40.9 | 42.3 | 35.8 | NA |
| Radium-226/228 | pCi/L | 55.3 | 53.3 | 52.5 | 47.8 | 42.8 | 50.0 | 41.4 | 42.7 | 36.4 | NA |
| Radium-228 | pCi/L | 0.591 | 0.639 | 0.721 | 0.995 | 1.15 | < 0.431 | 0.538 | 0.363 | < 0.804 | NA |
| Selenium | ug/L | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 5.0 | < 25 | 8.0 | < 5.0 | < 5.0 | NA |
| Thallium | ug/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 5.0 | < 1.0 | < 1.0 | < 1.0 | NA |

**Notes:**
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 2
Summary of Analytical Results for Groundwater Samples
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, Michigan

| Sample Location: | | MW-108A | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 2/1/2017 | 2/1/2017 | 3/8/2017 | 4/4/2017 | 4/4/2017 | 4/24/2017 | 5/16/2017 | 5/16/2017 | 6/15/2017 | 7/6/2017 | 7/6/2017 | 7/20/2017 |
| Constituent | Unit | | Field Dup | | | Field Dup | | | Field Dup | | | Field Dup | |
| **Appendix III** | | | | | | | | | | | | | |
| Boron | ug/L | 1,100 | 1,100 | 1,100 | 1,200 | 1,200 | 1,200 | 1,300 | 1,400 | 1,300 | 1,300 | 1,300 | 1,300 |
| Calcium | ug/L | 370,000 | 360,000 | 380,000 | 380,000 | 370,000 | 390,000 | 390,000 | 410,000 | 440,000 | 440,000 | 430,000 | 440,000 |
| Chloride | mg/L | 1,700 | 1,700 | 1,700 | 1,800 | 1,800 | 1,600 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,900 |
| Fluoride | mg/L | < 1.0 | < 1.0 | 1.2 | 1.3 | 1.3 | < 1.3 | 1.1 | 1.1 | < 2.5 | < 1.3 | < 1.3 | 1.1 |
| pH | SU | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.1 | 7.0 | 6.9 | 7.0 | 6.9 | 7.0 |
| Sulfate | mg/L | 940 | 940 | 930 | 1,000 | 990 | 900 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Total Dissolved Solids | mg/L | 4,200 | 4,300 | 4,200 | 4,600 | 4,400 | 4,100 | 4,500 | 4,400 | 4,700 | 4,600 | 4,500 | 4,500 |
| **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 |
| 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 |
| Barium | ug/L | 45 | 43 | 47 | 52 | 52 | 44 | 41 | 43 | 48 | 48 | 46 | 47 |
| 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 |
| 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 |
| Chromium | ug/L | < 2.0 | < 2.0 | 2.9 | 2.6 | 2.5 | 7.1 | 3.3 | 3.1 | 31 | 7.6 | 8.8 | 2.7 |
| 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 |
| Fluoride | mg/L | < 1.0 | < 1.0 | 1.2 | 1.3 | 1.3 | < 1.3 | 1.1 | 1.1 | < 2.5 | < 1.3 | < 1.3 | 1.1 |
| 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 |
| Lithium | ug/L | 120 | 120 | 120 | 120 | 130 | 140 | 110 | 120 | 130 | 140 | 140 | 150 |
| 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 |
| Molybdenum | ug/L | 19 | 19 | 17 | 18 | 18 | 20 | 20 | 20 | 21 | 18 | 17 | 16 |
| Radium-226 | pCi/L | 0.757 | 0.639 | 0.892 | 0.700 | 0.803 | 0.874 | 0.714 | 0.496 | 0.723 | 0.937 | 1.11 | 0.775 |
| Radium-226/228 | pCi/L | 1.02 | 1.34 | 1.78 | 1.36 | 1.48 | 1.38 | 1.28 | 1.03 | 1.38 | 1.20 | 1.68 | 1.93 |
| Radium-228 | pCi/L | < 0.507 | 0.704 | 0.891 | 0.663 | 0.674 | 0.509 | 0.563 | 0.538 | 0.660 | < 0.668 | < 0.622 | 1.16 |
| 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 |
| 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 |

**Notes:**
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units.
pCi/L - picocuries per liter.
NA - not analyzed
All metals were analyzed as total, unless otherwise specified.

Table 3
Summary of Field Parameters
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, 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-101 | 8/10/2016 | 0.78 | -133.1 | 7.00 | 1,306 | 13.59 | 9.75 |
| | 9/29/2016 | 0.67 | -307.0 | 7.79 | 1,950 | 11.82 | 32.7 |
| | 11/16/2016 | 1.51 | 21.2 | 6.91 | 1,404 | 12.62 | 22.3 |
| | 1/19/2017 | 2.62 | 52.5 | 6.79 | 765 | 9.26 | 1.58 |
| | 3/9/2017 | 1.08 | -91.3 | 6.92 | 1,799 | 11.28 | 17.8 |
| | 4/24/2017 | 0.23 | -146.4 | 6.91 | 1,798 | 12.63 | 10.06 |
| | 6/15/2017 | 0.24 | -223.4 | 6.91 | 1,626 | 13.80 | 0.12 |
| | 7/20/2017 | 0.16 | -201.2 | 6.94 | 1,737 | 13.03 | 10.2 |
| MW-102 | 8/11/2016 | 7.00 | 63.3 | 6.49 | 1,652 | 13.21 | 0.23 |
| | 9/29/2016 | 0.76 | -251.0 | 7.56 | 2,300 | 12.95 | 24.0 |
| | 11/16/2016 | 2.09 | 16.8 | 6.79 | 1,688 | 13.18 | 9.09 |
| | 1/19/2017 | 3.97 | 65.6 | 6.74 | 862 | 9.34 | 2.86 |
| | 3/9/2017 | 3.36 | -80.6 | 6.94 | 2,116 | 10.86 | 1.55 |
| | 4/24/2017 | 4.59 | 23.9 | 6.91 | 2,148 | 13.08 | 4.20 |
| | 6/15/2017 | 0.91 | -96.3 | 6.75 | 1,970 | 17.03 | 0.82 |
| | 7/19/2017 | 0.56 | -206.6 | 6.86 | 2,066 | 15.29 | 0.10 |
| | 8/24/2017 | 0.34 | -219.6 | 6.85 | 2,138 | 12.76 | 0.03 |
| MW-103 | 8/11/2016 | 1.23 | -208.8 | 6.67 | 2,714 | 14.04 | 0.07 |
| | 9/28/2016 | 0.98 | -374.0 | 7.58 | 3,640 | 12.27 | 21.4 |
| | 11/17/2016 | 2.63 | -254.0 | 6.75 | 2,638 | 12.05 | 2.58 |
| | 1/18/2017 | 1.44 | -249.6 | 6.70 | 2,576 | 10.22 | 2.10 |
| | 3/8/2017 | 0.32 | -321.6 | 6.77 | 2,461 | 12.25 | 0.69 |
| | 4/24/2017 | 0.37 | -339.7 | 6.77 | 3,344 | 11.56 | 0.41 |
| | 6/14/2017 | 0.37 | -341.4 | 6.70 | 3,423 | 16.73 | 0.64 |
| | 7/19/2017 | 0.24 | -337.2 | 6.73 | 3,378 | 16.46 | 0.31 |
| MW-104 | 8/11/2016 | 1.70 | -196.3 | 6.82 | 2,855 | 14.03 | 4.52 |
| | 9/29/2016 | 0.65 | -327.0 | 7.88 | 4,090 | 13.78 | 23.5 |
| | 11/17/2016 | 2.15 | -257.3 | 6.97 | 3,469 | 13.09 | 18.3 |
| | 1/18/2017 | 0.86 | -239.2 | 6.80 | 3,492 | 11.17 | 1.50 |
| | 3/8/2017 | 0.20 | -302.0 | 6.94 | 2,670 | 12.10 | 1.57 |
| | 4/24/2017 | 0.19 | -325.8 | 6.93 | 3,234 | 12.98 | 0.42 |
| | 6/14/2017 | 0.28 | -315.4 | 6.85 | 3,317 | 17.80 | 2.84 |
| | 7/19/2017 | 0.18 | -321.0 | 6.92 | 3,279 | 16.68 | 0.49 |
| MW-105 | 8/10/2016 | 1.80 | 28.4 | 6.59 | 10,940 | 15.09 | 1.00 |
| | 9/28/2016 | 0.73 | -263.0 | 7.90 | 14,660 | 13.35 | 20.0 |
| | 11/16/2016 | 0.75 | 0.3 | 6.87 | 1,085 | 13.58 | 8.69 |
| | 1/19/2017 | 0.72 | -117.9 | 6.78 | 5,656 | 11.58 | 0.82 |
| | 3/8/2017 | 0.57 | 1.4 | 6.83 | 9,374 | 12.13 | 0.01 |
| | 4/24/2017 | 0.22 | -214.2 | 6.80 | 10,695 | 12.75 | 0.07 |
| | 6/14/2017 | 0.23 | -203.3 | 6.82 | 12,420 | 15.12 | 0.13 |
| | 7/20/2017 | 0.70 | -165.1 | 6.93 | 13,035 | 15.29 | 0.25 |

**Notes:**

mg/L - milligrams per liter.

mV - milliVolt.

SU - standard unit.

umhos/cm - micro-mhos per centimeter.

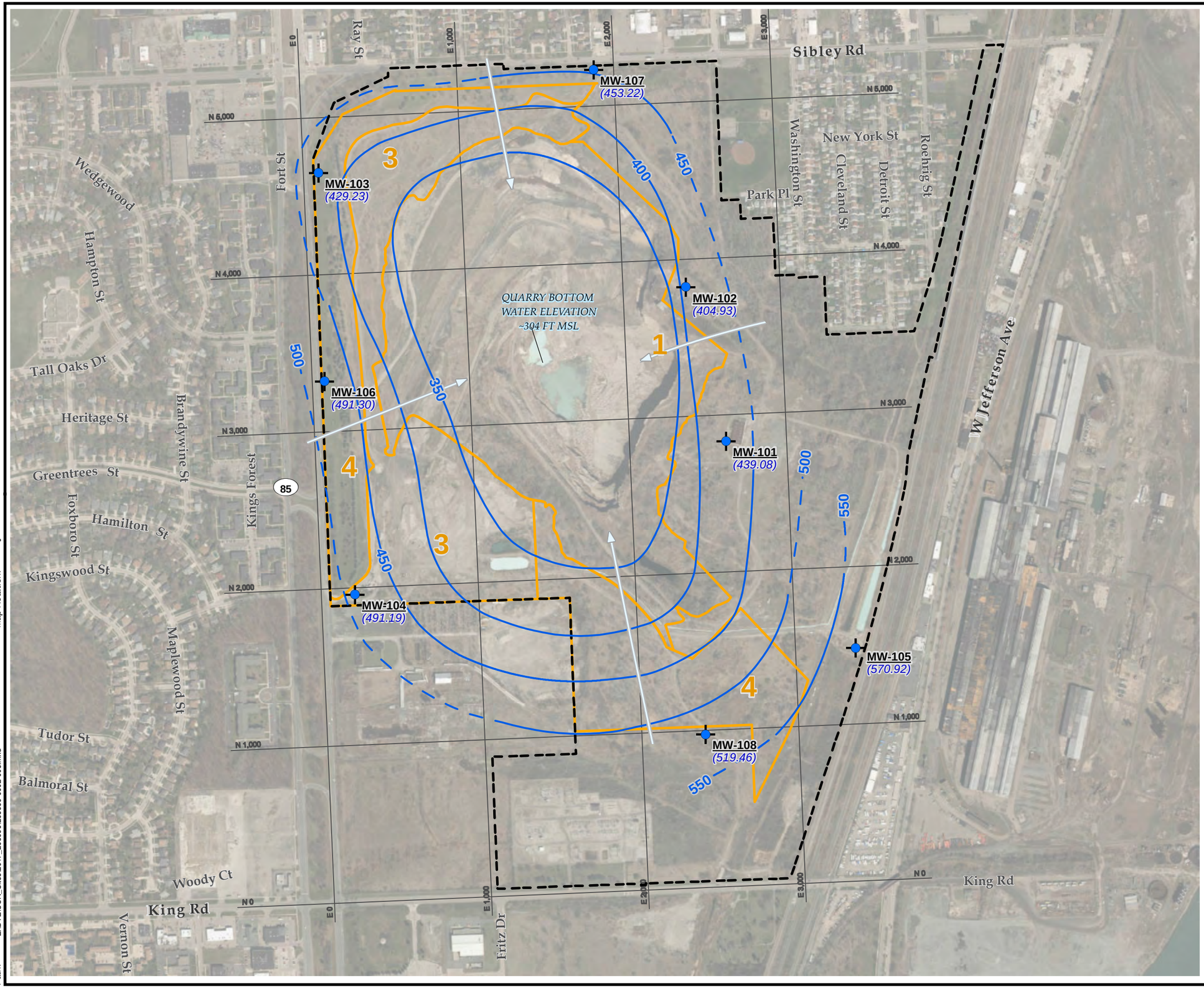
deg C - degrees celcius.

NTU - nephelometric turbidity units.

Table 3
Summary of Field Parameters
Sibley Quarry Landfill – RCRA CCR Monitoring Program
Trenton, 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-106 | 8/11/2016 | 1.50 | -229.9 | 6.67 | 2,596 | 13.77 | 2.19 |
| | 9/28/2016 | 0.77 | -359.0 | 7.59 | 3,500 | 13.43 | 42.9 |
| | 11/17/2016 | 4.61 | -228.4 | 6.48 | 2,598 | 13.15 | 5.15 |
| | 1/18/2017 | 1.88 | -255.7 | 6.73 | 2,456 | 10.03 | 0.92 |
| | 3/9/2017 | 0.35 | -322.1 | 6.84 | 3,236 | 12.32 | 0.41 |
| | 4/24/2017 | 0.73 | -333.4 | 6.80 | 3,194 | 13.31 | 0.77 |
| | 6/14/2017 | 0.61 | -331.3 | 6.75 | 3,278 | 17.71 | 0.74 |
| | 7/19/2017 | 0.45 | -316.1 | 6.81 | 3,224 | 17.29 | 4.33 |
| | 8/24/2017 | 0.33 | -337.6 | 6.82 | 3,398 | 14.54 | 3.28 |
| MW-107 | 8/10/2016 | 1.22 | -268.9 | 6.53 | 36,450 | 18.50 | 0.26 |
| | 9/29/2016 | 0.68 | -317.0 | 7.59 | 4,970 | 14.67 | 27.1 |
| | 11/16/2016 | 1.56 | -244.6 | 6.66 | 3,588 | 11.94 | 0.00 |
| | 1/18/2017 | 2.83 | -291.3 | 6.66 | 34,270 | 9.92 | 3.15 |
| | 3/9/2017 | 0.97 | -295.3 | 6.73 | 41,193 | 7.21 | 2.18 |
| | 4/26/2017 | 0.36 | -309.6 | 6.67 | 48,733 | 14.44 | 0.51 |
| | 6/15/2017 | 0.40 | -304.5 | 6.60 | 45,983 | 15.70 | 0.78 |
| | 7/19/2017 | 0.75 | -311.4 | 6.67 | 49,155 | 16.51 | 0.64 |
| | 8/24/2017 | 0.32 | -332.1 | 6.65 | 51,549 | 14.36 | 0.39 |
| MW-108A | 2/1/2017 | 4.98 | 110.4 | 6.70 | 4,789 | 11.01 | 6.37 |
| | 3/8/2017 | 0.39 | 40.8 | 6.83 | 6,991 | 11.37 | 3.42 |
| | 4/4/2017 | 0.23 | 37.9 | 6.86 | 6,560 | 11.23 | 11.66 |
| | 4/24/2017 | 0.53 | 24.4 | 6.86 | 6,593 | 12.79 | 1.96 |
| | 5/16/2017 | 0.51 | 34.3 | 6.84 | 6,451 | 11.89 | 2.36 |
| | 6/15/2017 | 0.34 | 24.0 | 6.80 | 6,518 | 13.12 | 3.84 |
| | 7/6/2017 | 0.72 | 87.6 | 6.83 | 7,165 | 14.08 | 4.58 |
| | 7/20/2017 | 0.59 | 49.2 | 6.87 | 7,038 | 13.89 | 4.77 |

**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
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015 AND MAY 2016.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT: DTE ELECTRIC COMPANY
SIBLEY QUARRY
801 FORT STREET
TRENTON, MICHIGAN

TITLE: GROUNDWATER POTENTIOMETRIC SURFACE MAP AUGUST 2016

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| CHECKED BY: | C. SCIESZKA | | FIGURE 1 |
| APPROVED BY: | V. BUENING | | |
| DATE: | JANUARY 2018 | | |

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

FILE NO.: 265996-0002-003.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/15/2018, 09:51:47 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-003.mxd


## LEGEND

- MONITORING WELLS
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015 AND MAY 2016.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP SEPTEMBER 2016

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| 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.: 265996-0002-004.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/16/2018, 11:33:59 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-004.mxd


## LEGEND

- MONITORING WELLS
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015 AND MAY 2016.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

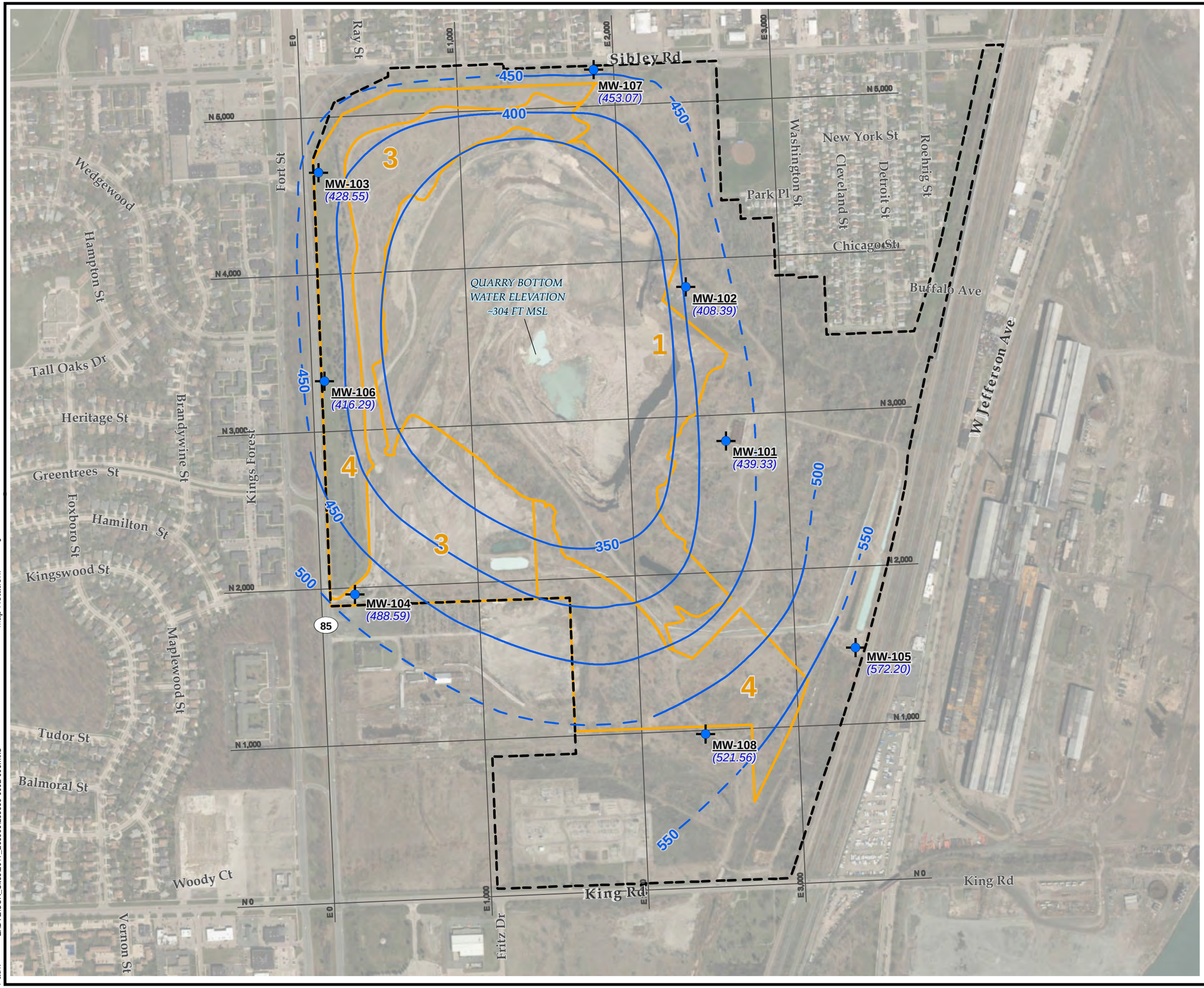
TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP NOVEMBER 2016

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| 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.: 265996-0002-005.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/16/2018, 11:37:39 AM by SMAJOR -- LAYOUT:ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-005.mxd




## LEGEND

- MONITORING WELLS
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANUARY 2017.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT: DTE ELECTRIC COMPANY
SIBLEY QUARRY
801 FORT STREET
TRENTON, MICHIGAN

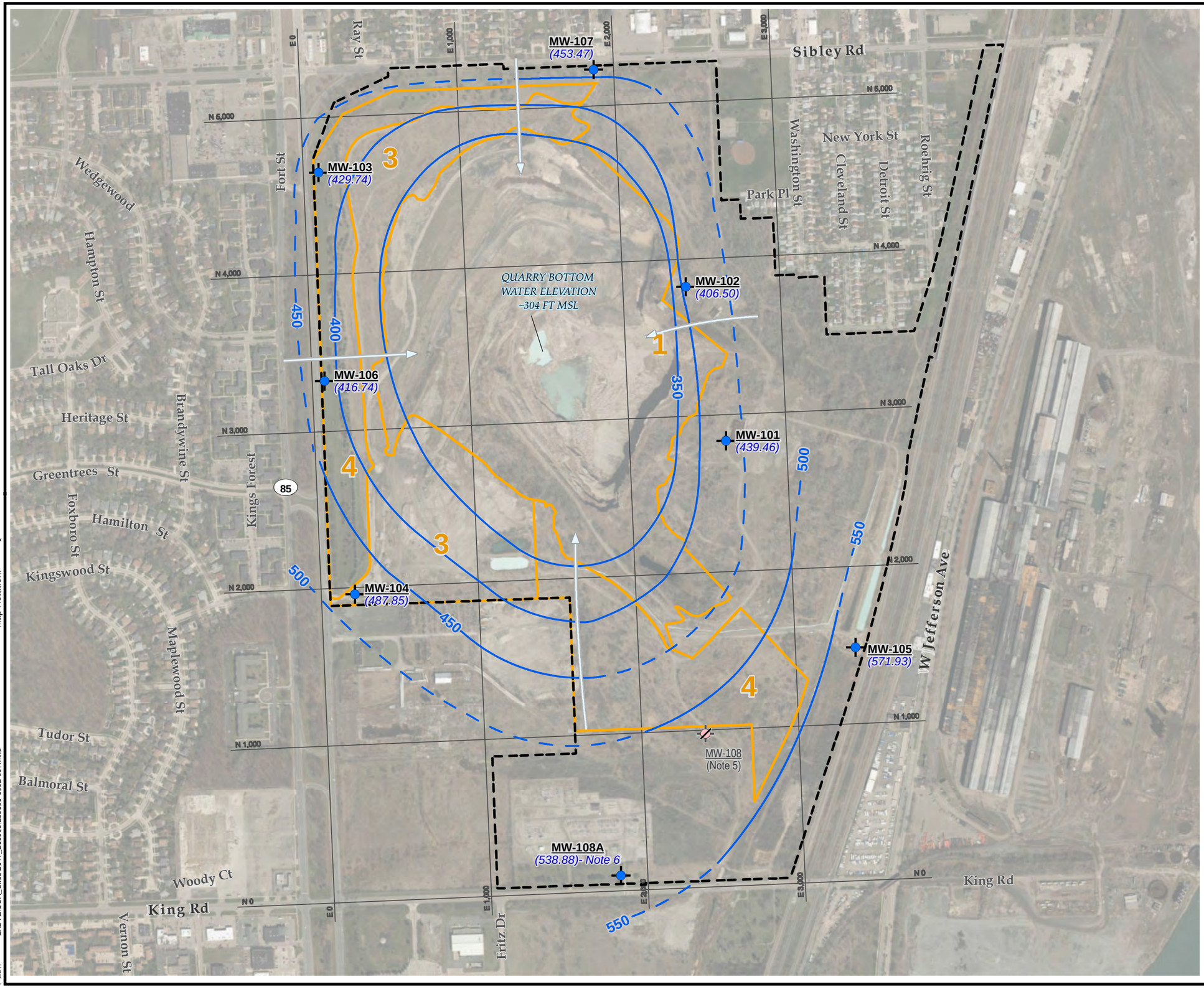
TITLE: GROUNDWATER POTENTIOMETRIC SURFACE MAP JANUARY 2017

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| CHECKED BY: | C. SCIESZKA | | FIGURE 4 |
| APPROVED BY: | V. BUENING | | |
| DATE: | JANUARY 2018 | | |

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

FILE NO.: 265996-0002-006.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/16/2018, 11:39:50 AM by SMAJOR – LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-006.mxd




## LEGEND

- MONITORING WELLS
- DECOMMISSIONED MONITORING WELL
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANUARY 2017.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
5. MONITORING WELL MW-108 WAS DECOMMISSIONED ON 1/25/2017.
6. MONITORING WELL MW-108A WAS INSTALLED ON 1/24/2017.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

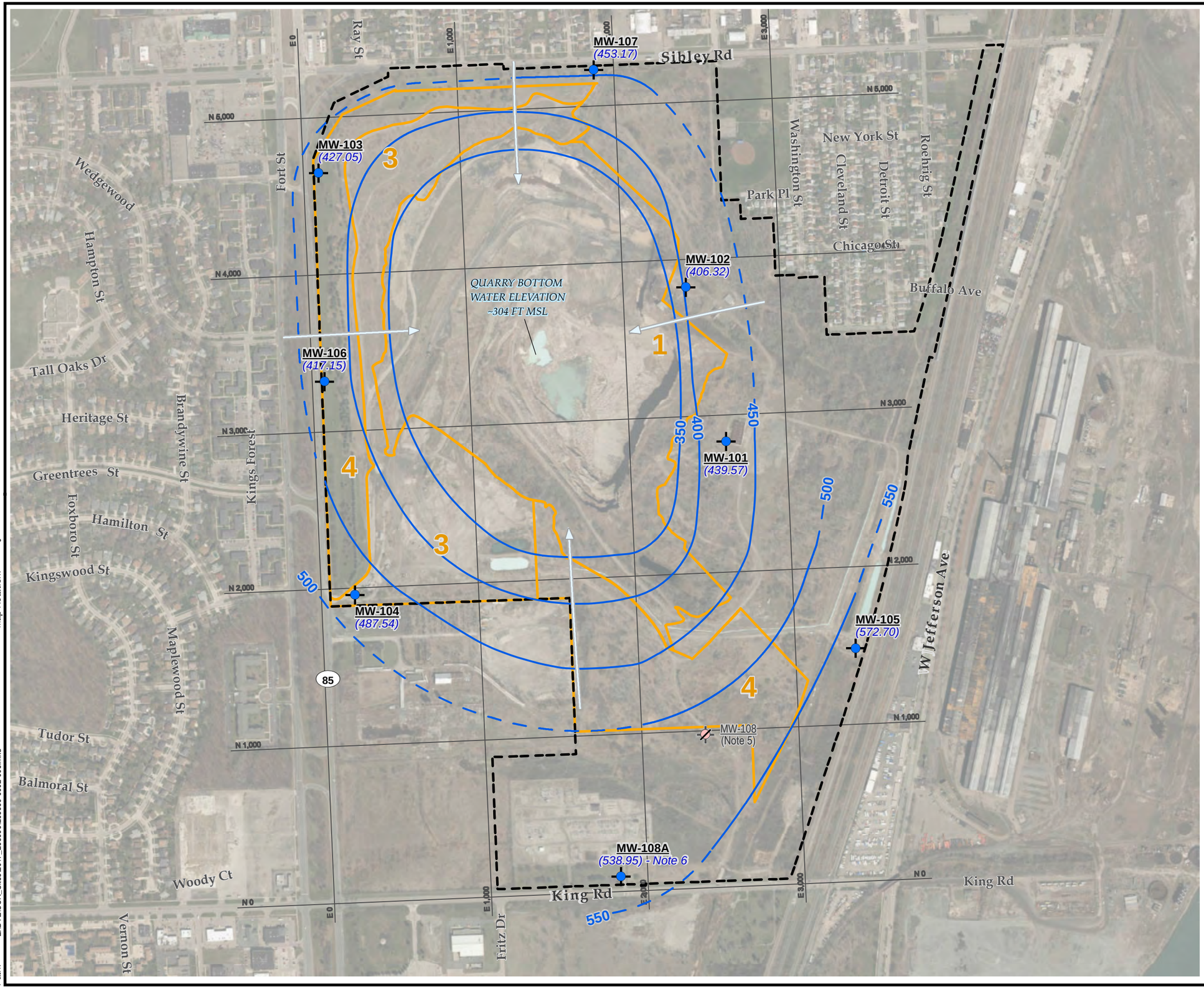
TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP MARCH 2017

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| 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.: 265996-0002-007.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/16/2018, 16:22:23 PM by SMAJOR -- LAYOUT: ANSI B (11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-007.mxd




## LEGEND

- MONITORING WELLS
- DECOMMISSIONED MONITORING WELL
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANURARY 2017.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
5. MONITORING WELL MW-108 WAS DECOMMISSIONED ON 1/25/2017.
6. MONITORING WELL MW-108A WAS INSTALLED ON 1/24/2017.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

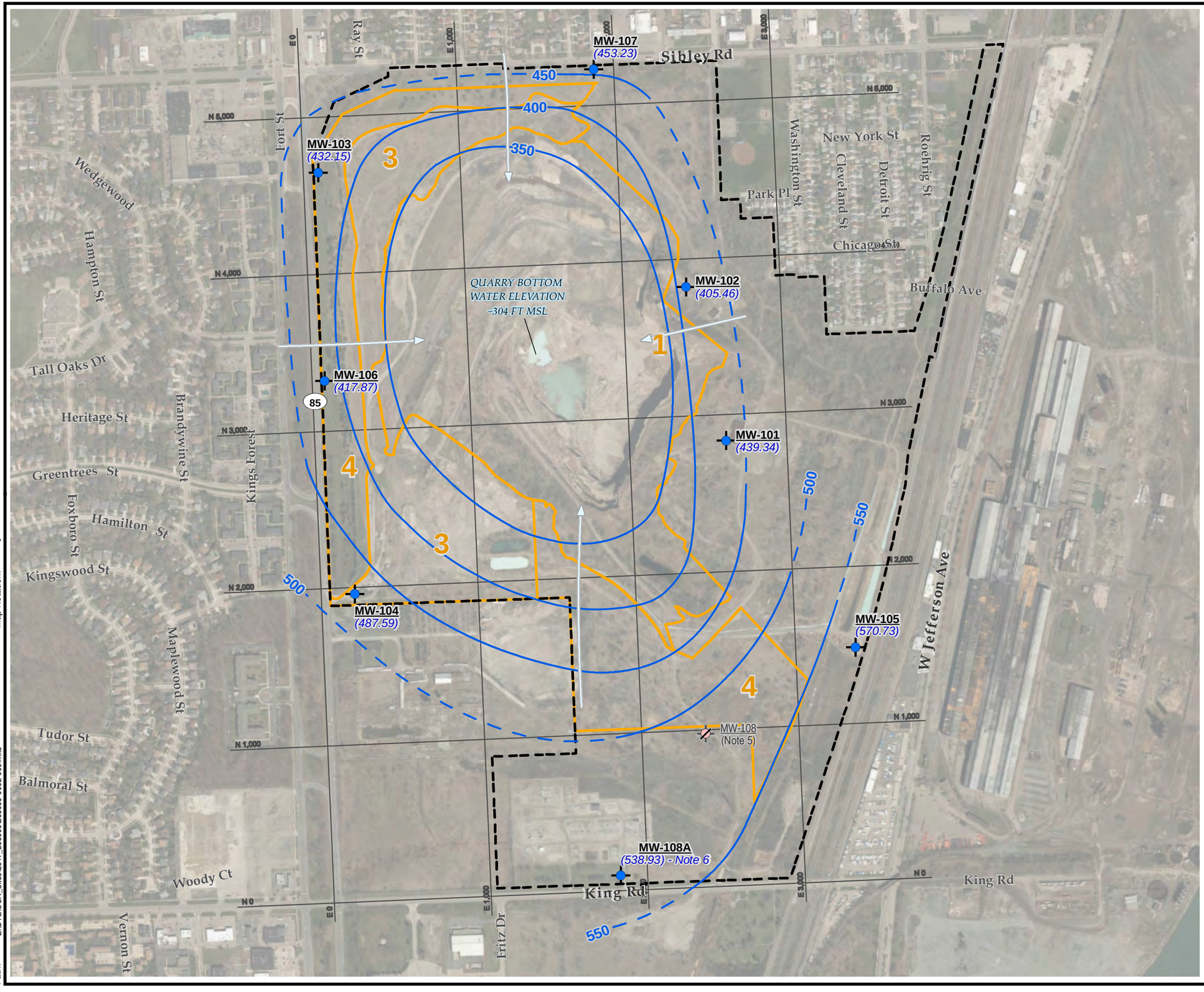
TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP APRIL 2017

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| CHECKED BY: | S. HOLMSTROM | | |
| 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.: 265996-0002-008.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/15/2018, 09:55:43 AM by SMAJOR -- LAYOUT: ANSI B (11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-008.mxd




## LEGEND

- MONITORING WELLS
- DECOMMISSIONED MONITORING WELL
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANURARY 2017.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
5. MONITORING WELL MW-108 WAS DECOMMISSIONED ON 1/25/2017.
6. MONITORING WELL MW-108A WAS INSTALLED ON 1/24/2017.

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

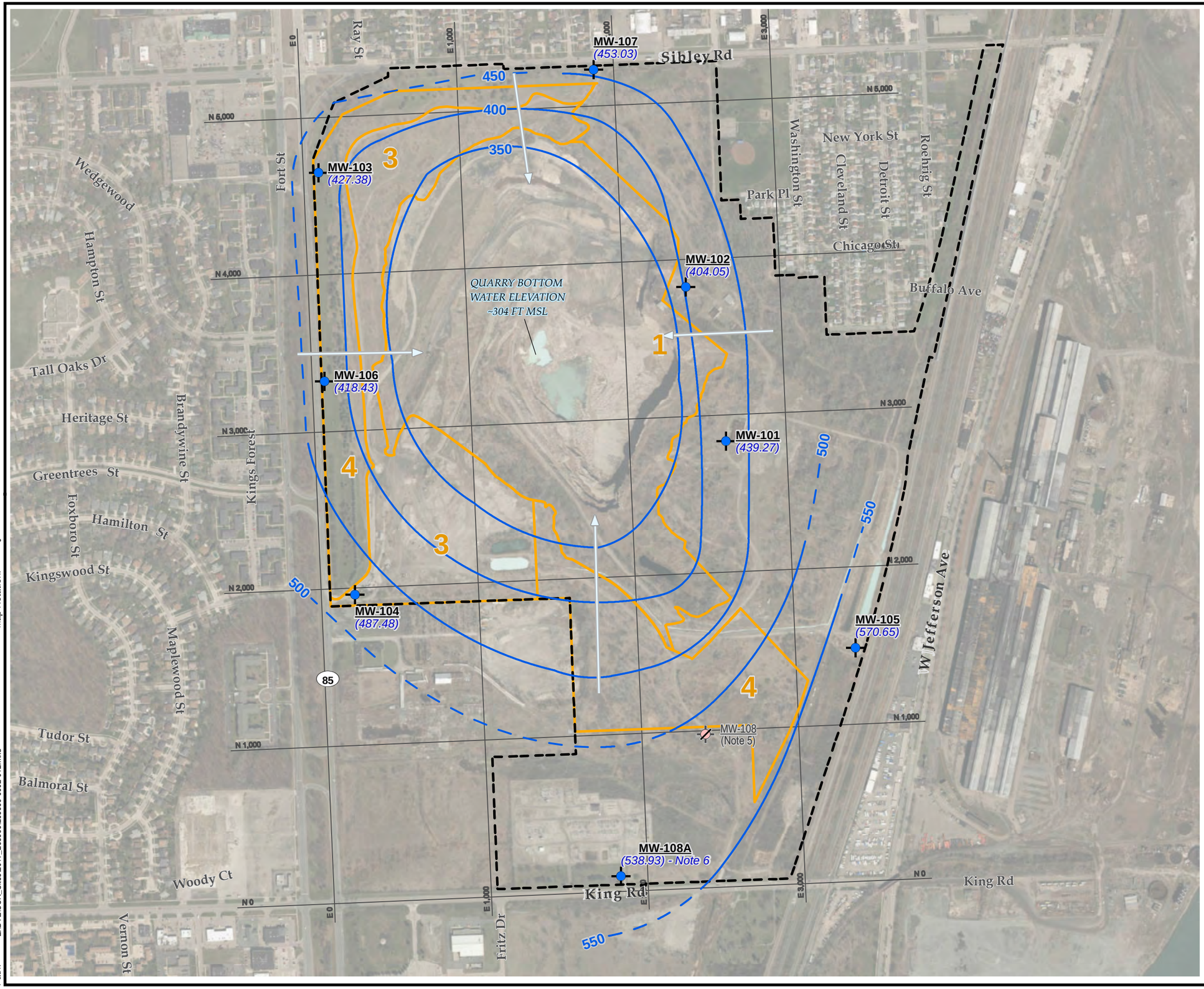
TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP JUNE 2017

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| 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.: 265996-0002-009.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/29/2018, 08:50:04 AM by SMAJOR -- LAYOUT: ANSI B (11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-009.mxd




## LEGEND

- MONITORING WELLS
- DECOMMISSIONED MONITORING WELL
- SIBLEY QUARRY PROPERTY LINE
- SOLID WASTE DISPOSAL AREA BOUNDARY
- 1 — FILL AREA DESIGNATION
- (439.08) — GROUNDWATER ELEVATION (FT NGVD 1929)
- POTENTIOMETRIC SURFACE CONTOUR (50-FT INTERVAL, DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

## NOTES

1. BASE MAP IMAGERY FROM ESRI/MICROSOFT, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2011.
2. SITE LAYOUT INFORMATION FROM GEOREFERENCED CAD FILE. FEATURES ARE APPROXIMATE.
3. SURVEY PERFORMED BY THE DTE SURVEY GROUP IN AUGUST 2015, MAY 2016 AND JANURARY 2017.
4. GROUNDWATER ELEVATIONS DISPLAYED IN FEET RELATIVE TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.
5. MONITORING WELL MW-108 WAS DECOMMISSIONED ON 1/25/2017.
6. MONITORING WELL MW-108A WAS INSTALLED ON 1/24/2017.

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:
**DTE ELECTRIC COMPANY**
**SIBLEY QUARRY**
**801 FORT STREET**
**TRENTON, MICHIGAN**

TITLE:
# GROUNDWATER POTENTIOMETRIC SURFACE MAP JULY 2017

| | | | |
|---|---|---|---|
| DRAWN BY: | J. PAPEZ | PROJ NO.: | 265996.0002 |
| CHECKED BY: | C. SCIESZKA | | |
| APPROVED BY: | V. BUENING | | **FIGURE 8** |
| DATE: | JANUARY 2018 | | |

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

FILE NO.: 265996-0002-012.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 1/16/2018, 11:46:29 AM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: E:\DTE\CCR_Sites\2017_265996\265996-0002-012.mxd

# Appendix B
# Data Quality Review

# Laboratory Data Quality Review
# Groundwater Monitoring Event September 2017
# DTE Electric Company Sibley Quarry Landfill (DTE SQLF)

Groundwater samples were collected by TRC for the September 2017 sampling event. Samples were analyzed for anions, pH, total metals, total dissolved solids, and alkalinity by Test America Laboratories, Inc. (Test America), located in Canton, Ohio. The laboratory analytical results are reported in laboratory report J85421-1.

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

- MW-101
- MW-102
- MW-103
- MW-104
- MW-105
- MW-106
- MW-107
- MW-108A

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 |
| Alkalinity | SM 2320B |

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-105; relative percent differences (RPDs) between the parent and duplicate sample were within the QC limits.
- Laboratory duplicates were performed on sample MW-108A for alkalinity and on sample MW-101 for pH; RPDs between the parent and duplicate sample were within the QC limits.
- MS/MSD analyses were performed on sample MW-101 for anions (chloride, fluoride, and sulfate). The chloride recovery in the MSD was below the lower laboratory control limit. Chloride sample results may be potentially biased low. However, chloride results for this sampling event are within the historical range. The sulfate recoveries in the MS/MSD were below the lower laboratory control limits. The sulfate concentration in the parent sample was >4x the spike concentration; therefore, the laboratory control limits are not applicable. Data usability is not affected.
- The laboratory report had been revised to report the fluoride data to the MDL due to elevated fluoride reporting limits.

# 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.:** 265996.0002.0000 Phase 001, Task 001

**Subject:** Background Statistical Evaluation – DTE Electric Company, Sibley Quarry Landfill, Trenton, Michigan

---

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) Sibley Quarry Landfill (SQLF) CCR unit.

The SQLF is a licensed Type III solid waste disposal facility owned and operated by DTE Electric. The disposal facility currently receives the majority of CCR from the Trenton Channel and River Rouge Power Plants. In addition, a small amount of CCR is also received from the Monroe Power Plant. The SQLF is operated under the current operating license number 9394 in accordance with Michigan Part 115 of the Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994, as amended.

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

| | | |
|---|---|---|
| MW-101 | MW-102 | MW-103 |
| MW-104 | MW-105 | MW-106 |
| MW-107 | MW-108A | |

Following the baseline data collection period (August 2016 through September 2017), the background data for the SQLF 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 eight background wells utilized for the SQLF CCR Unit includes MW-101 through MW-107 and MW-108A. 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) show potential or suspect outliers for anions (chloride, fluoride, and sulfate) at MW-101 on 1/19/2017, and for total dissolved solids (TDS) at MW-106 on 4/24/2017.

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

Outlier removal from the background data set is summarized in Table 1. Probability plots (Attachment B) were used to further evaluate the potential outliers in anion data for MW-101 and TDS data for MW-106 that were identified in the T v. C graphs (Attachment A). In general, probability plots of the data residuals for MW-101 show that anion data collected on 1/19/2017 were from a different distribution than the remaining data. Probability plots of the data residuals for MW-106 show that the (TDS) data collected on 4/24/2017 were from a different distribution than the remaining data. Prior to outlier removal, the anion parameters for MW-101 and TDS for MW-106 exhibited a non-normal distribution. The data sets for most of the parameters exhibited a normal distribution after the removal of these outliers. As such, anion data collected from monitoring well MW-101 on 1/19/2017 and TDS data collected from monitoring well MW-106 on 4/24/2017 were removed from the background data set used to calculate the statistical limits.

## 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 2.

## Prediction Limits

Table 2 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 Outlier Evaluation
Table 2 – Summary of Descriptive Statistics and Prediction Limit Calculations
Attachment A – Background Concentration Time-Series Charts
Attachment B – Probability Plots for MW-101 and MW-106 Outlier Evaluation
Attachment C – ChemStat™ Prediction Limit Outputs

# Tables

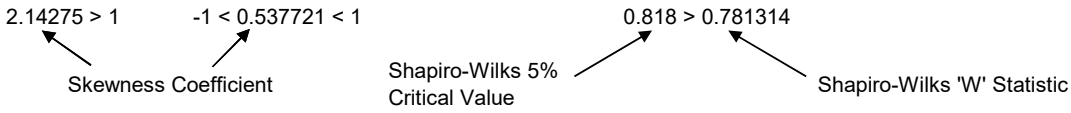
Table 1
Summary of Outlier Evaluation
Background Statistical Evaluation
DTE Electric Company – Sibley Quarry Landfill

| Parameter | Units | Monitoring Well | Sample Date | Data Outlier | Basis for Removal of Outlier |
|---|---|---|---|---|---|
| Chloride | mg/L | MW-101 | 01/19/17 | 31 | Anion analysis for this sample had anomalously low results. |
| Fluoride | mg/L | MW-101 | 01/19/17 | 0.34 | Anion analysis for this sample had anomalously low results. |
| Sulfate | mg/L | MW-101 | 01/19/17 | 110 | Anion analysis for this sample had anomalously low results. |
| Total Dissolved Solids | mg/L | MW-106 | 04/24/17 | 6,100 | Anomalously high concentration. |

Table 2
Summary of Descriptive Statistics and Prediction Limit Calculations
Background Statistical Evaluation
DTE Electric Company – Sibley Quarry Landfill

| 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-101 | -1 < -0.328311 < 1 | -- | -- | -- | N | Parametric | 280 |
| MW-102 | >50% Non-Detect | -- | -- | -- | N | Non-Parametric | 200 |
| MW-103 | -1 < -0.276469 < 1 | -- | -- | -- | N | Parametric | 810 |
| MW-104 | -1 < 0.97111 < 1 | -- | -- | -- | N | Parametric | 970 |
| MW-105 | -1 < 0 < 1 | -- | -- | -- | N | Parametric | 2,600 |
| MW-106 | -1 < 0.212536 < 1 | -- | -- | -- | N | Parametric | 810 |
| MW-107 | -1 < -0.309839 < 1 | -- | -- | -- | N | Parametric | 1,500 |
| MW-108A | -1 < -0.493382 < 1 | -- | -- | -- | N | Parametric | 1,400 |
| **Calcium (ug/L)** | | | | | | | |
| MW-101 | 1.60163 > 1 | 1.48316 > 1 | 0.818 > 0.761295 | 0.818 > 0.787381 | N | Non-Parametric | 270,000 |
| MW-102 | -1 < -0.27275 < 1 | -- | -- | -- | N | Parametric | 310,000 |
| MW-103 | -1 < 0.883789 < 1 | -- | -- | -- | N | Parametric | 630,000 |
| MW-104 | -1 < -0.992966 < 1 | -- | -- | -- | N | Parametric | 530,000 |
| MW-105 | -1 < -0.12077 < 1 | -- | -- | -- | N | Parametric | 830,000 |
| MW-106 | -1 < -0.781033 < 1 | -- | -- | -- | N | Parametric | 650,000 |
| MW-107 | -1 < -0.221716 < 1 | -- | -- | -- | N | Parametric | 1,500,000 |
| MW-108A | -1 < 0.383367 < 1 | -- | -- | -- | N | Parametric | 470,000 |
| **Chloride (mg/L)** | | | | | | | |
| MW-101 | -1 < -0.358608 < 1 | -- | -- | -- | Y | Parametric | 200 |
| MW-102 | -1 < 0.347067 < 1 | -- | -- | -- | N | Parametric | 270 |
| MW-103 | -1 < -0.660484 < 1 | -- | -- | -- | N | Parametric | 160 |
| MW-104 | 1.07244 > 1 | -1 < 0.867122 < 1 | -- | -- | N | Parametric | 800 |
| MW-105 | -1 < -0.596147 < 1 | -- | -- | -- | N | Parametric | 4,800 |
| MW-106 | -1 < -0.209922 < 1 | -- | -- | -- | N | Parametric | 130 |
| MW-107 | -1 < -0.243998 < 1 | -- | -- | -- | N | Parametric | 21,000 |
| MW-108A | -1 < -0.391042 < 1 | -- | -- | -- | N | Parametric | 1,900 |
| **Fluoride (mg/L)** | | | | | | | |
| MW-101 | -1 < -0.6158 < 1 | -- | -- | -- | Y | Parametric | 2.1 |
| MW-102 | -1 < -0.519861 < 1 | -- | -- | -- | N | Parametric | 1.9 |
| MW-103 | -1 < 0.302615 < 1 | -- | -- | -- | N | Parametric | 2.1 |
| MW-104 | 1.16993 > 1 | -1 < 0.717499 < 1 | -- | -- | N | Parametric | 2.8 |
| MW-105 | >50% Non-Detect | -- | -- | -- | N | Non-Parametric | 5.8 |
| MW-106 | 1.90134 > 1 | 1.49177 > 1 | 0.829 > 0.721988 | 0.829 > 0.814033 | N | Non-Parametric | 3.0 |
| MW-107 | >50% Non-Detect | -- | -- | -- | N | Non-Parametric | 2.5 |
| MW-108A | 3.21441 > 1 | 2.11602 > 1 | 0.829 > 0.729779 | 0.829 > 0.719407 | N | Non-Parametric | 2.5 |

**Notes:**

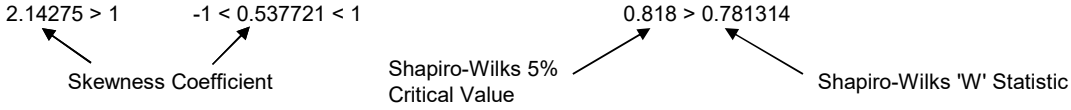



ug/L = micrograms per liter
mg/L = milligrams per liter
SU = standard units

Table 2
Summary of Descriptive Statistics and Prediction Limit Calculations
Background Statistical Evaluation
DTE Electric Company – Sibley Quarry Landfill

| 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-101 | 2.1118 > 1 | 2.09114 > 1 | 0.818 > 0.585097 | 0.818 > 0.595294 | N | Non-Parametric | 6.8 - 7.8 |
| MW-102 | 1.41851 > 1 | 1.30393 > 1 | 0.829 > 0.808507 | 0.829 > 0.824506 | N | Non-Parametric | 6.5 - 7.6 |
| MW-103 | 2.2049 > 1 | 2.19692 > 1 | 0.818 > 0.532446 | 0.818 > 0.539495 | N | Non-Parametric | 6.7 - 7.6 |
| MW-104 | 2.13417 > 1 | 2.11519 > 1 | 0.818 > 0.582346 | 0.818 > 0.593527 | N | Non-Parametric | 6.8 - 7.9 |
| MW-105 | 1.98233 > 1 | 1.93312 > 1 | 0.818 > 0.649239 | 0.818 > 0.666586 | N | Non-Parametric | 6.6 - 7.9 |
| MW-106 | 1.80375 > 1 | 1.71426 > 1 | 0.829 > 0.720982 | 0.829 > 0.738664 | N | Non-Parametric | 6.5 - 7.6 |
| MW-107 | 2.33039 > 1 | 2.30908 > 1 | 0.829 > 0.552168 | 0.829 > 0.563482 | N | Non-Parametric | 6.5 - 7.6 |
| MW-108A | -1.59031 < -1 | -1.60026 < -1 | 0.818 > 0.776489 | 0.818 > 0.773893 | N | Non-Parametric | 6.7 - 6.9 |
| **Sulfate (mg/L)** | | | | | | | |
| MW-101 | -1 < 0.115199 < 1 | -- | -- | -- | Y | Parametric | 740 |
| MW-102 | -1 < -0.759582 < 1 | -- | -- | -- | N | Parametric | 770 |
| MW-103 | -1 < -0.391042 < 1 | -- | -- | -- | N | Parametric | 2,100 |
| MW-104 | -1 < -0.516398 < 1 | -- | -- | -- | N | Parametric | 1,900 |
| MW-105 | -1.33333 < -1 | -1.47869 < -1 | 0.818 > 0.816259 | 0.818 > 0.788157 | N | Non-Parametric | 2,000 |
| MW-106 | -1 < -0.176583 < 1 | -- | -- | -- | N | Parametric | 2,100 |
| MW-107 | -1 < 0.96 < 1 | -- | -- | -- | N | Parametric | 3,800 |
| MW-108A | -1 < -0.749816 < 1 | -- | -- | -- | N | Parametric | 1,100 |
| **Total Dissolved Solids (mg/L)** | | | | | | | |
| MW-101 | -1 < 0 < 1 | -- | -- | -- | N | Parametric | 1,400 |
| MW-102 | -1 < -0.777592 < 1 | -- | -- | -- | N | Parametric | 1,800 |
| MW-103 | -1 < 0.185989 < 1 | -- | -- | -- | N | Parametric | 3,700 |
| MW-104 | -1 < 0.353863 < 1 | -- | -- | -- | N | Parametric | 4,100 |
| MW-105 | -1 < 0.482827 < 1 | -- | -- | -- | N | Parametric | 9,700 |
| MW-106 | -1.25109 < -1 | -1.322 < -1 | 0.818 > 0.810824 | 0.818 > 0.799426 | Y | Non-Parametric | 3,200 |
| MW-107 | -1 < -0.136905 < 1 | -- | -- | -- | N | Parametric | 41,000 |
| MW-108A | -1 < -0.330962 < 1 | -- | -- | -- | N | Parametric | 4,900 |

**Notes:**

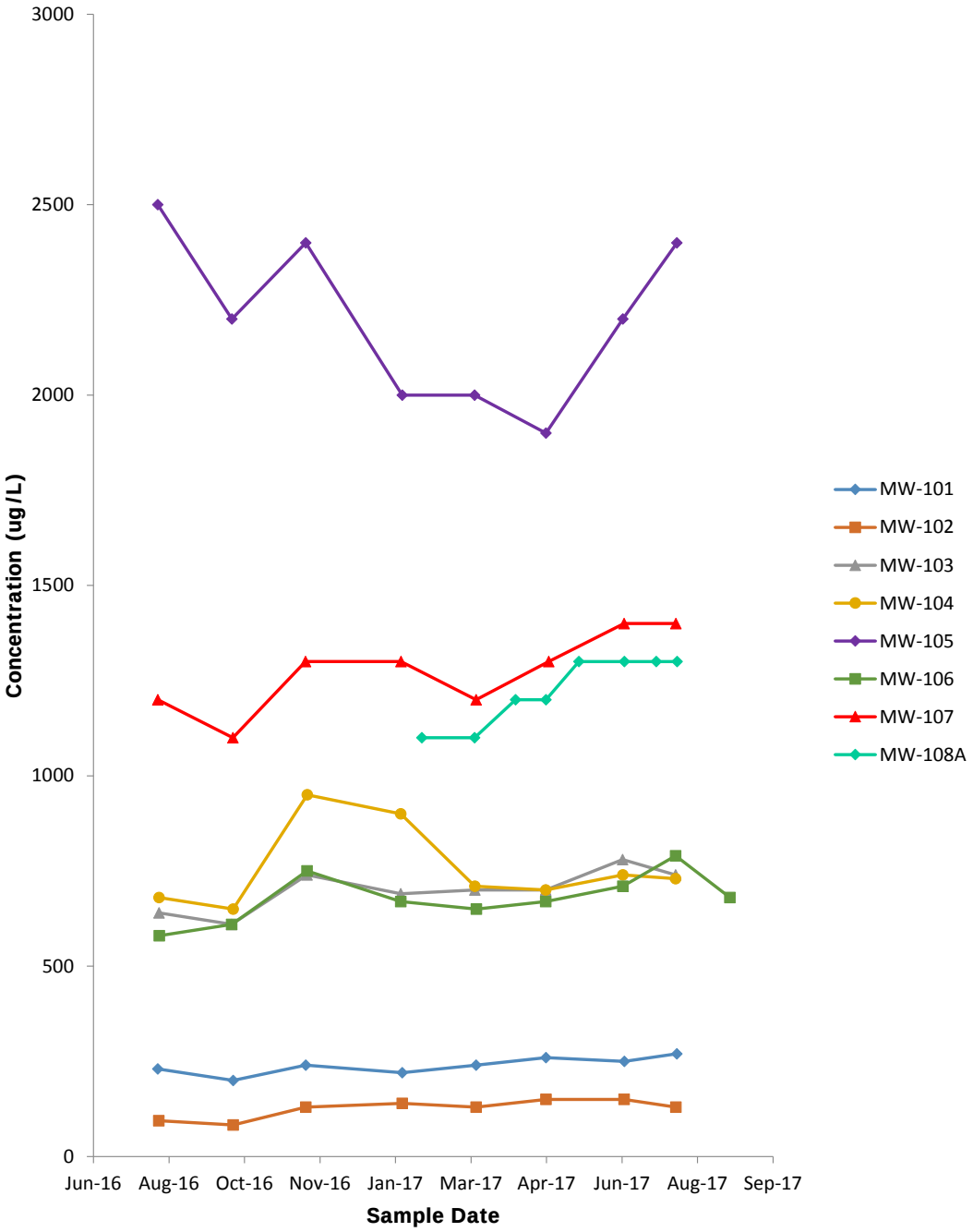



ug/L = micrograms per liter
mg/L = milligrams per liter
SU = standard units

# Attachment A

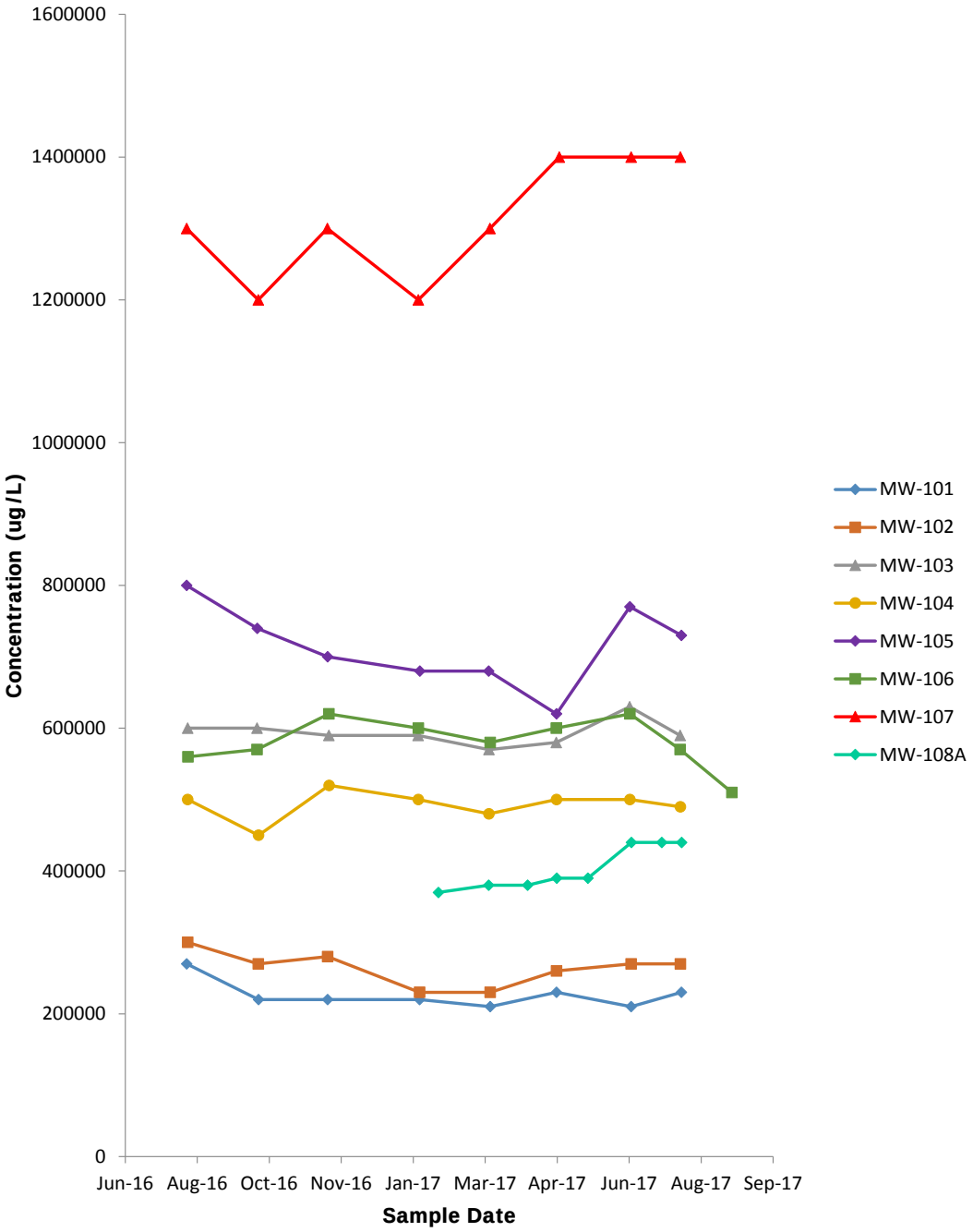
# Background Concentration Time-Series Charts

**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**Boron**



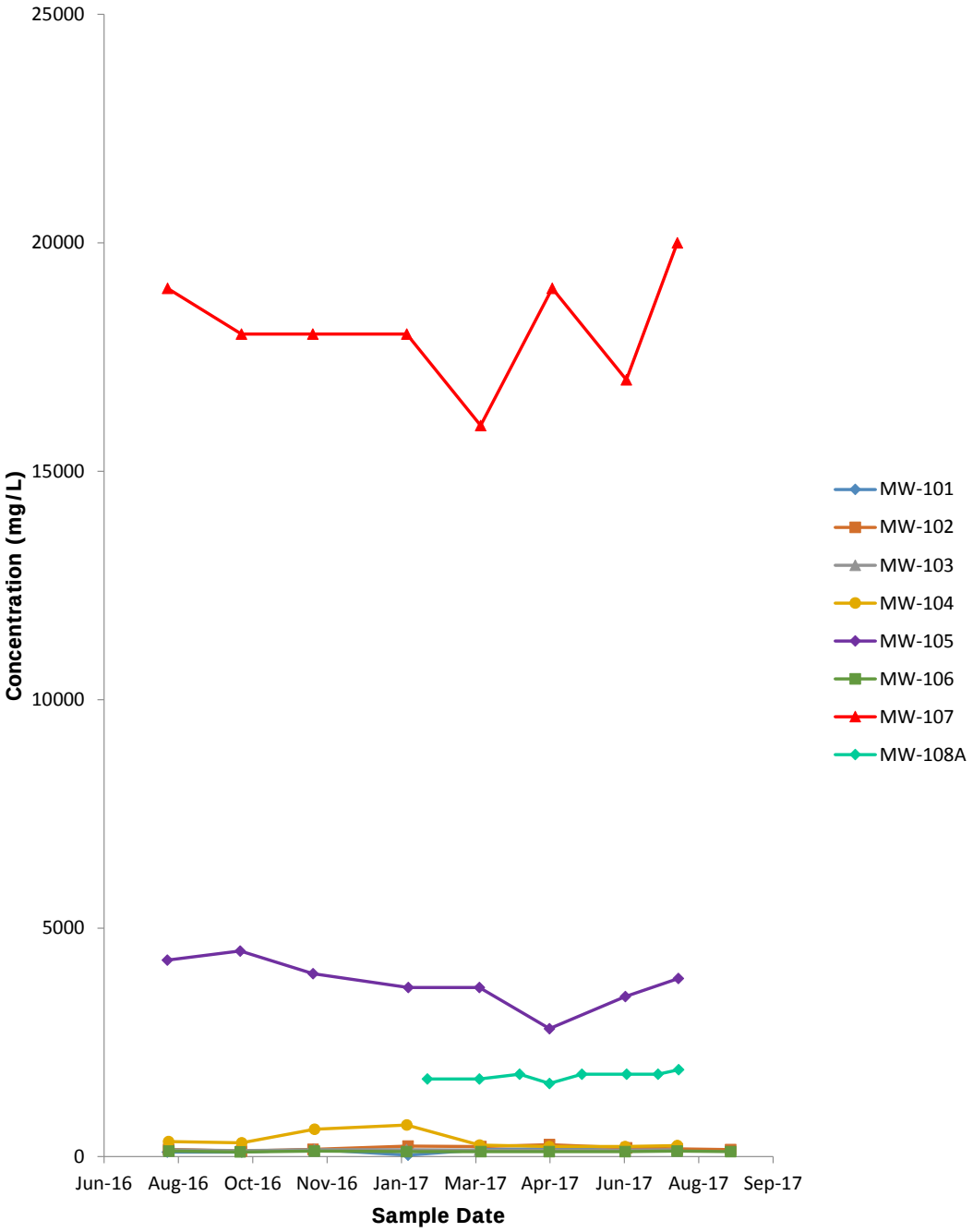

Open symbols denote non-detect concentrations.

**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**Calcium**



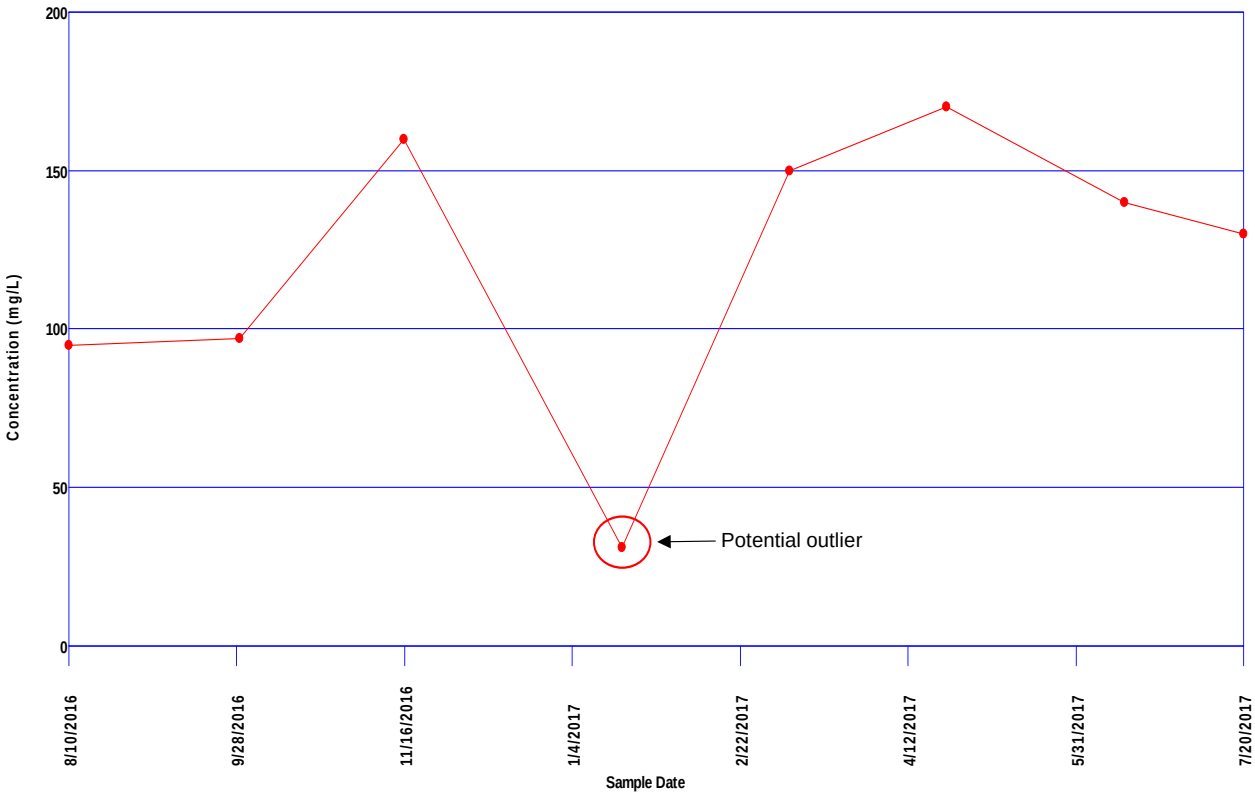

Open symbols denote non-detect concentrations.

**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**Chloride**

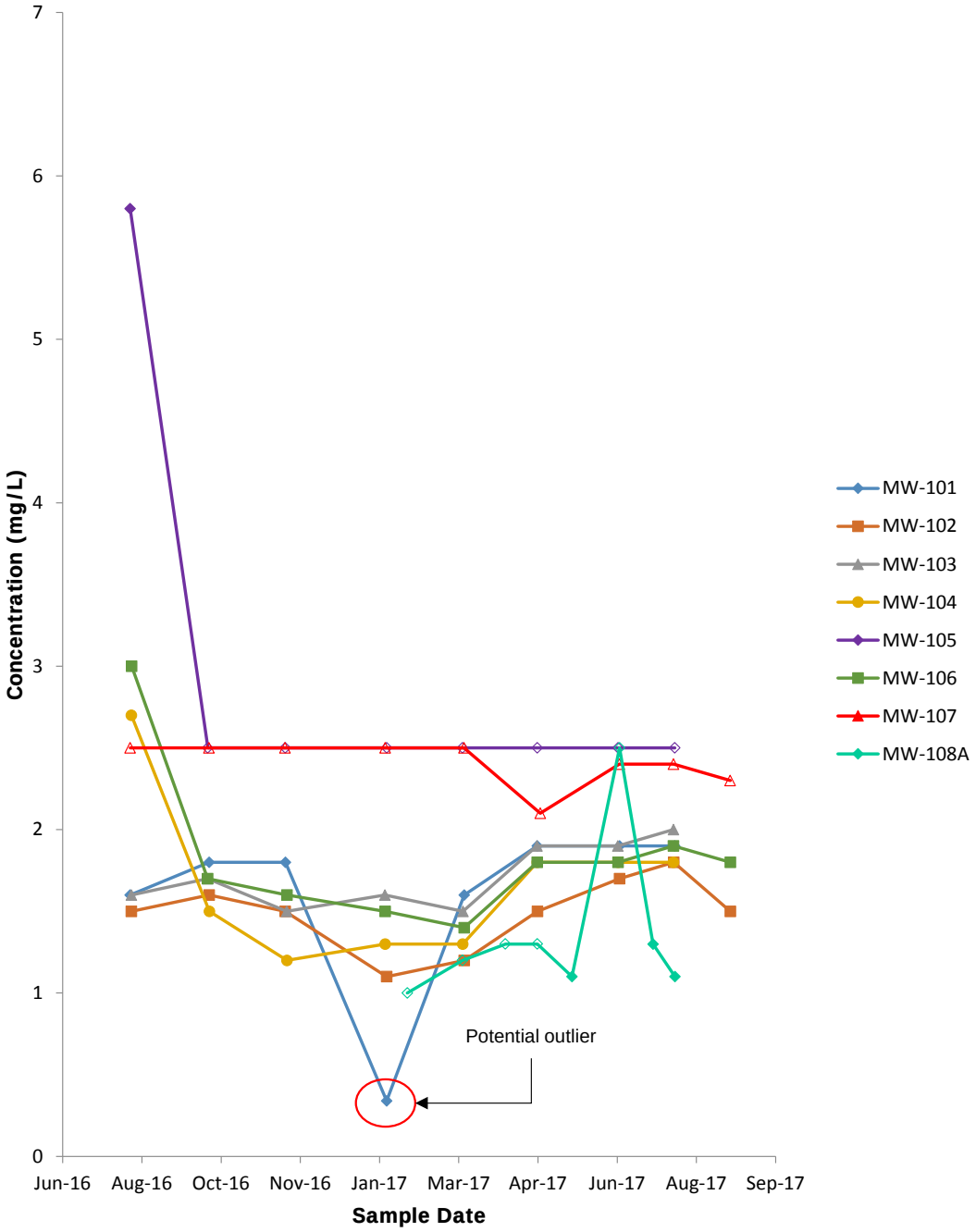



Open symbols denote non-detect concentrations.

**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**MW-101 Chloride**

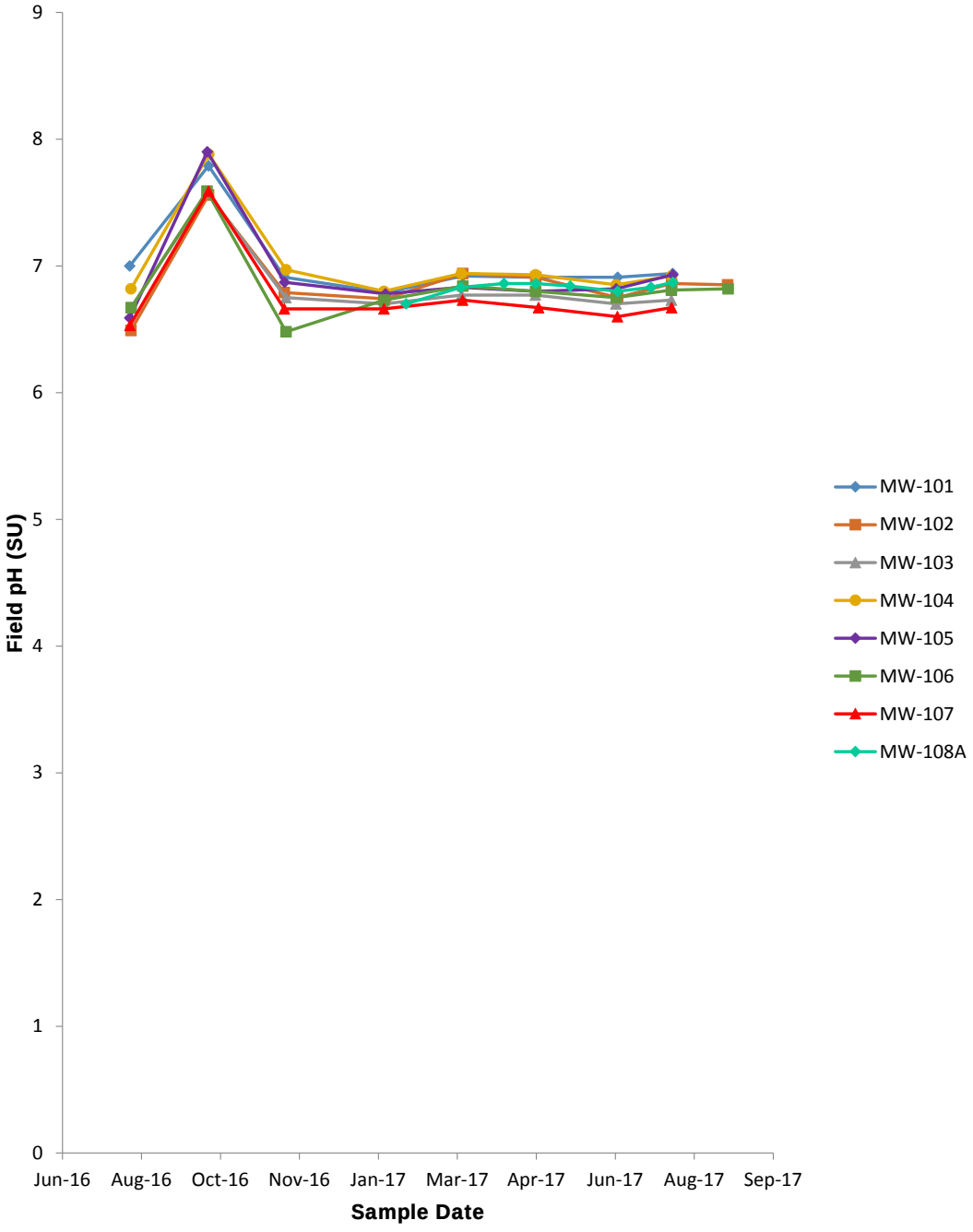


**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**Fluoride**

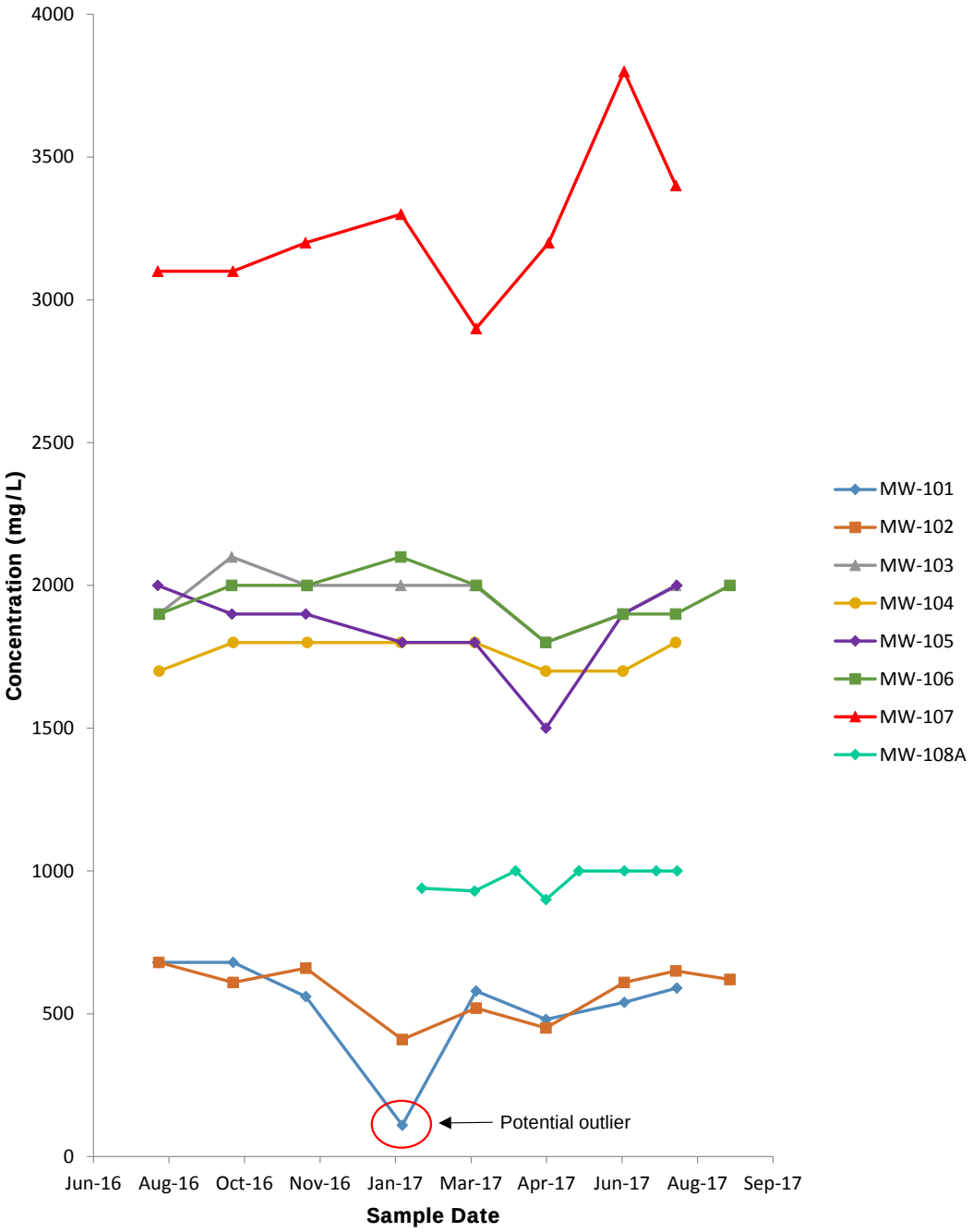



Open symbols denote non-detect concentrations.

**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**pH, Field**

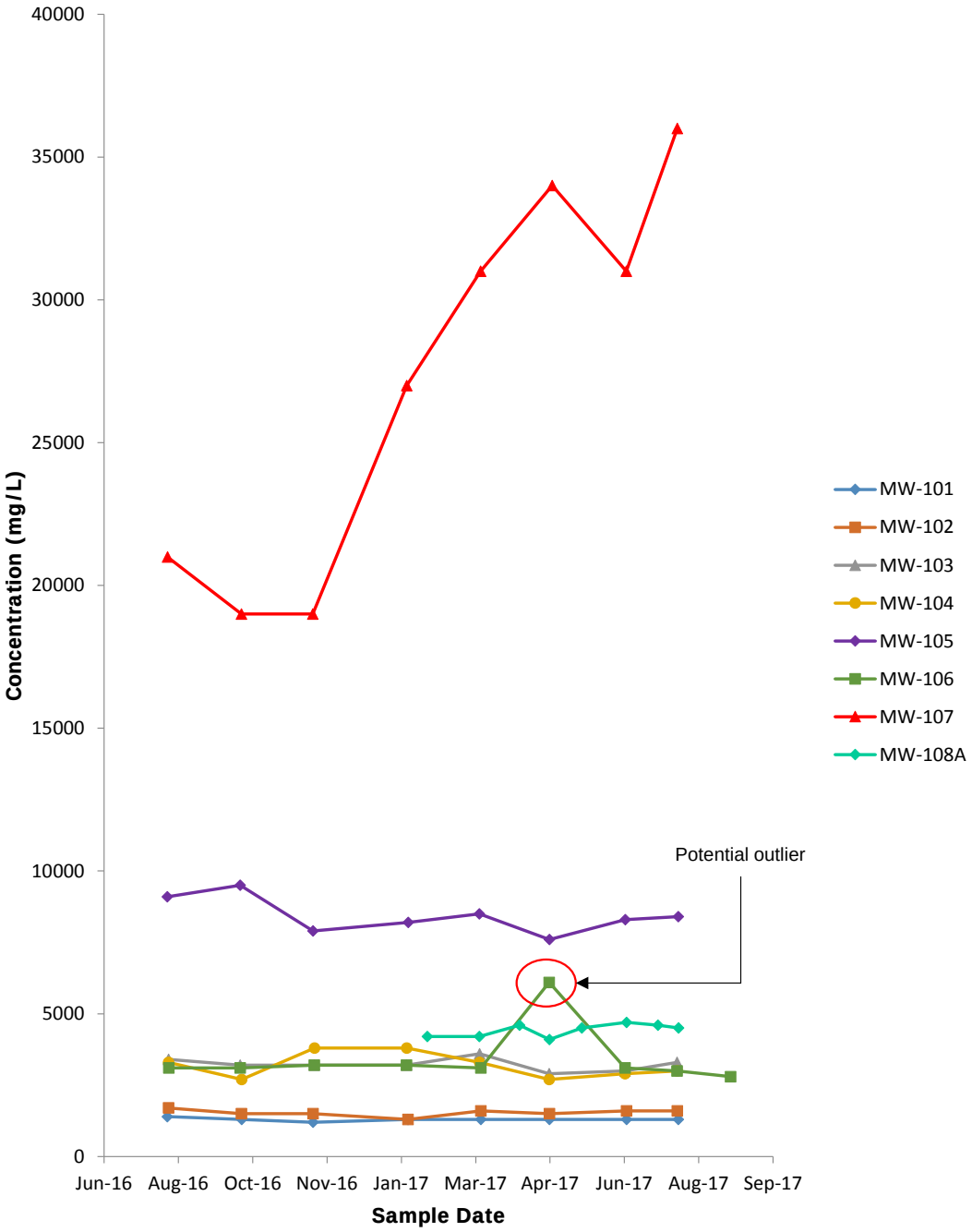


**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**Sulfate**




Open symbols denote non-detect concentrations.

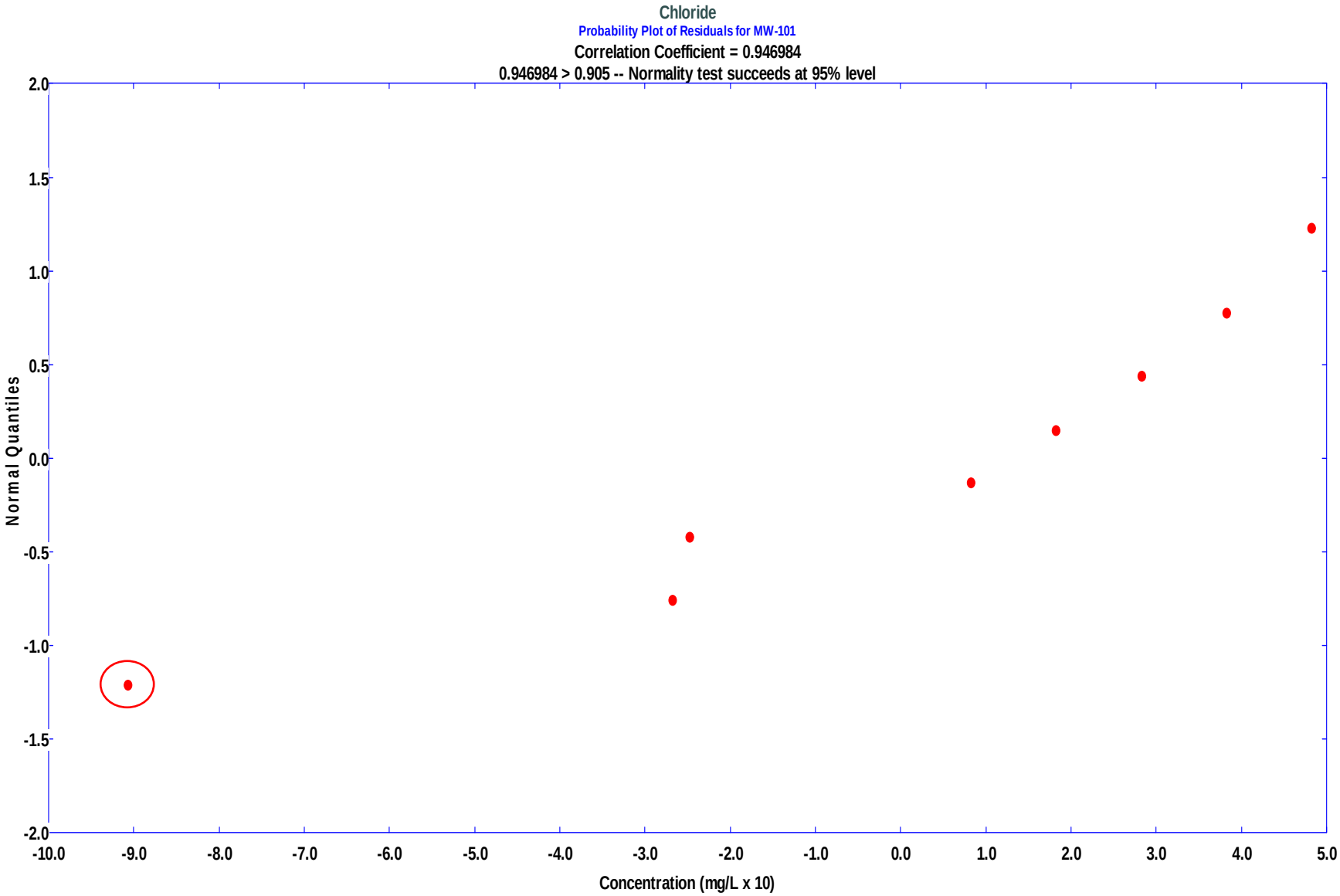
**Time-Series Plots**
**DTE Electric Company - Sibley Quarry Landfill**
**Trenton, Michigan**
**Total Dissolved Solids**

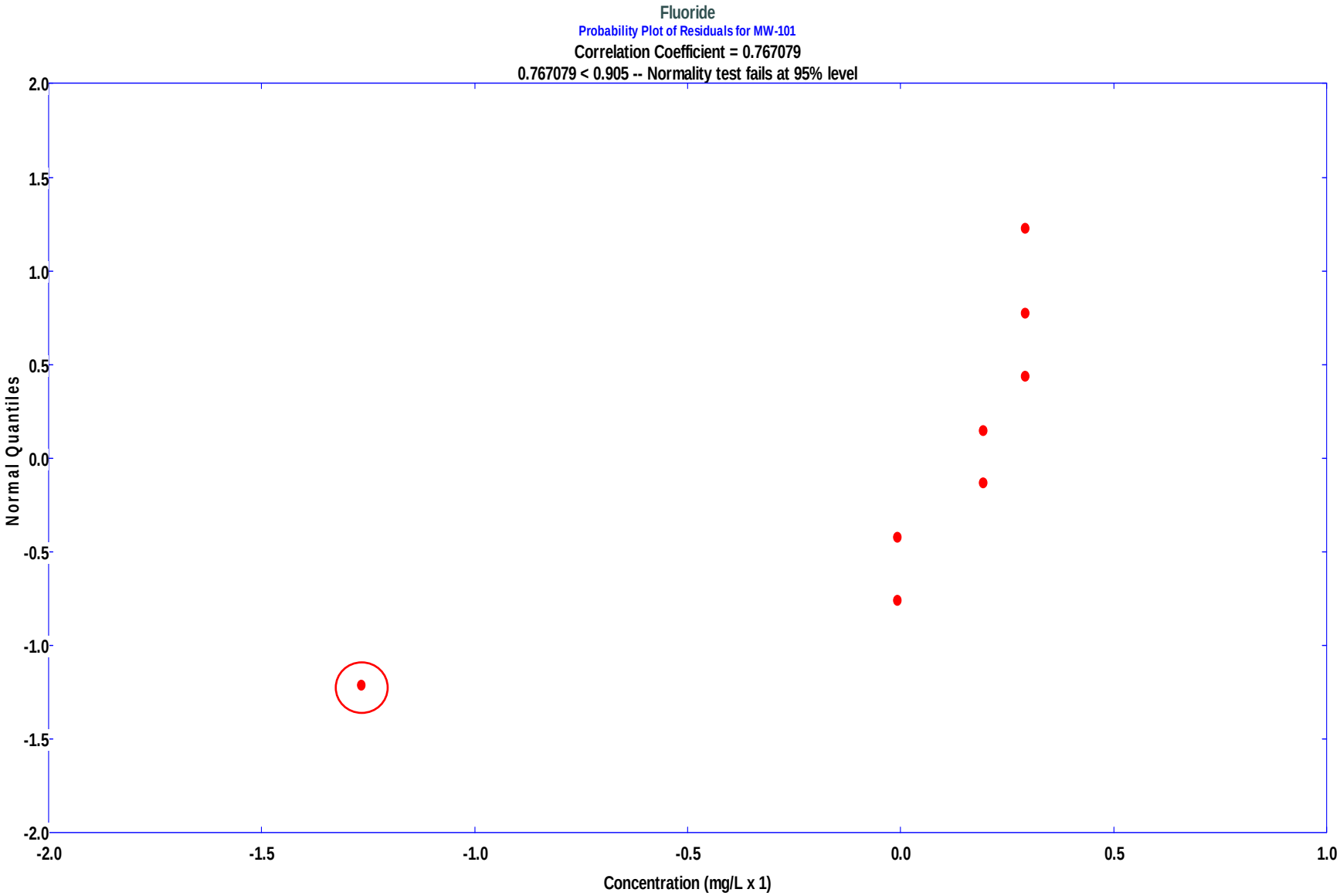


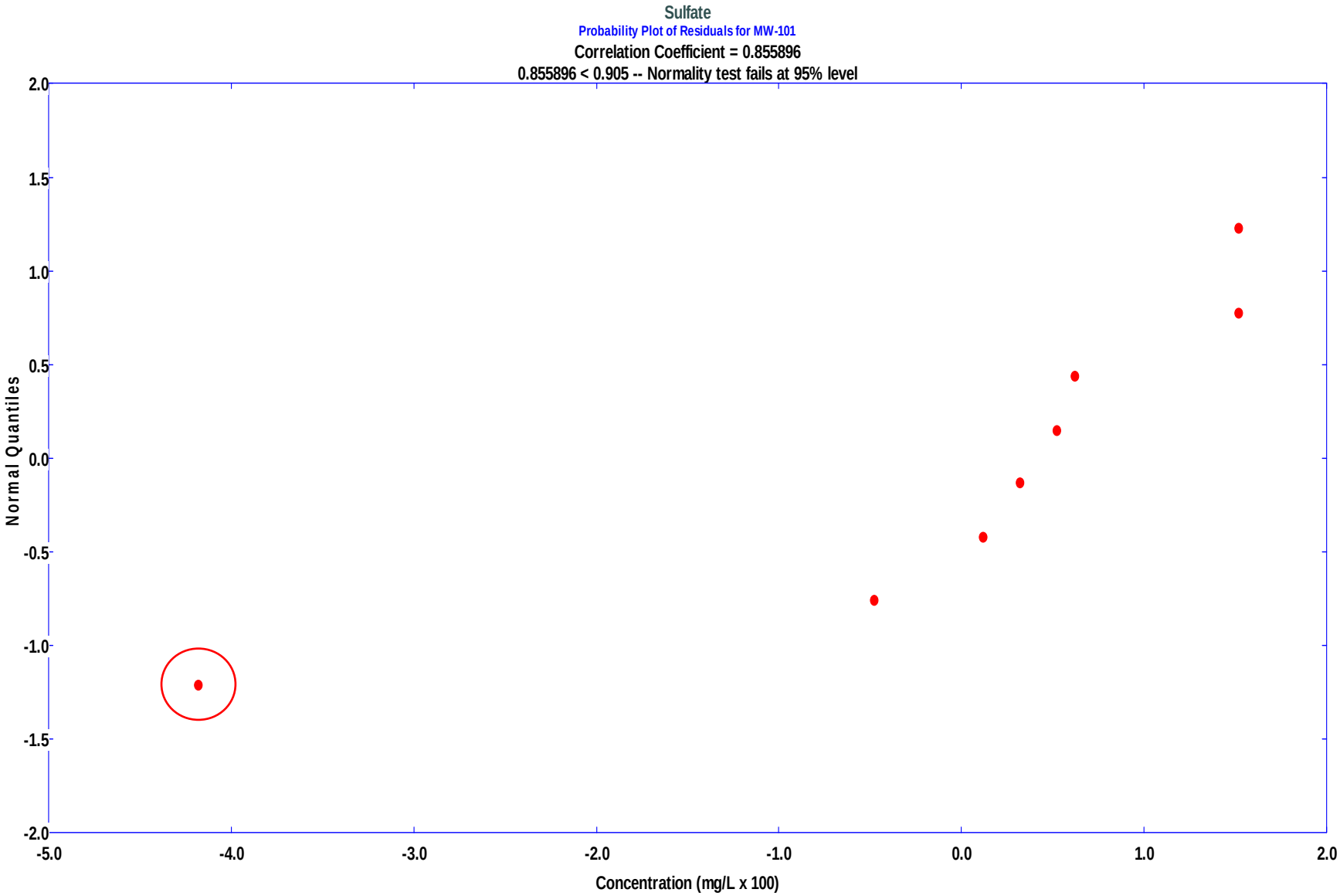

Open symbols denote non-detect concentrations.

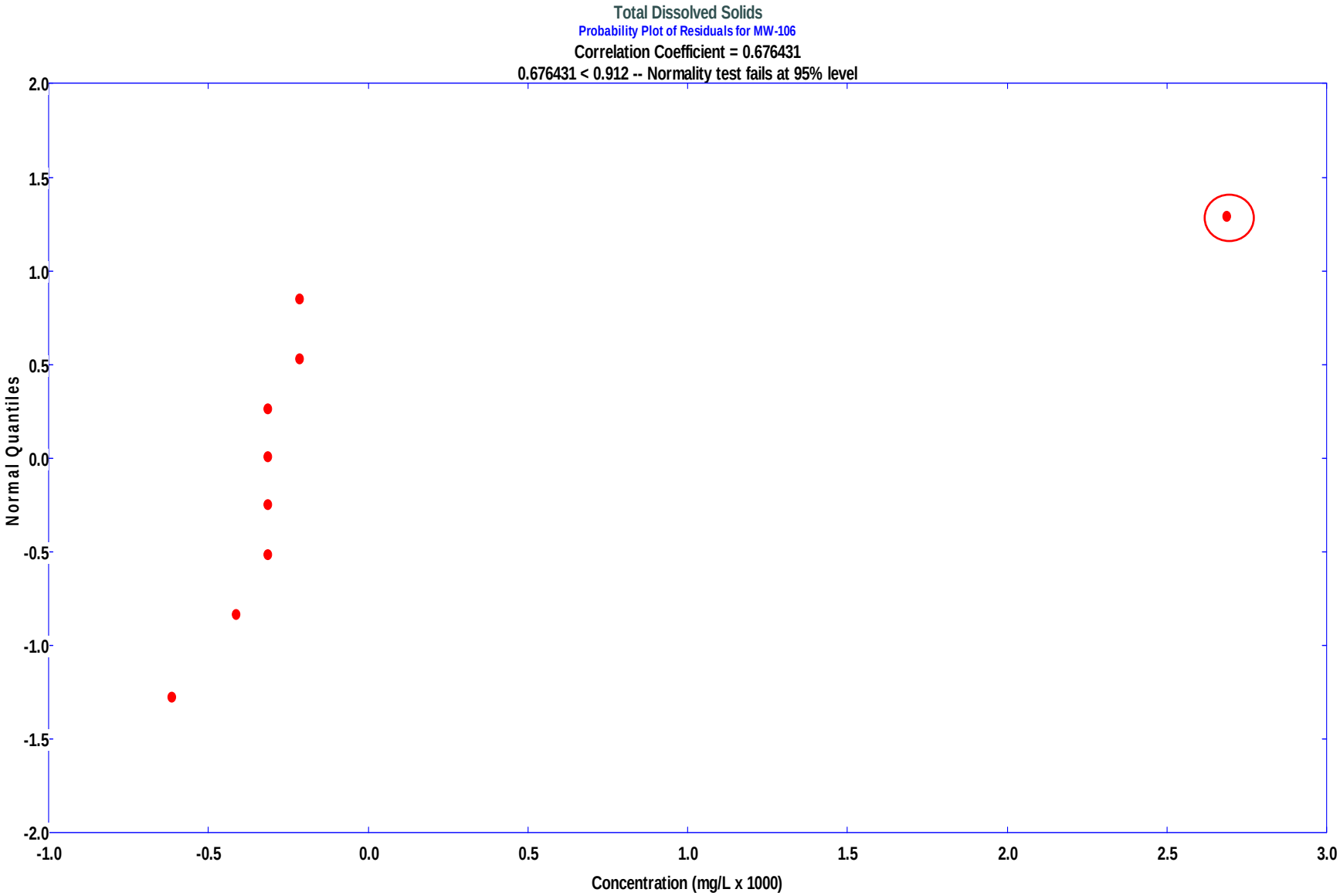
# Attachment B

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

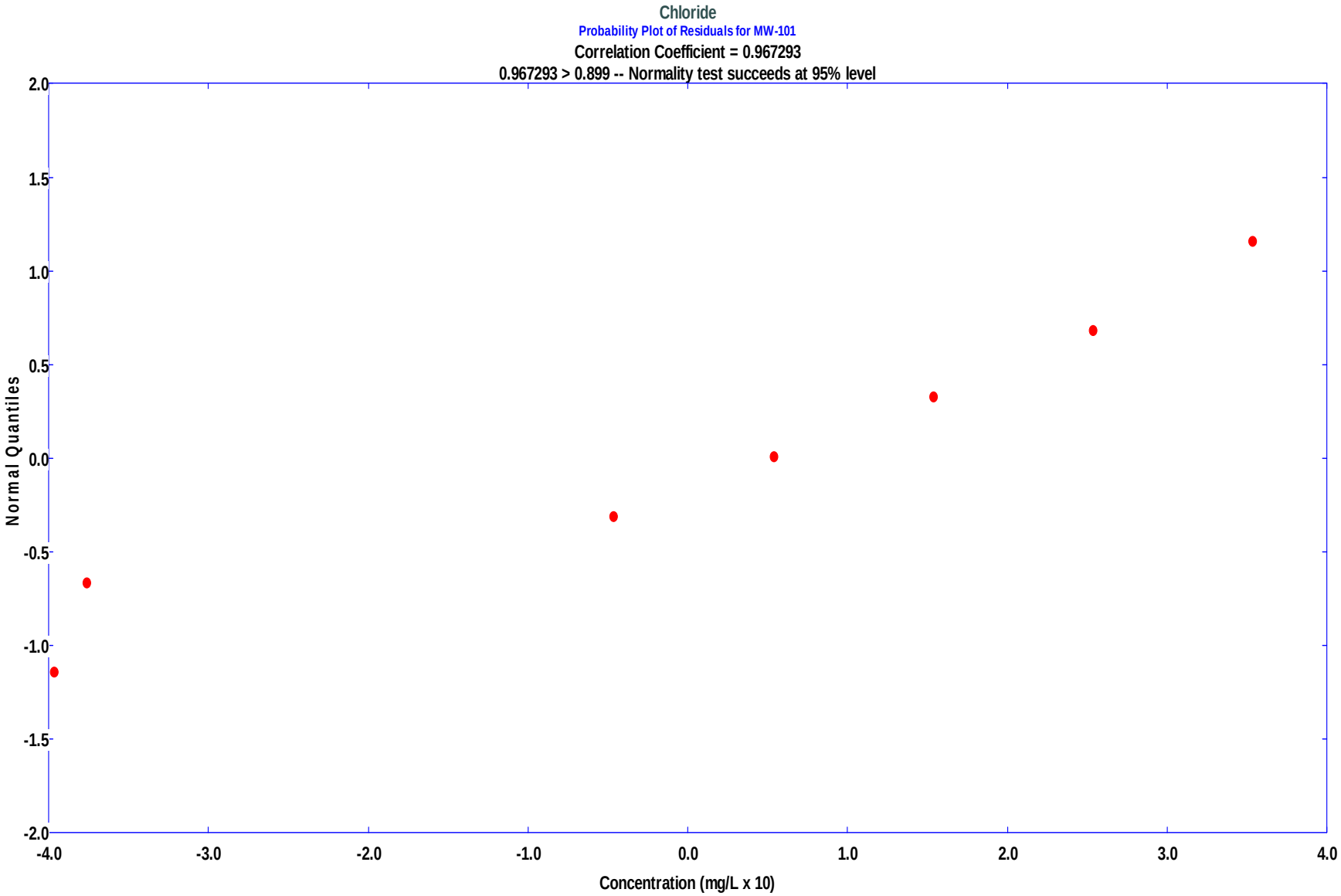

Chloride
Probability Plot of Residuals for MW-101
Correlation Coefficient = 0.946984
0.946984 > 0.905 -- Normality test succeeds at 95% level
Normal Quantiles
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-10.0
-9.0
-8.0
-7.0
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Concentration (mg/L x 10)


Fluoride
Probability Plot of Residuals for MW-101
Correlation Coefficient = 0.767079
0.767079 < 0.905 -- Normality test fails at 95% level
Normal Quantiles
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
Concentration (mg/L x 1)

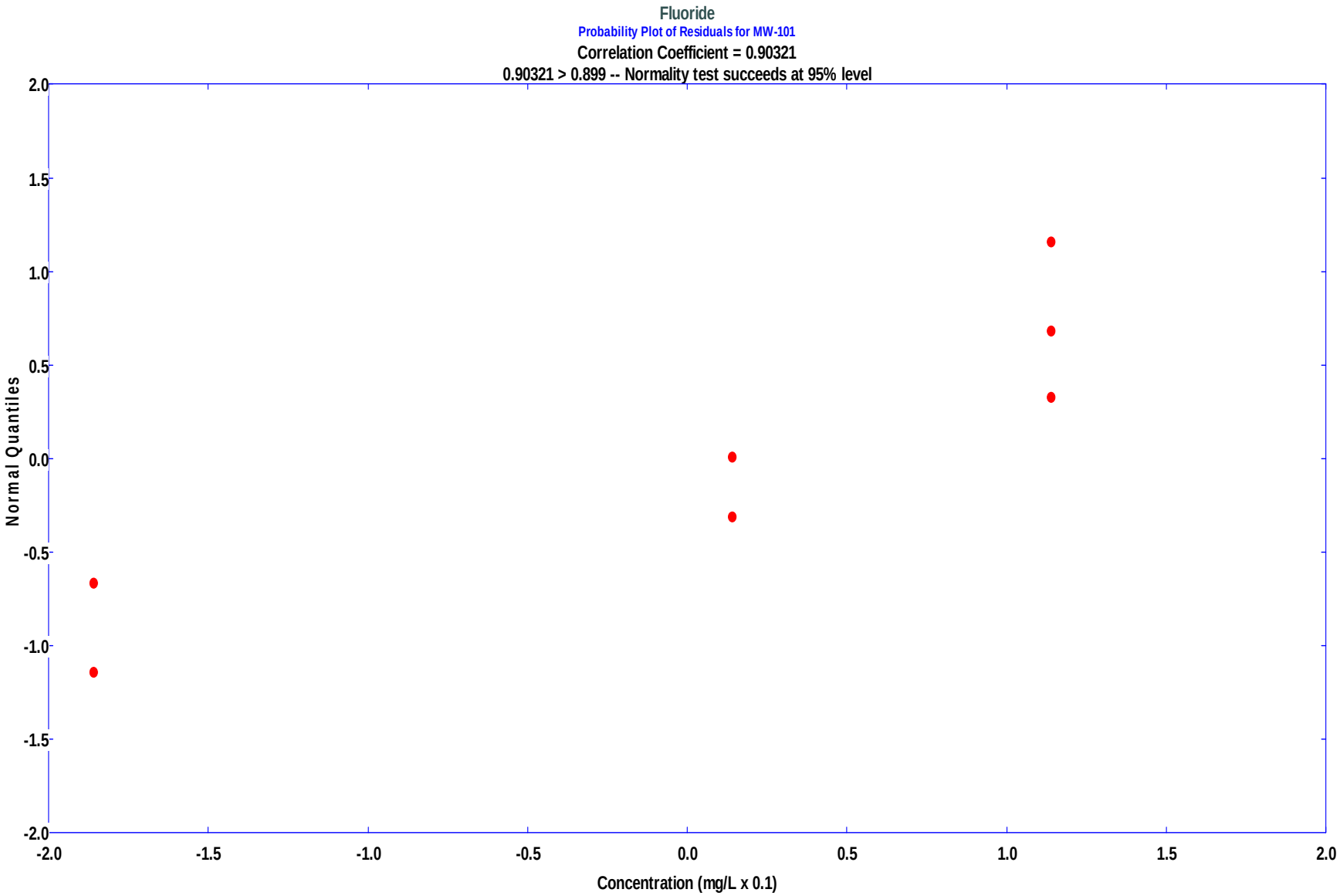

Sulfate
Probability Plot of Residuals for MW-101
Correlation Coefficient = 0.855896
0.855896 < 0.905 -- Normality test fails at 95% level
Normal Quantiles
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
Concentration (mg/L x 100)


Total Dissolved Solids
Probability Plot of Residuals for MW-106
Correlation Coefficient = 0.676431
0.676431 < 0.912 -- Normality test fails at 95% level
Normal Quantiles
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Concentration (mg/L x 1000)

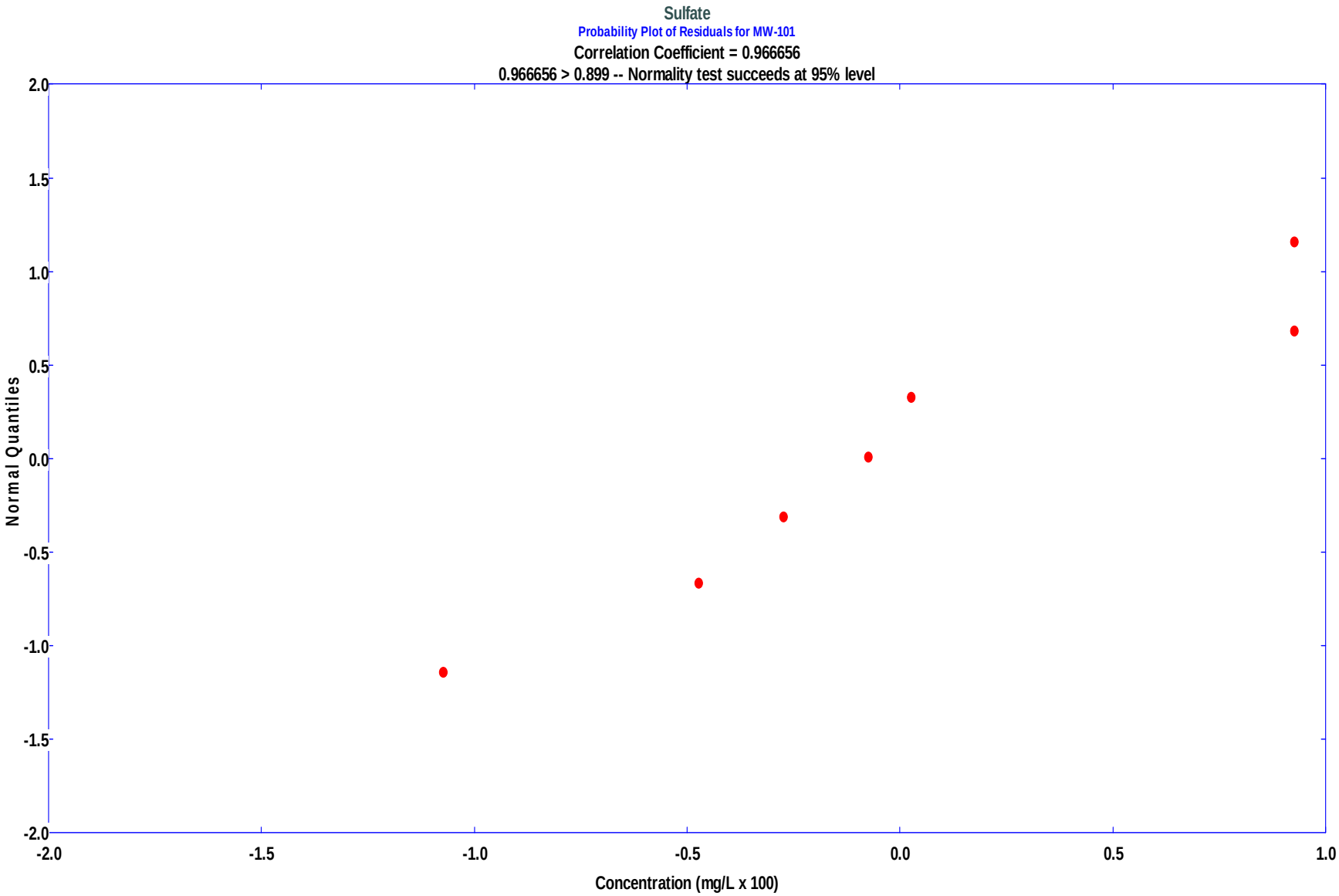
After outlier removal



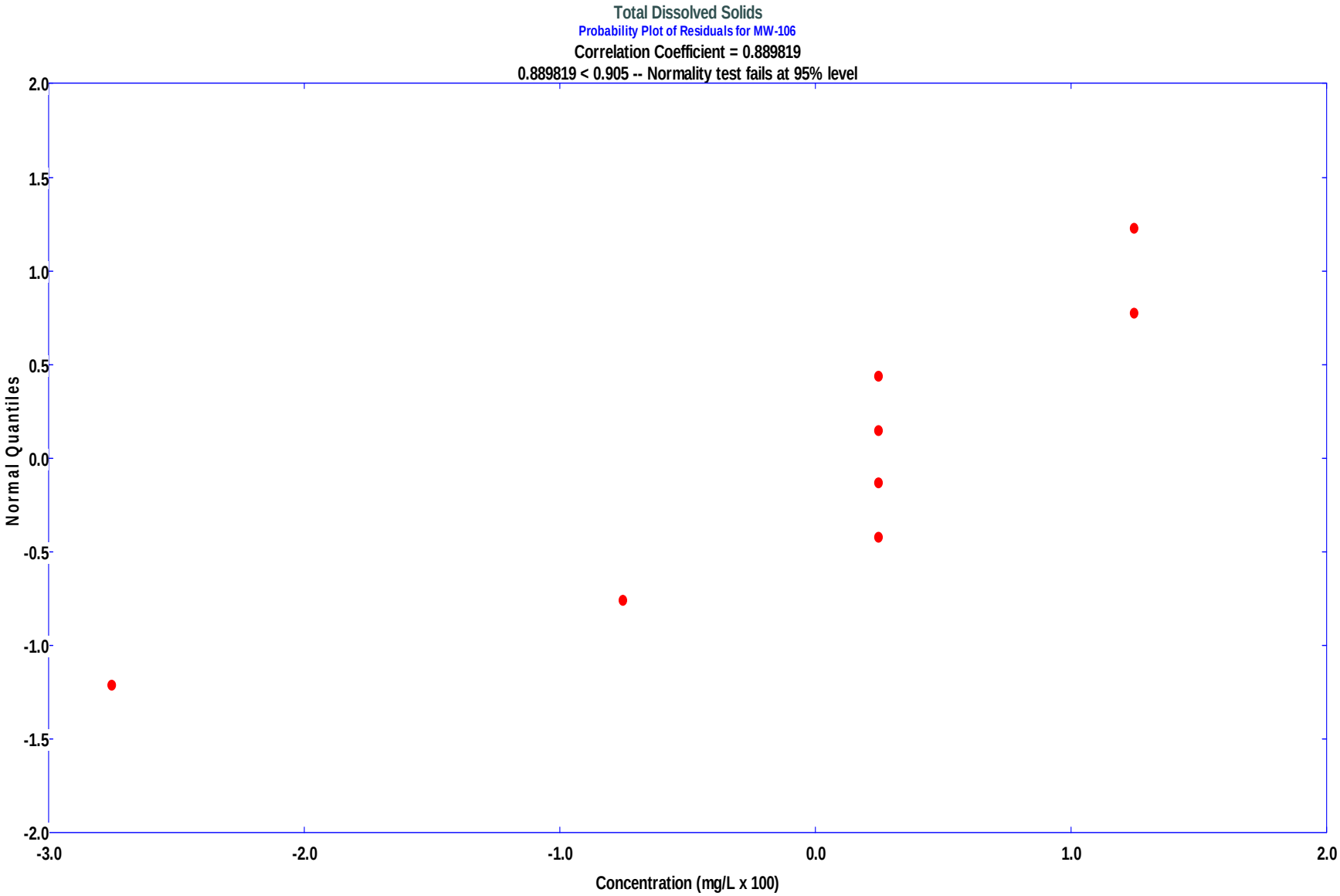
After outlier removal



After outlier removal



After outlier removal



# Attachment C

# ChemStat™ Prediction Limit Outputs

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-101**
**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 |
|---|---|---|
| | 8/10/2016 | 230 |
| | 9/29/2016 | 200 |
| | 11/16/2016 | 240 |
| | 1/19/2017 | 220 |
| | 3/9/2017 | 240 |
| | 4/24/2017 | 260 B |
| | 6/15/2017 | 250 |
| | 7/20/2017 | 270 B |

From 8 baseline samples
Baseline mean = 238.75
Baseline std Dev = 22.3207

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 280 | [0, 283.604] | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-102**
**Parameter: Boron**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 75%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 8
**Maximum Baseline Concentration = 200**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 94 |
| | 9/29/2016 | 83 |
| | 11/16/2016 | ND<200 J |
| | 1/19/2017 | ND<200 J |
| | 3/9/2017 | ND<200 J |
| | 4/24/2017 | ND<200 JB |
| | 6/15/2017 | ND<200 J |
| | 7/19/2017 | ND<200 JB |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 200 | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-103**
**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 |
|---|---|---|
| | 8/11/2016 | 640 |
| | 9/28/2016 | 610 |
| | 11/17/2016 | 740 |
| | 1/18/2017 | 690 |
| | 3/8/2017 | 700 |
| | 4/24/2017 | 700 B |
| | 6/14/2017 | 780 |
| | 7/19/2017 | 740 B |

From 8 baseline samples
Baseline mean = 700
Baseline std Dev = 55.2914

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 760 | [0, 811.108] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-104**
**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 |
|---|---|---|
| | 8/11/2016 | 680 |
| | 9/29/2016 | 650 |
| | 11/17/2016 | 950 |
| | 1/18/2017 | 900 |
| | 3/8/2017 | 710 |
| | 4/24/2017 | 700 B |
| | 6/14/2017 | 740 |
| | 7/19/2017 | 730 B |

From 8 baseline samples
Baseline mean = 757.5
Baseline std Dev = 107.935

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 760 | [0, 974.396] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-105**
**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 |
|---|---|---|
| | 8/10/2016 | 2500 |
| | 9/28/2016 | 2200 |
| | 11/16/2016 | 2400 |
| | 1/19/2017 | 2000 |
| | 3/8/2017 | 2000 |
| | 4/24/2017 | 1900 B |
| | 6/14/2017 | 2200 |
| | 7/20/2017 | 2400 B |

From 8 baseline samples
Baseline mean = 2200
Baseline std Dev = 220.389

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 2500 | [0, 2642.87] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-106**
**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 |
|---|---|---|
| | 8/11/2016 | 580 |
| | 9/28/2016 | 610 |
| | 11/17/2016 | 750 |
| | 1/18/2017 | 670 |
| | 3/9/2017 | 650 |
| | 4/24/2017 | 670 B |
| | 6/14/2017 | 710 |
| | 7/19/2017 | 790 B |
| | 8/24/2017 | 680 B |

From 9 baseline samples
Baseline mean = 678.889
Baseline std Dev = 65.0854

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1000 | [0, 806.465] | TRUE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-107**
**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 |
|---|---|---|
| | 8/10/2016 | 1200 |
| | 9/29/2016 | 1100 |
| | 11/16/2016 | 1300 |
| | 1/18/2017 | 1300 |
| | 3/9/2017 | 1200 |
| | 4/26/2017 | 1300 |
| | 6/15/2017 | 1400 |
| | 7/19/2017 | 1400 B |

From 8 baseline samples
Baseline mean = 1275
Baseline std Dev = 103.51

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1500 | [0, 1483] | TRUE |

**Prediction limit (PL) is 1,500 ug/L with appropriate significant figures. Result from 9/20/17 is equal to, but does not exceed the final PL.**

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-108A**
**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 |
|---|---|---|
| | 2/1/2017 | 1100 |
| | 3/8/2017 | 1100 |
| | 4/4/2017 | 1200 |
| | 4/24/2017 | 1200 B |
| | 5/16/2017 | 1300 |
| | 6/15/2017 | 1300 |
| | 7/6/2017 | 1300 B |
| | 7/20/2017 | 1300 B |

From 8 baseline samples
Baseline mean = 1225
Baseline std Dev = 88.6405

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 1400 | [0, 1403.12] | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-101**
**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) = 8
**Maximum Baseline Concentration = 270000**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | 270000 |
| | 9/29/2016 | 220000 |
| | 11/16/2016 | 220000 |
| | 1/19/2017 | 220000 |
| | 3/9/2017 | 210000 |
| | 4/24/2017 | 230000 |
| | 6/15/2017 | 210000 |
| | 7/20/2017 | 230000 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 230000 | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-102**
**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 |
|---|---|---|
| | 8/11/2016 | 300000 |
| | 9/29/2016 | 270000 |
| | 11/16/2016 | 280000 |
| | 1/19/2017 | 230000 |
| | 3/9/2017 | 230000 |
| | 4/24/2017 | 260000 |
| | 6/15/2017 | 270000 |
| | 7/19/2017 | 270000 |

From 8 baseline samples
Baseline mean = 263750
Baseline std Dev = 23867.2

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 260000 | [0, 311711] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-103**
**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 |
|---|---|---|
| | 8/11/2016 | 600000 |
| | 9/28/2016 | 600000 |
| | 11/17/2016 | 590000 |
| | 1/18/2017 | 590000 |
| | 3/8/2017 | 570000 |
| | 4/24/2017 | 580000 |
| | 6/14/2017 | 630000 |
| | 7/19/2017 | 590000 |

From 8 baseline samples
Baseline mean = 593750
Baseline std Dev = 17677.7

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 560000 | [0, 629273] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-104**
**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 |
|---|---|---|
| | 8/11/2016 | 500000 |
| | 9/29/2016 | 450000 |
| | 11/17/2016 | 520000 |
| | 1/18/2017 | 500000 |
| | 3/8/2017 | 480000 |
| | 4/24/2017 | 500000 |
| | 6/14/2017 | 500000 |
| | 7/19/2017 | 490000 |

From 8 baseline samples
Baseline mean = 492500
Baseline std Dev = 20528.7

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 470000 | [0, 533753] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-105**
**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 |
|---|---|---|
| | 8/10/2016 | 800000 |
| | 9/28/2016 | 740000 |
| | 11/16/2016 | 700000 |
| | 1/19/2017 | 680000 |
| | 3/8/2017 | 680000 |
| | 4/24/2017 | 620000 |
| | 6/14/2017 | 770000 |
| | 7/20/2017 | 730000 |

From 8 baseline samples
Baseline mean = 715000
Baseline std Dev = 57071.4

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 700000 | [0, 829685] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-106**
**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 |
|---|---|---|
| | 8/11/2016 | 560000 |
| | 9/28/2016 | 570000 |
| | 11/17/2016 | 620000 |
| | 1/18/2017 | 600000 |
| | 3/9/2017 | 580000 |
| | 4/24/2017 | 600000 |
| | 6/14/2017 | 620000 |
| | 7/19/2017 | 570000 |
| | 8/24/2017 | 510000 |

From 9 baseline samples
Baseline mean = 581111
Baseline std Dev = 34440

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 560000 | [0, 648618] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-107**
**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 |
|---|---|---|
| | 8/10/2016 | 1.3e+006 |
| | 9/29/2016 | 1.2e+006 |
| | 11/16/2016 | 1.3e+006 |
| | 1/18/2017 | 1.2e+006 |
| | 3/9/2017 | 1.3e+006 |
| | 4/26/2017 | 1.4e+006 |
| | 6/15/2017 | 1.4e+006 |
| | 7/19/2017 | 1.4e+006 |

From 8 baseline samples
Baseline mean = 1.3125e+006
Baseline std Dev = 83452.3

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1.3e+006 | [0, 1.4802e+006] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-108A**
**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 |
|---|---|---|
| | 2/1/2017 | 370000 |
| | 3/8/2017 | 380000 |
| | 4/4/2017 | 380000 |
| | 4/24/2017 | 390000 |
| | 5/16/2017 | 390000 |
| | 6/15/2017 | 440000 |
| | 7/6/2017 | 440000 |
| | 7/20/2017 | 440000 |

From 8 baseline samples
Baseline mean = 403750
Baseline std Dev = 30676.9

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 420000 | [0, 465395] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-101**
**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 |
|---|---|---|
| | 8/10/2016 | 95 |
| | 9/29/2016 | 97 |
| | 11/16/2016 | 160 |
| | 3/9/2017 | 150 |
| | 4/24/2017 | 170 |
| | 6/15/2017 | 140 |
| | 7/20/2017 | 130 |

From 7 baseline samples
Baseline mean = 134.571
Baseline std Dev = 29.3477

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 = 7 (background observations) - 1
t(0.95, 7) = 1.94318

| Date | Samples | Mean | Interval | Significant |
|---|---|---|---|---|
| 9/20/2017 | 1 | 120 | [0, 195.537] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-102**
**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 |
|---|---|---|
| | 8/11/2016 | 160 |
| | 9/29/2016 | 120 |
| | 11/16/2016 | 160 |
| | 1/19/2017 | 230 |
| | 3/9/2017 | 220 |
| | 4/24/2017 | 260 |
| | 6/15/2017 | 190 |
| | 7/19/2017 | 170 |
| | 8/24/2017 | 150 |

From 9 baseline samples
Baseline mean = 184.444
Baseline std Dev = 44.4722

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 170 | [0, 271.616] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-103**
**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 |
|---|---|---|
| | 8/11/2016 | 150 |
| | 9/28/2016 | 130 |
| | 11/17/2016 | 150 |
| | 1/18/2017 | 150 |
| | 3/8/2017 | 140 |
| | 4/24/2017 | 140 |
| | 6/14/2017 | 140 |
| | 7/19/2017 | 150 |

From 8 baseline samples
Baseline mean = 143.75
Baseline std Dev = 7.44024

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 150 | [0, 158.701] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-104**
**Parameter: Chloride**
**Natural Logarithm Transformation**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/11/2016 | 5.79909 |
| | 9/29/2016 | 5.70378 |
| | 11/17/2016 | 6.39693 |
| | 1/18/2017 | 6.53669 |
| | 3/8/2017 | 5.52146 |
| | 4/24/2017 | 5.39363 |
| | 6/14/2017 | 5.39363 |
| | 7/19/2017 | 5.48064 |

From 8 baseline samples
Baseline mean = 5.77823
Baseline std Dev = 0.449501

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 5.52146 | [0, 6.68151] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-105**
**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 |
|---|---|---|
| | 8/10/2016 | 4300 |
| | 9/28/2016 | 4500 |
| | 11/16/2016 | 4000 |
| | 1/19/2017 | 3700 |
| | 3/8/2017 | 3700 |
| | 4/24/2017 | 2800 |
| | 6/14/2017 | 3500 |
| | 7/20/2017 | 3900 |

From 8 baseline samples
Baseline mean = 3800
Baseline std Dev = 520.988

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 4300 | [0, 4846.93] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-106**
**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 |
|---|---|---|
| | 8/11/2016 | 120 |
| | 9/28/2016 | 100 |
| | 11/17/2016 | 120 |
| | 1/18/2017 | 110 |
| | 3/9/2017 | 110 |
| | 4/24/2017 | 110 |
| | 6/14/2017 | 110 |
| | 7/19/2017 | 120 |
| | 8/24/2017 | 110 |

From 9 baseline samples
Baseline mean = 112.222
Baseline std Dev = 6.66667

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 140 | [0, 125.29] | TRUE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-107**
**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 |
|---|---|---|
| | 8/10/2016 | 19000 |
| | 9/29/2016 | 18000 |
| | 11/16/2016 | 18000 |
| | 1/18/2017 | 18000 |
| | 3/9/2017 | 16000 |
| | 4/26/2017 | 19000 |
| | 6/15/2017 | 17000 |
| | 7/19/2017 | 20000 |

From 8 baseline samples
Baseline mean = 18125
Baseline std Dev = 1246.42

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 20000 | [0, 20629.7] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-108A**
**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 |
|---|---|---|
| | 2/1/2017 | 1700 |
| | 3/8/2017 | 1700 |
| | 4/4/2017 | 1800 |
| | 4/24/2017 | 1600 |
| | 5/16/2017 | 1800 |
| | 6/15/2017 | 1800 |
| | 7/6/2017 | 1800 |
| | 7/20/2017 | 1900 |

From 8 baseline samples
Baseline mean = 1762.5
Baseline std Dev = 91.6125

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 2100 | [0, 1946.6] | TRUE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-101**
**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 |
|---|---|---|
| | 8/10/2016 | 1.6 |
| | 9/29/2016 | 1.8 |
| | 11/16/2016 | 1.8 |
| | 3/9/2017 | 1.6 |
| | 4/24/2017 | 1.9 |
| | 6/15/2017 | 1.9 |
| | 7/20/2017 | 1.9 |

From 7 baseline samples
Baseline mean = 1.78571
Baseline std Dev = 0.134519

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 = 7 (background observations) - 1
t(0.95, 7) = 1.94318

| Date | Samples | Mean | Interval | Significant |
|---|---|---|---|---|
| 9/20/2017 | 1 | 2 | [0, 2.06516] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-102**
**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 |
|---|---|---|
| | 8/11/2016 | 1.5 |
| | 9/29/2016 | 1.6 |
| | 11/16/2016 | 1.5 |
| | 1/19/2017 | 1.1 |
| | 3/9/2017 | 1.2 |
| | 4/24/2017 | 1.5 |
| | 6/15/2017 | 1.7 |
| | 7/19/2017 | 1.8 |
| | 8/24/2017 | 1.5 |

From 9 baseline samples
Baseline mean = 1.48889
Baseline std Dev = 0.220479

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1.8 | [0, 1.92106] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-103**
**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 |
|---|---|---|
| | 8/11/2016 | 1.6 |
| | 9/28/2016 | 1.7 |
| | 11/17/2016 | 1.5 |
| | 1/18/2017 | 1.6 |
| | 3/8/2017 | 1.5 |
| | 4/24/2017 | 1.9 |
| | 6/14/2017 | 1.9 |
| | 7/19/2017 | 2 |

From 8 baseline samples
Baseline mean = 1.7125
Baseline std Dev = 0.195941

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1.9 | [0, 2.10624] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-104**
**Parameter: Fluoride**
**Natural Logarithm Transformation**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/11/2016 | 0.993252 |
| | 9/29/2016 | 0.405465 |
| | 11/17/2016 | 0.182322 |
| | 1/18/2017 | 0.262364 |
| | 3/8/2017 | 0.262364 |
| | 4/24/2017 | 0.587787 |
| | 6/14/2017 | 0.587787 |
| | 7/19/2017 | 0.587787 |

From 8 baseline samples
Baseline mean = 0.483641
Baseline std Dev = 0.263784

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 0.641854 | [0, 1.01372] | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-105**
**Parameter: Fluoride**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 87.5%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 8
**Maximum Baseline Concentration = 5.8**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | 5.8 |
| | 9/28/2016 | ND<2.5 U |
| | 11/16/2016 | ND<2.5 U |
| | 1/19/2017 | ND<2.5 U |
| | 3/8/2017 | ND<2.5 U |
| | 4/24/2017 | ND<2.5 U |
| | 6/14/2017 | ND<2.5 U |
| | 7/20/2017 | ND<2.5 U |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/21/2017 | 1 | 2.5 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-106**
**Parameter: Fluoride**
**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 = 3**
Confidence Level = 90%
False Positive Rate = 10%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 3 |
| | 9/28/2016 | 1.7 |
| | 11/17/2016 | 1.6 |
| | 1/18/2017 | 1.5 |
| | 3/9/2017 | 1.4 |
| | 4/24/2017 | 1.8 |
| | 6/14/2017 | 1.8 |
| | 7/19/2017 | 1.9 |
| | 8/24/2017 | 1.8 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 1.9 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-107**
**Parameter: Fluoride**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

Total Percent Non-Detects = 77.7778%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 9
**Maximum Baseline Concentration = 2.5**
Confidence Level = 90%
False Positive Rate = 10%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | ND<2.5 UF1 |
| | 9/29/2016 | ND<2.5 U |
| | 11/16/2016 | ND<2.5 U |
| | 1/18/2017 | ND<2.5 U |
| | 3/9/2017 | ND<2.5 U |
| | 4/26/2017 | 2.1 |
| | 6/15/2017 | ND<2.4 U |
| | 7/19/2017 | ND<2.4 U |
| | 8/24/2017 | 2.3 F1 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 1.3 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-108A**
**Parameter: Fluoride**
**Original Data (Not Transformed)**
**Cohen's Adjustment**

Total Percent Non-Detects = 50%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 8
**Maximum Baseline Concentration = 2.5**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 2/1/2017 | ND<1 U |
| | 3/8/2017 | 1.2 |
| | 4/4/2017 | 1.3 |
| | 4/24/2017 | ND<1.3 U |
| | 5/16/2017 | 1.1 |
| | 6/15/2017 | ND<2.5 U |
| | 7/6/2017 | ND<1.3 U |
| | 7/20/2017 | 1.1 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/21/2017 | 1 | 1.3 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-101**
**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 = 7.79** **Minimum Baseline Concentration = 6.79**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | 7 |
| | 9/29/2016 | 7.79 |
| | 11/16/2016 | 6.91 |
| | 1/19/2017 | 6.79 |
| | 3/9/2017 | 6.92 |
| | 4/24/2017 | 6.91 |
| | 6/15/2017 | 6.91 |
| | 7/20/2017 | 6.94 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 6.97 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-102**
**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) = 9
**Maximum Baseline Concentration = 7.56** **Minimum Baseline Concentration = 6.49**
Confidence Level = 90%
False Positive Rate = 10%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 6.49 |
| | 9/29/2016 | 7.56 |
| | 11/16/2016 | 6.79 |
| | 1/19/2017 | 6.74 |
| | 3/9/2017 | 6.94 |
| | 4/24/2017 | 6.91 |
| | 6/15/2017 | 6.75 |
| | 7/19/2017 | 6.86 |
| | 8/24/2017 | 6.85 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 6.82 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-103**
**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 = 7.58** **Minimum Baseline Concentration = 6.67**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 6.67 |
| | 9/28/2016 | 7.58 |
| | 11/17/2016 | 6.75 |
| | 1/18/2017 | 6.7 |
| | 3/8/2017 | 6.77 |
| | 4/24/2017 | 6.77 |
| | 6/14/2017 | 6.7 |
| | 7/19/2017 | 6.73 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 6.76 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-104**
**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 = 7.88** **Minimum Baseline Concentration = 6.8**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 6.82 |
| | 9/29/2016 | 7.88 |
| | 11/17/2016 | 6.97 |
| | 1/18/2017 | 6.8 |
| | 3/8/2017 | 6.94 |
| | 4/24/2017 | 6.93 |
| | 6/14/2017 | 6.85 |
| | 7/19/2017 | 6.92 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 6.94 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-105**
**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 = 7.9** **Minimum Baseline Concentration = 6.59**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | 6.59 |
| | 9/28/2016 | 7.9 |
| | 11/16/2016 | 6.87 |
| | 1/19/2017 | 6.78 |
| | 3/8/2017 | 6.83 |
| | 4/24/2017 | 6.8 |
| | 6/14/2017 | 6.82 |
| | 7/20/2017 | 6.93 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/21/2017 | 1 | 6.87 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-106**
**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) = 9
**Maximum Baseline Concentration = 7.59** **Minimum Baseline Concentration = 6.48**
Confidence Level = 90%
False Positive Rate = 10%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 6.67 |
| | 9/28/2016 | 7.59 |
| | 11/17/2016 | 6.48 |
| | 1/18/2017 | 6.73 |
| | 3/9/2017 | 6.84 |
| | 4/24/2017 | 6.8 |
| | 6/14/2017 | 6.75 |
| | 7/19/2017 | 6.81 |
| | 8/24/2017 | 6.82 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 6.8 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-107**
**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) = 9
**Maximum Baseline Concentration = 7.59** **Minimum Baseline Concentration = 6.53**
Confidence Level = 90%
False Positive Rate = 10%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | 6.53 |
| | 9/29/2016 | 7.59 |
| | 11/16/2016 | 6.66 |
| | 1/18/2017 | 6.66 |
| | 3/9/2017 | 6.73 |
| | 4/26/2017 | 6.67 |
| | 6/15/2017 | 6.6 |
| | 7/19/2017 | 6.67 |
| | 8/24/2017 | 6.65 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 6.65 | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-108A**
**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 = 6.87** **Minimum Baseline Concentration = 6.7**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 2/1/2017 | 6.7 |
| | 3/8/2017 | 6.83 |
| | 4/4/2017 | 6.86 |
| | 4/24/2017 | 6.86 |
| | 5/16/2017 | 6.84 |
| | 6/15/2017 | 6.8 |
| | 7/6/2017 | 6.83 |
| | 7/20/2017 | 6.87 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/21/2017 | 1 | 6.83 | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-101**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/10/2016 | 680 |
| | 9/29/2016 | 680 |
| | 11/16/2016 | 560 |
| | 3/9/2017 | 580 |
| | 4/24/2017 | 480 |
| | 6/15/2017 | 540 |
| | 7/20/2017 | 590 |

From 7 baseline samples
Baseline mean = 587.143
Baseline std Dev = 72.7357

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 = 7 (background observations) - 1
t(0.95, 7) = 1.94318

| Date | Samples | Mean | Interval | Significant |
|---|---|---|---|---|
| 9/20/2017 | 1 | 670 | [0, 738.24] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-102**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/11/2016 | 680 |
| | 9/29/2016 | 610 |
| | 11/16/2016 | 660 |
| | 1/19/2017 | 410 |
| | 3/9/2017 | 520 |
| | 4/24/2017 | 450 |
| | 6/15/2017 | 610 |
| | 7/19/2017 | 650 |
| | 8/24/2017 | 620 |

From 9 baseline samples
Baseline mean = 578.889
Baseline std Dev = 96.2347

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 700 | [0, 767.522] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-103**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/11/2016 | 1900 |
| | 9/28/2016 | 2100 |
| | 11/17/2016 | 2000 |
| | 1/18/2017 | 2000 |
| | 3/8/2017 | 2000 |
| | 4/24/2017 | 1800 |
| | 6/14/2017 | 1900 |
| | 7/19/2017 | 2000 |

From 8 baseline samples
Baseline mean = 1962.5
Baseline std Dev = 91.6125

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1900 | [0, 2146.6] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-104**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/11/2016 | 1700 |
| | 9/29/2016 | 1800 |
| | 11/17/2016 | 1800 |
| | 1/18/2017 | 1800 |
| | 3/8/2017 | 1800 |
| | 4/24/2017 | 1700 |
| | 6/14/2017 | 1700 |
| | 7/19/2017 | 1800 |

From 8 baseline samples
Baseline mean = 1762.5
Baseline std Dev = 51.7549

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1900 | [0, 1866.5] | TRUE |

**Prediction limit (PL) is 1,900 mg/L with appropriate significant figures. Result from 9/20/17 is equal to, but does not exceed the final PL.**

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-105**
**Parameter: Sulfate**
**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 = 2000**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/10/2016 | 2000 |
| | 9/28/2016 | 1900 |
| | 11/16/2016 | 1900 |
| | 1/19/2017 | 1800 |
| | 3/8/2017 | 1800 |
| | 4/24/2017 | 1500 |
| | 6/14/2017 | 1900 |
| | 7/20/2017 | 2000 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/21/2017 | 1 | 2200 | TRUE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-106**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/11/2016 | 1900 |
| | 9/28/2016 | 2000 |
| | 11/17/2016 | 2000 |
| | 1/18/2017 | 2100 |
| | 3/9/2017 | 2000 |
| | 4/24/2017 | 1800 |
| | 6/14/2017 | 1900 |
| | 7/19/2017 | 1900 |
| | 8/24/2017 | 2000 |

From 9 baseline samples
Baseline mean = 1955.56
Baseline std Dev = 88.1917

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1900 | [0, 2128.42] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-107**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 8/10/2016 | 3100 |
| | 9/29/2016 | 3100 |
| | 11/16/2016 | 3200 |
| | 1/18/2017 | 3300 |
| | 3/9/2017 | 2900 |
| | 4/26/2017 | 3200 |
| | 6/15/2017 | 3800 |
| | 7/19/2017 | 3400 |

From 8 baseline samples
Baseline mean = 3250
Baseline std Dev = 267.261

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 3400 | [0, 3787.06] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-108A**
**Parameter: Sulfate**
**Original Data (Not Transformed)**
**Non-Detects Replaced with Detection Limit**

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

| Baseline Samples | Date | Result |
|---|---|---|
| | 2/1/2017 | 940 |
| | 3/8/2017 | 930 |
| | 4/4/2017 | 1000 |
| | 4/24/2017 | 900 |
| | 5/16/2017 | 1000 |
| | 6/15/2017 | 1000 |
| | 7/6/2017 | 1000 |
| | 7/20/2017 | 1000 |

From 8 baseline samples
Baseline mean = 971.25
Baseline std Dev = 41.2094

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 1100 | [0, 1054.06] | TRUE |

**Prediction limit (PL) is 1,100 mg/L with appropriate significant figures. Result from 9/21/17 is equal to, but does not exceed the final PL.**

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-101**
**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 |
|---|---|---|
| | 8/10/2016 | 1400 |
| | 9/29/2016 | 1300 |
| | 11/16/2016 | 1200 |
| | 1/19/2017 | 1300 |
| | 3/9/2017 | 1300 |
| | 4/24/2017 | 1300 |
| | 6/15/2017 | 1300 |
| | 7/20/2017 | 1300 |

From 8 baseline samples
Baseline mean = 1300
Baseline std Dev = 53.4522

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1400 | [0, 1407.41] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-102**
**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 |
|---|---|---|
| | 8/11/2016 | 1700 |
| | 9/29/2016 | 1500 |
| | 11/16/2016 | 1500 |
| | 1/19/2017 | 1300 |
| | 3/9/2017 | 1600 |
| | 4/24/2017 | 1500 |
| | 6/15/2017 | 1600 |
| | 7/19/2017 | 1600 |

From 8 baseline samples
Baseline mean = 1537.5
Baseline std Dev = 118.773

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 1500 | [0, 1776.18] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-103**
**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 |
|---|---|---|
| | 8/11/2016 | 3400 |
| | 9/28/2016 | 3200 |
| | 11/17/2016 | 3200 |
| | 1/18/2017 | 3200 |
| | 3/8/2017 | 3600 |
| | 4/24/2017 | 2900 |
| | 6/14/2017 | 3000 |
| | 7/19/2017 | 3300 |

From 8 baseline samples
Baseline mean = 3225
Baseline std Dev = 218.763

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 3200 | [0, 3664.6] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-104**
**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 |
|---|---|---|
| | 8/11/2016 | 3300 |
| | 9/29/2016 | 2700 |
| | 11/17/2016 | 3800 |
| | 1/18/2017 | 3800 |
| | 3/8/2017 | 3300 |
| | 4/24/2017 | 2700 |
| | 6/14/2017 | 2900 |
| | 7/19/2017 | 3000 |

From 8 baseline samples
Baseline mean = 3187.5
Baseline std Dev = 442.194

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 3000 | [0, 4076.09] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-105**
**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 |
|---|---|---|
| | 8/10/2016 | 9100 |
| | 9/28/2016 | 9500 |
| | 11/16/2016 | 7900 |
| | 1/19/2017 | 8200 |
| | 3/8/2017 | 8500 |
| | 4/24/2017 | 7600 |
| | 6/14/2017 | 8300 |
| | 7/20/2017 | 8400 |

From 8 baseline samples
Baseline mean = 8437.5
Baseline std Dev = 613.974

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 8400 | [0, 9671.28] | FALSE |

## Non-Parametric Prediction Interval

**Intra-Well Comparison for MW-106**
**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 = 3200**
Confidence Level = 88.9%
False Positive Rate = 11.1%

| Baseline Measurements | Date | Value |
|---|---|---|
| | 8/11/2016 | 3100 |
| | 9/28/2016 | 3100 |
| | 11/17/2016 | 3200 |
| | 1/18/2017 | 3200 |
| | 3/9/2017 | 3100 |
| | 6/14/2017 | 3100 |
| | 7/19/2017 | 3000 |
| | 8/24/2017 | 2800 |

| Date | Count | Mean | Significant |
|---|---|---|---|
| 9/20/2017 | 1 | 3100 | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-107**
**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 |
|---|---|---|
| | 8/10/2016 | 21000 |
| | 9/29/2016 | 19000 |
| | 11/16/2016 | 19000 |
| | 1/18/2017 | 27000 |
| | 3/9/2017 | 31000 |
| | 4/26/2017 | 34000 |
| | 6/15/2017 | 31000 |
| | 7/19/2017 | 36000 |

From 8 baseline samples
Baseline mean = 27250
Baseline std Dev = 6819.09

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 |
|---|---|---|---|---|
| 9/20/2017 | 1 | 27000 | [0, 40953] | FALSE |

## Parametric Prediction Interval Analysis

**Intra-Well Comparison for MW-108A**
**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 |
|---|---|---|
| | 2/1/2017 | 4200 |
| | 3/8/2017 | 4200 |
| | 4/4/2017 | 4600 |
| | 4/24/2017 | 4100 |
| | 5/16/2017 | 4500 |
| | 6/15/2017 | 4700 |
| | 7/6/2017 | 4600 |
| | 7/20/2017 | 4500 |

From 8 baseline samples
Baseline mean = 4425
Baseline std Dev = 225.198

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 |
|---|---|---|---|---|
| 9/21/2017 | 1 | 5000 | [0, 4877.54] | TRUE |