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November 27, 2024

Mr. Brian Rath
Land Quality Bureau
Iowa Department of Natural Resources
6200 Park Ave
Des Moines, IA 50321

Subject: **2024 Annual Water Quality Report**
Interstate Power and Light Company – Marshalltown East and West Closed Landfills
Permits #64-SDP-05-91C; #64-SDP-03-90C

Dear Mr. Rath:

On behalf of Interstate Power and Light Company (IPL), Alliant Energy is providing the enclosed 2024 Annual Water Quality Report for the closed Marshalltown East and West landfills, as required by Permits #67-SDP-05-91C, #64-SDP-03-90C, and associated amendments.

Please call me at (515) 558-9704 or email me at jennycoughlin@alliantenergy.com with any questions regarding the enclosed report.

Sincerely,

Jenny Coughlin
Sr. Environmental Specialist
Alliant Energy Corporate Services, Inc.

Enclosures

Cc: IDNR Field Office #5
George Kueny – IPL Marshalltown Generating Station
Meghan Blodgett, Thomas Karwoski – SCS Engineers

2024 Annual Water Quality Report

Interstate Power and Light Company Marshalltown East and West Closed Landfills Permit #64-SDP-5-91C and #64-SDP-3-90C

Interstate Power and Light, an Alliant Energy Company
200 First Street SE
Cedar Rapids, Iowa 52401

SCS ENGINEERS

25224064.00 | November 27, 2024

2830 Dairy Drive
Madison, WI 53718
608-224-2830

CERTIFICATION

I, Thomas J. Karwoski, hereby certify that this report was prepared by me, or under my direct supervision, and that I am a qualified ground water scientist as defined in Iowa Administrative Code (IAC) SS 113.10(1)d.

Signature

November 27, 2024
Date

Pages or Sheets Covered by this Certification:

2024 Annual Water Quality Report – November 2024, Interstate Power and Light Company, Marshalltown East and West Closed Landfills

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EXECUTIVE SUMMARY

Period of Report Coverage

The period of coverage for this report is from November 2023 through October 2024 and includes the April 2024 water level measurement event and the September 2024 groundwater sampling event conducted at the Marshalltown East and West Closed Landfills (Site), Coal Combustion Residual (CCR) landfills located near Marshalltown, Iowa (**Figure 1**).

Report Priority

Comparison of the September 2024 results to the groundwater protection standards (GWPSs) indicated that there was one new GWPS exceedances in 2024 for molybdenum at MW-21. Molybdenum was added to the sampling program in 2023. The GWPS exceedances detected in September 2024 are:

- Lithium: MW-3, MW-10, MW-11AR, MW-13, MW-14, MW-18, MW-20, MW-21, and MW-23
- Molybdenum: MW-20, MW-21

Monitoring well MW-10 is a background well for the East Landfill, and lithium concentrations detected at many of the other wells with GWPS exceedances were similar to the concentration at MW-10. The September 2024 sampling event was the second time samples were tested for lithium and molybdenum at the Site, so the GWPS exceedances for lithium and molybdenum have not been confirmed and cannot be compared to historical data, but these results indicate that lithium concentrations in groundwater at the site may be at least partly attributable to natural conditions.

Most exceedances of the background Upper Prediction Limits (UPLs) were consistent with previous results, with the following exceptions:

- MW-4: No GWPS exceedances
- MW-21: New GWPS exceedance for molybdenum

Dedicated pumps were installed in 2023 at MW-4, MW-5, and MW-18 in an attempt to reduce turbidity in samples from these wells. In 2024, total suspended solids (TSS) at MW-4 was 12 milligrams per liter (mg/L). TSS at MW-5 was less than the limit of quantitation. TSS was not detected at MW-18. While TSS data from previous years are not available for comparison, these results and the reduction in UPL and GWPS exceedances at MW-5 and MW-18 indicate that the installation of dedicated pumps did apparently improve sample quality at some wells, and some standards exceedances previously detected at MW-5 and MW-18 may be attributable to suspended sediment in the samples.

Groundwater samples collected in 2024 were unfiltered, in accordance with the variance to Iowa Administrative Code (IAC) 567-103.1(2)f granted on September 16, 2016, and the conditions of the landfill permit renewal dated December 22, 2016. The 2024 sampling event was the ninth round of unfiltered samples collected at the site, and 2024 was the sixth reporting period during which the new statistical approach was applied at the Site.

SCS Engineers (SCS) recommends that the current monitoring program be continued during 2025.

No additional requests or amendments to the permit are needed at this time.

Site Status and Applicable Rules

The following summarizes the site status and applicable rules associated with groundwater sampling at the Marshalltown East and West Closed Landfills:

- **Landfill Status:** Closed
- **Types of Wastes Accepted:** CCR
- **Applicable IAC Rules:** 567-103 current version, certain provisions of 567-115.26(6) 567-115.21 (referenced for monitoring well maintenance and evaluation requirements, in place of the rescinded 567-110.9).

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ACRONYMS/ABBREVIATIONS

AWQR = Annual Water Quality Report
CCR = Coal Combustion Residual
COC = Chain of Custody
DO = Dissolved Oxygen
EPA = Environmental Protection Agency
GWGCS = Groundwater Gradient Control System
GWPS = Groundwater Protection Standard
IAC = Illinois Administrative Code
IDNR = Iowa Department of Natural Resources
LCS = Laboratory Control Sample
mg/L = milligrams per liter
MS = Matrix Spike
MSD = Matrix Spike Duplicate
MCL = EPA Maximum Contaminant Level
ORP = Oxidation-Reduction Potential
QA/QC = Quality Assurance/Quality Control
RCRA = Resource Conservation and Recovery Act
Site = Marshalltown East and West Closed Landfills
SMCLs = Secondary Maximum Contaminant Levels
SSI = Statistically Significant Increase above background
SWS = Statewide Standard
TDS = Total Dissolved Solids
TSS = Total Suspended Solids
UPL = Upper Prediction Limits
U.S. EPA = U.S. Environmental Protection Agency
Unified Guidance = Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act Facilities

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1.0 SITE BACKGROUND

1.1 SITE HISTORY

The Marshalltown East and West Closed Landfills are closed coal combustion residual (CCR) landfills located near Marshalltown, Iowa (**Figure 1**). The Marshalltown East and West Landfills were used for disposal of CCR. No CCR or other waste has been disposed at the site since 1995, when the East Landfill was capped and closed. The West Landfill was capped and closed in 1993. A site plan is shown on **Figure 2.** A Facility Inspection Report for 2024 is included in **Appendix A.** Erosion features were not noted at the site in 2024.

1.2 SITE HYDROGEOLOGY

1.2.1 Geology

A detailed description of the regional and local geology is provided in the Phase II Hydrogeological Investigation Report prepared by James M. Montgomery, submitted in December 1991 (Montgomery, 1991), and in earlier investigation reports. A summary of the site geology, as described in the December 1991 report, is presented here.

The unconsolidated geology at the site generally consists of loess, glacial till, and alluvium. The loess consists of fine-grained sediment; the till includes material ranging in size from clay to boulders; and the alluvium primarily consists of sand, silt, and clay deposited by the stream on the western border of the site.

The unconsolidated material overlies Mississippian limestone bedrock. The limestone unit at the site is classified as an aquifer. Prior to landfilling, the limestone unit was mined at the site. The bedrock surface at the site is highly variable as a result of erosion and weathering, and depth to bedrock ranges from 6 feet at MW-8 to 69 feet at MW-10.

1.2.2 Hydrogeology/Groundwater Flow Conditions

Groundwater, surface water, and leachate levels were measured during April and September 2024. The groundwater levels during the September event were measured prior to purging the wells for sampling. The groundwater and surface water elevation data are presented in **Table 4A**, and vertical gradients are presented in **Table 4B.** The 2024 water level data were used to create water table and potentiometric surface maps (**Figures 3** through **6**).

As described below in **Section 3.0**, a biennial evaluation of water level conditions was included in the 2023 Annual Water Quality Report (AWQR). The next biennial evaluation will be completed in 2025.

2.0 SAMPLING STATUS SUMMARY

The Iowa Department of Natural Resources (IDNR) has requested that sampling data be summarized in a series of tables to consistently convey information related to groundwater monitoring at CCR landfills throughout Iowa. These tables are discussed within the text in appropriate sections as noted and included in the Tables section at the end of the text. **Table 1** provides an overview of the sampling status for the Site, including the monitoring points in the program, current monitoring program, comparative statistics findings, and the number of samples collected. **Figure 2** summarizes the monitoring network for Marshalltown.

Field sheets from the 2024 monitoring events are included in **Appendix B.** Sampling completed in 2018 to 2024 and anticipated sampling for 2025 is summarized in **Table 2.** The laboratory analytical report for samples collected in 2024 is included in **Appendix C.** Groundwater chemistry summary tables for historic data collected before 2019 are included in **Appendix D.** Groundwater chemistry tables for all data collected since the transition to unfiltered sampling in 2016 are included in **Appendix E.** Sufficient water was not present for sample collection at MW-22 in September 2024.

As requested by IDNR, calcium, lithium, molybdenum, total dissolved solids (TDS), and total suspended solids (TSS) were added to the sampling parameters for all monitoring wells, surface water monitoring points, and leachate sampling points reported in the AWQR beginning in 2023 and continued for the current monitoring period. Because of the low number of samples for the parameters listed above, UPLs cannot be calculated at this time. UPL calculations for these parameters will be included in the report when a minimum of four samples have been collected at background wells.

Additionally, field parameters dissolved oxygen (DO) and oxidation-reduction potential (ORP) are included in the tables of this AWQR for the second time for evaluation of the potential influences on groundwater chemistry due to reducing groundwater conditions. DO and ORP are required parameters to determine stability during low-flow sampling and have been included in previous AWQRs on field sheets.

Copper and zinc were not included in the analytical parameter list for monitoring wells or surface water points in 2024, as proposed in the June 22, 2023 Assessment Workplan. IDNR's July 14, 2023 response to this submittal approved the recommendation to remove copper and zinc, with the exception that they should be retained for leachate samples in sampling events 2023 onwards.

3.0 MONITORING WELL MAINTENANCE AND PERFORMANCE SUMMARY

IAC 567-115.21 was referenced for monitoring well maintenance and evaluation, in place of the rescinded 567-110.9. Each requirement is listed below in italics, followed by text describing how the requirement was addressed.

a. *A biennial examination of high and low water levels accompanied by a discussion of the acceptability of well location (vertically and horizontally) and exposure of the screened interval to the atmosphere.*

An evaluation was included in the 2023 AWQR and concluded that the existing monitoring wells adequately characterize the groundwater quality and groundwater flow conditions at the site. The next biennial evaluation will be required in 2025.

b. *A biennial evaluation of water level conditions in the monitoring wells to ensure that the effects of waste disposal or well operation have not resulted in changes in the hydrologic setting and resultant flow paths.*

An evaluation was included in the 2023 AWQR. The next biennial evaluation will be required in 2025. Water levels in 2024 were generally consistent with historical data.

c. *Annual measurement of well depths to ensure that wells are physically intact and not filling with sediment.*

Measured well depths are summarized in **Table 4A**. The difference between the previously-measured total depths and the most recent total depths were less than 1 foot in all wells except MW-20. The measured total depth at MW-20 was more than 1 foot deeper than the documented total depth in both April and September 2024. These measurements appear to reflect the difficulty of accurately measuring total depth in a deep well using a flexible water level tape. It does not appear siltation is affecting the ability of the monitoring wells to produce representative groundwater samples and groundwater elevation data.

d. *Every five years conduct in-situ permeability tests on monitoring wells to compare test data with those collected originally to determine if well deterioration is occurring.*

A variance to IAC 567-110.9(2)(d) for in situ permeability tests every 5 years was granted by the IDNR in a letter dated May 4, 1999. Although IAC 567-110 has been rescinded since the variance was granted, the same permeability test requirements are now in IAC 567-115.21(2), and our understanding is that the conditions of the variance still apply. The conditions of the variance state that, if a well cannot be sampled or purged because of plugging, the well will be replaced within 6 months of reporting this condition to IDNR in the annual report. The monitoring wells at this site are performing adequately as noted above.

Table 3 provides the years in which each requirement was previously met and for which it is next scheduled.

3.1 DEDICATED PUMP INSTALLATIONS AND NETWORK UPDATES

Dedicated bladder pumps were installed at monitoring wells MW-4, MW-5, and MW-18 prior to the September 2023 monitoring event, to reduce turbidity in samples and assess whether lower-turbidity samples may affect detected metals concentrations.

Removal of the Leachate Tank from the sampling program was proposed in the June 22, 2023 Recommended Assessment Steps submittal, and approved by IDNR on July 14, 2023. Suspension of water level monitoring at LL-1 was approved by IDNR in the 2022 AWQR review letter, dated February 17, 2023.

3.2 WELL MAINTENANCE RECOMMENDATIONS

No well maintenance activities are recommended based on observations during the 2024 monitoring events.

4.0 QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

Data validation quality assurance/quality control (QA/QC) procedures are performed on analytical results for laboratory quality control samples, and a quality assurance assessment of the data is conducted as the data are generated. The QA/QC review procedure provides documentation of the accuracy and precision of the analytical data and confirms that the analyses are sufficiently sensitive to detect constituents at levels below regulatory standards, where such standards exist. QA/QC data validation includes review of sample handling, analytical sensitivity, blanks, accuracy, and precision. The QA/QC and data validation procedures and findings are discussed in more detail below.

4.1 SAMPLE COLLECTION AND HANDLING

Groundwater samples are collected using a dedicated QED Well Wizard bladder pump, or a QED Sample Pro pump with disposable bladders and dedicated tubing. In wells without dedicated pumps, the QED Sample Pro pump is decontaminated between wells and a new bladder is used for each well. Samples are not field filtered. The water level measurement tape is decontaminated between wells. All samples are placed on ice after collection and are transported to the laboratory in sealed coolers under Chain of Custody (COC).

Sample receipt forms were reviewed and checked to verify that samples were received in good condition and within the acceptable temperature range. COC records for each sampling event were reviewed and confirmed that information was complete.

For the September 2024 sampling event, no issues with sample preservation or with sample collection and handling procedures were identified.

4.2 ANALYTICAL SENSITIVITY AND BLANKS

Laboratory QA/QC procedures and post-analysis data validation assist in producing data of acceptable quality and reliability. Eurofins - Cedar Falls is a certified laboratory in Iowa and performed QA/QC procedures, including analyzing laboratory method blanks in association with samples collected for the project to check for contributions to the analytical results possibly attributable to laboratory-based contamination. A field blank was submitted with the groundwater samples to assess whether cross-contamination occurred during sample handling and transport.

There were no detections in the September 2024 field or laboratory method blank samples.

4.3 ACCURACY

Laboratory analytical accuracy can be assessed by evaluating the constituent recoveries from the following laboratory QA/QC samples: laboratory control sample (LCS), and matrix spike/matrix spike duplicate (MS/MSD). LCS samples assess the accuracy of analytical procedures by checking the ability to recover constituents added to clean aqueous matrices. MS/MSD samples assess the accuracy of analytical procedures by checking the ability to recover constituents added to submitted samples. The MS and MSD results for iron exceeded the control limits.

4.4 DATA QUALITY SUMMARY

Based on the above QA/QC procedures and the field sampling standard operating procedures, the samples collected during this reporting period are considered to be representative of site conditions at the locations and times they were obtained. Based on the QA/QC review, no samples were rejected as unusable due to QC failures.

5.0 COMPARISON TO STANDARDS

5.1 STATISTICAL ANALYSIS

Following the eighth sampling round in 2023, the schedule for prediction limit updates changed from annual to every 2-3 years. Therefore, no updated statistical summary report is included with this AWQR, and the next statistical summary report is planned for 2025 or 2026. The 2023 statistical summary report is included in **Appendix E** for reference. **Table 5** provides the background and GWPS summary for the Site.

When prediction limits are next recalculated, IPL may propose combining the monitoring networks at both the East and West Landfills and using the same background wells for both landfills. The number of wells in the network has an effect on UPL calculations, therefore this change was not considered for 2024 reporting.

Groundwater samples collected in September 2024 were unfiltered, in accordance with the variance to 567-103.1(2)f granted on September 16, 2016, and the conditions of the landfill permit renewal dated December 22, 2016. The 2024 sampling event was the ninth round of unfiltered samples collected at the Site, and 2024 was the sixth reporting period during which the new statistical approach was applied at the Site.

The selected statistical analysis method uses a prediction interval approach as recommended for detection monitoring in the March 2009 U.S. Environmental Protection Agency (U.S. EPA) Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act (RCRA) Facilities (Unified Guidance).

Interwell testing was selected for the prediction interval evaluation. Monitoring results from the downgradient wells were compared to the UPLs to evaluate whether a statistically significant increase (SSI) over background has occurred. UPLs were calculated separately for the East and West Landfills. Consistent with previous sampling events, monitoring wells MW-9 and MW-10 were used as the background wells for the East Landfill and MW-8, MW-13, and MW-14 were used as the background wells for the West Landfill.

Monitoring results from the downgradient wells were compared to the UPLs to evaluate whether an SSI over background has occurred. UPL calculations were updated in 2023 using the eight rounds of unfiltered sample results for metals and a longer data record for anions that are not typically affected by filtration (e.g., chloride, sulfate).

Detection of an SSI at a compliance well indicates that the groundwater quality is different than the background groundwater quality but does not necessarily indicate an impact to public health or the environment.

To evaluate potential health impacts, the monitoring results were compared to health-based GWPS values. The GWPS values were set at the drinking water Maximum Contaminant Level (MCL) if one exists, otherwise the Iowa Statewide Standard (SWS) for protected groundwater. If the UPL established based on background monitoring was higher than the MCL or SWS, then the GWPS was set at the UPL. Secondary Maximum Contaminant Levels (SMCLs) were not used to establish GWPS values because SMCLs are not health-based standards, but they are shown in **Table 5** for comparison with the UPL and GWPS values.

5.2 2024 RESULTS

Table 6 is a summary of monitoring points/detected constituents from the 2024 sampling events that did not exceed a UPL. Table 7 provides a summary of ongoing and newly identified SSIs and compares these concentrations to the GWPS values.

Table 8 provides a visualization of the historic SSIs and regulatory standard exceedances since 2016, the first year during which unfiltered samples were collected at the site. Table 8 does not identify UPL exceedances prior to 2019, as this was the first year UPLs were calculated.

5.3 STANDARDS HISTORY

The standards for 2019 through 2024 are summarized in Table 9. Graphs of standards history are included in Appendix F.

6.0 SUMMARY OF FINDINGS FOR GROUNDWATER

6.1 COMPARISON TO STANDARDS

Comparison of the September 2024 results to the GWPSs indicated that there were no new GWPS exceedances in 2024, with the exception of a new GWPS exceedance for molybdenum at MW-21. Lithium and molybdenum were included in the sampling event for the first time in 2023, and GWPS exceedances were detected at several wells in 2024. The GWPS exceedances detected in September 2024 are:

- Lithium: MW-3, MW-10, MW-11AR, MW-13, MW-14, MW-18, MW-20, MW-21, and MW-23
- Molybdenum: MW-20, MW-21

Monitoring well MW-10 is a background well for the East Landfill, and lithium concentrations detected at many of the other wells with GWPS exceedances were similar to the concentration at MW-10. The September 2024 sampling event was the second time samples were tested for lithium and molybdenum at the Site, so there is limited historical data to compare to the GWPS exceedances for lithium and molybdenum. A UPL for lithium cannot yet be calculated, but these results indicate that lithium concentrations in groundwater at the site may be at least partly attributable to natural conditions.

Exceedances of the background UPLs were generally consistent with previous results.

Dedicated pumps were installed in 2023 at MW-4, MW-5, and MW-18 to reduce turbidity in samples from these wells. In September 2024, TSS at MW-4 was 12 mg/L, less than the limit of quantitation at MW-5, and not detected at MW-18. Fewer UPL and GPS exceedances were recorded at MW-5 and MW-18 in 2023 and 2024 as compared to previous years. The same UPL and GWPS exceedances were recorded at MW-4 in 2024 as compared to 2021-2023 with the exception of manganese, which no longer exceeds the UPL or GWPS. While TSS data from previous years are not available for comparison, these results indicate that the installation of dedicated pumps did apparently improve sample quality at some wells and some standards exceedances previously detected at MW-5 and MW-18 may be attributable to suspended sediment in the samples.

6.2 TREND ANALYSIS

Mann-Kendall trend tests were not performed in 2024 as no parameters with GWPS exceedances have sufficient data available for trend analysis. Only lithium and molybdenum were detected at concentrations exceeding GWPSs, and 2024 is the second year for which data are available for these parameters.

6.3 TOTAL SUSPENDED SOLIDS EVALUATION

TSS was added to the parameter list in 2023. TSS over 5 mg/L was detected at approximately half of monitoring wells, including one well with a dedicated pump (MW-4, TSS = 12 mg/L). There were no TSS values of 20 mg/L or greater observed in the 2024 results.

Elevated TSS does not appear to be correlated with higher metals concentrations when comparing results between wells, as the three wells with the highest TSS results had relatively few or no UPL or GWPS exceedances in 2024. As discussed in **Section 6.1**, fewer UPL and GWPS exceedances were recorded at MW-5 and MW-18 in 2023 following the installation of dedicated pumps. TSS data from previous years are not available for comparison, but field turbidity at MW-5 and MW-18 was previously variable and the 2023 results appear to indicate that installation of dedicated pumps at these wells improved sample quality.

Installation of additional dedicated pumps at MW-20 and MW-21 is proposed to assess whether relatively high lithium and/or molybdenum concentrations at these wells may be affected by reducing TSS.

7.0 LEACHATE MONITORING SYSTEM

A sample was voluntarily collected from leachate point LW-1 during the September 2024 sampling event. LW-4 had an insufficient amount leachate for sample collection, but enough liquid to measure field parameters. Sampling results for leachate monitoring are included in **Table 11**.

During the April and September monitoring events, leachate levels are measured at leachate head wells LW-1 through LW-4. LW-1, LW-2, and LW-3 are located in the West Landfill and are generally dry or nearly dry. LW-1 contained 2.15 feet of leachate in April 2024 and 4.39 feet in September 2024. LW-2 and LW-3 were dry during both 2024 sampling events. LW-4 is located in the East Landfill and is not typically dry; it contained 0.88 feet of leachate during the April 2024 sampling event and 1.68 feet of leachate during the September 2024 sampling event.

Leachate depths and elevations measured during 2024 are summarized in **Table 12**.

8.0 GROUNDWATER GRADIENT CONTROL SYSTEM

A sample was collected from the Groundwater Gradient Control System (GWGCS) discharge in September 2024. This point has not been sampled in recent years because it was dry. Analytical results for the September 2024 GWGCS sample are included in **Table 11**.

9.0 RECEPTOR SURVEY

SCS performed an updated receptor survey for the site in 2024. Mr. Tyler Kelly of Marshall County Planning and Zoning informed SCS that most of the county is on Rural Water and that the best sources of potentially active private water supply well information are the GeoSAM database and the Private Well Tracking System database. SCS searched these two databases for wells within 1 mile of the Site. Search results, excluding wells listed as "plugged," are summarized in **Appendix G**.

10.0 RECOMMENDATIONS

SCS recommends that the current monitoring program be continued during 2025, with the inclusion of calcium, lithium, molybdenum, TDS, TSS, field dissolved oxygen, and field redox potential. Fluoride was only sampled at LW-01 and was below the method detection limit. Fluoride was removed from the sampling program for groundwater wells prior to the September 2024 sampling event. Based on communication with IDNR in 2023, fluoride should be included in the sampling program in 5 years and reevaluated.

The planned monitoring schedule for 2025 is summarized in **Table 2**.

11.0 REFERENCES

Montgomery, James M., 1991, Phase II Hydrogeologic Investigation Report and Hydrologic Monitoring System Plan for the Existing Marshalltown CCR Landfill, Iowa Electric Light and Power Company, December 1991.

SCS Engineers, 2018, 2018 Annual Water Quality Report, Interstate Power and Light Company – Marshalltown East and West Closed Landfill, November 28, 2018.

Tables

Table 1
Monitoring Program Summary
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Monitoring Point	Landfill	Formation	Current Monitoring Program	Change for Next Sampling Event	UPL Exceedances	Total # of Samples in each monitoring program since January 1, 2018
						Routine
Sampled Monitoring Wells						
MW-3	West	Shallow	Routine	NC	Selenium	7
MW-4	West	Shallow	Routine	NC	Arsenic, boron	7
MW-5	West	Shallow	Routine	NC	Barium, selenium	7
MW-7	West	Shallow	Routine	NC	none	7
MW-8	West	Shallow	Routine	NC	none	6**
MW-9	East	Shallow	Routine	NC	none	7
MW-10	East	Shallow	Routine	NC	none	7
MW-11AR	East	Deep	Routine	NC	Magnesium	7
MW-13	East and West*	Shallow	Routine	NC	Sulfate	7
MW-14	East and West*	Shallow	Routine	NC	none	7
MW-18	East	Shallow	Routine	NC	none	7
MW-19	West	Deep	Routine	NC	none	7
MW-20	East	Deep	Routine	NC	Boron, selenium, sulfate	7
MW-21	West	Deep	Routine	NC	Boron, selenium	7
MW-22	East	Shallow	Routine	NC	Not sampled**	3**
MW-23	East	Deep	Routine	NC	none	7
Surface Water Monitoring Points						
SW-1	East and West	N/A	Routine	NC	N/A	5
SW-2	West	N/A	Routine	NC	N/A	4
SW-3	East	N/A	Routine	NC	N/A	0
Leachate Monitoring Points						
LW-1	West	N/A	Routine (Voluntary)^	NC	N/A	5
LW-2	West	N/A	Routine (Voluntary)^	NC	N/A	0
LW-3	West	N/A	Routine (Voluntary)^	NC	N/A	0
LW-4	East	N/A	Routine (Voluntary)^	NC	N/A	3
Leachate Collection Tank	East	N/A	Removed from monitoring program in 2023	NC	N/A	5
LL-1	East	N/A	Removed from monitoring program in 2023	NC	N/A	N/A
Other Monitoring Points						
Groundwater Gradient Control System (GWGCS)	East	N/A	Routine (Voluntary)	NC	N/A	4

*: MW-13, MW-14, and SW-1 are included in the monitoring program for both the East and West landfills. MW-13 and MW-14 are the upgradient wells for the West landfill.
**: Insufficient water was available in MW-8 for sample collection in September 2021, and at MW-22 for sample collection in September 2021, 2022, 2023, and 2024.
^: Leachate elevations are required at LW-1 through LW-4. Samples are voluntarily collected for laboratory analysis.

Updated By: RM, 11/6/2024
Checked By: BR, 11/6/2024

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Table 2
Monitoring Program Implementation Schedule
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Recent Sampling Dates and Constituents															Upcoming Sampling Dates and Constituents	
Monitoring Point	**4/9/2018**	**9/11-13/2018**	**4/16-17/2019**	**9/16-17/2019**	**4/16/2020**	**9/1-2/2020**	**4/29/2021**	**9/27-29/2021**	**4/20/2022**	**7/7/2022**	**9/20-22/2022**	**4/13/2023**	**9/18-22/2023**	**4/8/2024**	**9/23-27/2024**	**April 2025**	**September 2025**
East Landfill Monitoring Wells																	
MW-9	Groundwater Elevation	List A	Groundwater Elevation	List A	Groundwater Elevation	List A**	Groundwater Elevation (plus List A at MW-10)	List A^	Groundwater Elevation	--	List A^	Groundwater Elevation	List A^	Groundwater Elevation	List A^	Groundwater Elevation	List A
MW-10																	
MW-11AR																	
MW-13*																	
MW-14*																	
MW-18																	
MW-20																	
MW-22										Total and dissolved arsenic							
MW-23										--							
West Landfill Monitoring Wells																	
MW-3	Groundwater Elevation	List A	Groundwater Elevation	List A	Groundwater Elevation	List A	Groundwater Elevation	List A^	Groundwater Elevation	--	List A	Groundwater Elevation	List A	Groundwater Elevation	List A	Groundwater Elevation	List A
MW-4																	
MW-5																	
MW-7																	
MW-8R																	
MW-13*																	
MW-14*																	
MW-19																	
MW-21																	
Surface Water Monitoring Wells																	
SW-1	Surface Water Depth	List A	Surface Water Depth	List A	Surface Water Depth	DRY	Surface Water Depth	List A	Surface Water Depth	--	List A	Surface Water Depth	List A	Surface Water Depth	List A	Surface Water Depth	List A
SW-2						DRY					DRY						
SW-3		DRY		DRY		DRY		DRY			DRY		DRY		DRY		
Leachate Monitoring Points[1,#]																	
LW-1	Leachate Elevation	List A	Leachate Elevation	Leachate Elevation	Leachate Elevation	List A	Leachate Elevation	List A	Leachate Elevation	--	List A	Leachate Elevation	List A	Leachate Elevation	List A	Leachate Elevation	List A
LW-2		DRY		DRY		DRY		DRY			DRY		DRY		DRY		
LW-3		DRY		DRY		DRY		DRY			DRY		DRY		DRY		
LW-4		Field Parameters^^		Field Parameters^^		List A		DRY			DRY[#]		DRY		Field Parameters^^		
Leachate Collection Tank[##]	Leachate Depth	List A	Leachate Depth	List A	Leachate Depth	List A	Leachate Depth	List A	Leachate Depth	--	List A	Leachate Depth	Removed from Program	Removed from Program	Removed from Program	Removed from Program	Removed from Program
LL-1[##]		Leachate Depth		Leachate Depth		Leachate Depth		Leachate Depth			Leachate Depth	Removed from Program					
Other Monitoring Points																	
Groundwater Gradient Control System (GWGCS)	--	List A	--	List A	--	DRY	--	List A	--	--	List A	--	List A	--	List A	--	List A

Notes:
List A: arsenic, barium, beryllium, boron, cobalt, copper, iron, lead, magnesium, manganese, selenium, zinc, chloride, sulfate, field pH, field specific conductance, field temperature, and groundwater elevation, leachate depth, or surface water depth. Metals are reported as total starting in 2016 (previously reported as dissolved). Calcium, fluoride, lithium, molybdenum, TSS, and TDS were added to the list in 2023.
1) Leachate elevations are required at LW-1 through LW-4. Samples are voluntarily collected for laboratory analysis.
*: MW-13, MW-14, and SW-1 are included in the monitoring program for both the East and West landfills. MW-13 and MW-14 are the upgradient wells for the West landfill.
**: MW-10 was not sampled during the September 2020 event; the well was inaccessible due to downed trees around the well. A strong derecho storm on August 10, 2020 caused significant tree damage in the area.
^: MW-8R and MW-22 did not produce sufficient water for sample collection in September 2021. MW-22 did not produce sufficient water for sample collection in September 2022 or 2023.
^^: The well produced sufficient water for field parameter measurement, but not for sample collection.
#: Depth to liquid measurements were obtained at LW-4 in September 2022 and 2024, but there was insufficient water to sample for field parameters or List A parameters.
##: LL-1 was removed from the sampling program after approval from Iowa DNR granted February 17, 2023. Leachate Collection Tank was removed from the sampling program after approval from Iowa DNR granted July 14, 2023.

Updated: BLR, 10/30/2024
Checked: RM, 11/6/2024

I:\25224064.00\Deliverables\2024 AWQR\Tables\[awqreport_Marshalltown_2024_DRAFT.xlsx]2 - Implementation Schedule

Table 3
Monitoring Well Maintenance and Performance Reevaluation Schedule
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Compliance with:	Monitoring Calendar Years						
	2019	2020	2021	2022	2023	2024	2025
567 IAC 115.21(2)a. high and low water levels (biennial)	Completed		Completed		Completed		Scheduled
567 IAC 115.21(2)b. changes in the hydrologic setting and flow paths (biennial)	Completed		Completed		Completed		Scheduled
567 IAC 115.21(2)c. well depths (annual)*	Completed	Completed	Completed	Completed	Completed	Completed	Scheduled
567 IAC 115.21(2)d. in-situ permeability tests (every 5 years)**	Not Applicable - Variance granted by IDNR (see comment below)						

Comments:
*: To avoid the potential for cross-contamination and increased sample turbidity associated with removing and re-installing dedicated pumps, well depths are not measured annually at wells with dedicated pumps.
**: A variance to IAC 567-110.9(2)(d) for in situ permeability tests every 5 years was granted by IDNR in a letter dated May 4, 1999. Although IAC 567-110 has been rescinded since the variance was granted, the same permeability test requirements are now in IAC 567-115.21(2), and our understanding is that the conditions of the variance still apply.

Updated By: BLR, 10/30/2024
Checked By: RM, 11/5/2024

I:\25224064.00\Deliverables\2024 AWQR\Tables\[awqreport_Marshalltown_2024_DRAFT.xlsx]3 - MW Main & Perform Schedule

Table 4A

Monitoring Well Maintenance and Performance Summary
2024 Annual Water Quality Report

Marshalltown East and West Closed Landfills

Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Top of Casing (Ft MSL)	Top of Screen^ (Ft MSL)	Total Depth (ft)		Date of Measurements		Depth Discrepancy (ft)
						4/8/2024	9/23-27/2024	
Shallow Hydrogeologic Unit Wells	MW-3	883.88	877.29	21.59	Groundwater Level (ft)	16.50	15.51	-0.03
					Groundwater Elevation (Ft MSL)	867.38	868.37	
					Measured Well Depth (ft)	21.62	21.59	
					Submerged screen	N	N	
	MW-4	880.51	876.49	19.02	Groundwater Level (ft)	9.99	8.89	N/A
					Groundwater Elevation (Ft MSL)	870.52	871.62	
					Measured Well Depth (ft)	--*	--*	
					Submerged screen	N	N	
	MW-5	891.41	884.92	21.49	Groundwater Level (ft)	16.99	16.14	N/A
					Groundwater Elevation (Ft MSL)	874.42	875.27	
					Measured Well Depth (ft)	--*	--*	
					Submerged screen	N	N	
	MW-7	903.85	876.20	42.65	Groundwater Level (ft)	29.21	28.44	-0.25
					Groundwater Elevation (Ft MSL)	874.64	875.41	
					Measured Well Depth (ft)	42.90	42.69	
					Submerged screen	N	N	
	MW-8	902.53	888.19	29.34	Groundwater Level (ft)	24.77	24.34	0.16
					Groundwater Elevation (Ft MSL)	877.76	878.19	
					Measured Well Depth (ft)	29.19	29.18	
					Submerged screen	N	N	
	MW-9	918.04	913.00	20.04	Groundwater Level (ft)	6.62	7.97	0.09
					Groundwater Elevation (Ft MSL)	911.42	910.07	
					Measured Well Depth (ft)	19.95	20.11	
					Submerged screen	N	N	
	MW-10	941.19	936.18	20.01	Groundwater Level (ft)	17.79	12.23	0.19
					Groundwater Elevation (Ft MSL)	923.40	928.96	
					Measured Well Depth (ft)	19.86	19.82	
					Submerged screen	N	N	
	MW-13	920.75	913.28	22.47	Groundwater Level (ft)	12.30	12.25	0.19
					Groundwater Elevation (Ft MSL)	908.45	908.50	
					Measured Well Depth (ft)	22.28	22.57	
					Submerged screen	N	N	
	MW-14	929.48	921.93	22.55	Groundwater Level (ft)	16.02	11.65	0.22
					Groundwater Elevation (Ft MSL)	913.46	917.83	
					Measured Well Depth (ft)	22.33	22.71	
					Submerged screen	N	N	
	MW-18	921.63	910.13	26.50	Groundwater Level (ft)	22.39	18.87	N/A
					Groundwater Elevation (Ft MSL)	899.24	902.76	
					Measured Well Depth (ft)	--*	--*	
					Submerged screen	N	N	
	MW-22	926.63	885.73	55.90	Groundwater Level (ft)	55.29	53.87	-0.60
					Groundwater Elevation (Ft MSL)	871.34	872.76	
					Measured Well Depth (ft)	56.50	55.72	
					Submerged screen	N	N	

Table 4A
Monitoring Well Maintenance and Performance Summary
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Top of Casing (Ft MSL)	Top of Screen^ (Ft MSL)	Total Depth (ft)		Date of Measurements		Depth Discrepancy (ft)
						4/8/2024	9/23-27/2024	
Piezometers (Deep Hydrogeologic Unit)	MW-11AR	922.53	869.84	57.69	Groundwater Level (ft)	51.03	49.68	0.29
					Groundwater Elevation (Ft MSL)	871.50	870.93	
					Measured Well Depth (ft)	57.40	57.49	
					Submerged screen	Y	Y	
	MW-19	891.46	856.41	40.05	Groundwater Level (ft)	16.88	16.13	0.22
					Groundwater Elevation (Ft MSL)	874.58	875.33	
					Measured Well Depth (ft)	39.83	39.87	
					Submerged screen	Y	Y	
	MW-20	920.86	846.74	79.12	Groundwater Level (ft)	49.63	48.54	-1.60
					Groundwater Elevation (Ft MSL)	871.23	872.32	
					Measured Well Depth (ft)	80.58	80.72	
					Submerged screen	Y	Y	
	MW-21	880.11	849.09	36.02	Groundwater Level (ft)	9.56	8.41	0.27
					Groundwater Elevation (Ft MSL)	870.55	871.70	
					Measured Well Depth (ft)	35.84	35.75	
					Submerged screen	Y	Y	
	MW-23	926.64	911.28	20.36	Groundwater Level (ft)	10.32	12.81	0.41
					Groundwater Elevation (Ft MSL)	916.32	913.83	
					Measured Well Depth (ft)	19.95	20.14	
					Submerged screen	Y	Y	
Surface Water Monitoring Points	SW-1	NA	NA	NA	Surface Water Depth	0.33	2.0	NA
	SW-2	NA	NA	NA	Surface Water Depth	DRY	0.50	NA
	SW-3	NA	NA	NA	Surface Water Depth	0.50	DRY	NA

^: Screen lengths of 15 for water table wells and 5 for piezometers and leachate monitoring wells are assumed. Original well construction forms were not available for review at the time this table was prepared.

*: Total depths at monitoring wells MW-4, MW-5, and MW-18 not measured due to dedicated pumps in wells.

NA - Not Applicable NM - Not Measured

Updated By: BLR, 10/30/2024
Checked By: RM, 11/7/2024

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Table 4B
Vertical Gradients
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Well Pair		Vertical Hydraulic Gradient (feet/foot)(1)	
Shallower Well	**Deeper Well**	**April 2024**	**September 2024**
MW-4	MW-21	0.002	0.005
MW-5	MW-19	0.011	0.004
MW-13	MW-20	-0.767	-0.734
MW-18	MW-11AR	-0.919	-0.951

Notes:
(1) A negative value indicates a downward gradient; a positive value indicates an upward gradient.

Updated: BLR, 10/30/2024
Checked: RM, 11/7/2024

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Table 5
Background and GWPS Summary
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Interwell Background								
Constituent	**Units**	**Samples***	**Detections**	**UPL**	**Statistical Test**	**Action Level**	**Source**	**Other Standards**
East Landfill - MW-9 and MW-10								
Field pH	SU	18	18	N/A	N/A	none	--	SMCL <6.5 or >8.5
Field Temperature	deg C	18	18	N/A	N/A	none	--	--
Field Specific Conductance	µmhos/cm	18	18	N/A	N/A	none	--	--
Field Dissolved Oxygen	mg/L	4	4	N/A	N/A	none	--	--
Field Oxidation Potential	mV	4	4	N/A	N/A	none	--	--
Arsenic	µg/l	18	6	1.60	PL(NP)	10	MCL	--
Barium	µg/l	18	18	203	PL(P)	2,000	MCL	--
Beryllium	µg/l	18	2	0.330	PL(NP)	4	MCL	--
Boron	µg/l	18	4	815	PL(P)	6,000	SWS	--
Calcium	mg/L	4	4	N/A	N/A	none	--	--
Chloride	mg/L	52	35	46.0	PL(NP)	none	--	SMCL 250
Cobalt	µg/l	18	15	4.95	PL(P)	4.95	Background	SWS 2.1
Fluoride	mg/L	4	0	N/A	N/A	4.00	MCL	SMCL 2
Iron	µg/l	18	16	3,520	PL(P)	none	--	SMCL 300
Lead	µg/l	18	7	1.90	PL(NP)	15	SWS	--
Lithium	µg/l	4	4	N/A	N/A	14	SWS	--
Magnesium	µg/l	18	18	27,400	PL(P)	none	--	--
Manganese	µg/l	18	17	3,050	PL(NP)	3,050	Background	SWS 300, SMCL 50
Molybdenum	µg/l	4	1	N/A	N/A	40	SWS	--
Selenium	µg/l	18	4	4.00	PL(NP)	50	MCL	--
Sulfate	mg/L	52	52	120	PL(NP)	none	--	SMCL 250
Total Dissolved Solids	mg/L	4	4	N/A	N/A	none	--	SMCL - 500
Total Suspended Solids	mg/L	4	3	N/A	N/A	none	--	--
West Landfill - MW-8, MW-13, and MW-14								
Field pH	SU	26	26	N/A	N/A	none	--	SMCL <6.5 or >8.5
Field Temperature	deg C	26	26	N/A	N/A	none	--	--
Field Specific Conductance	µmhos/cm	26	26	N/A	N/A	none	--	--
Field Dissolved Oxygen	mg/L	6	6	N/A	N/A	none	--	--
Field Oxidation Potential	mV	6	6	N/A	N/A	none	--	--
Arsenic	µg/l	26	10	1.60	PL(NP)	10	MCL	--
Barium	µg/l	26	26	163	PL(P)	2,000	MCL	--
Beryllium	µg/l	26	1	0.330	PL(NP)	4	MCL	--
Boron	µg/l	26	22	1,340	PL(P)	6,000	SWS	--
Calcium	mg/L	6	6	N/A	N/A	none	--	--
Chloride	mg/L	77	46	51.9	PL(NP)	none	--	SMCL 250
Cobalt	µg/l	26	22	3.58	PL(P)	3.58	Background	SWS 2.1
Fluoride	mg/L	6	2	N/A	N/A	4.00	MCL	SMCL 2
Iron	µg/l	26	24	5,220	PL(P)	none		SMCL 300
Lead	µg/l	26	20	2.55	PL(P)	15	SWS	--
Lithium	µg/l	6	6	N/A	N/A	14	SWS	--
Magnesium	µg/l	26	26	27,600	PL(P)	none	--	--
Manganese	µg/l	26	26	637	PL(P)	637	Background	SWS 300, SMCL 50
Molybdenum	µg/l	6	2	N/A	N/A	40	SWS	--
Selenium	µg/l	26	14	3.49	PL(P)	50	MCL	--
Sulfate	mg/L	77	77	175	PL(P)	none	--	SMCL 250
Total Dissolved Solids	mg/L	6	6	N/A	N/A	none	--	SMCL - 500
Total Suspended Solids	mg/L	6	6	N/A	N/A	none	--	--

PL(NP) - Prediction Limit (Non-Parametric)
PL(P) - Prediction Limit (Parametric)
MCL - Maximum Contaminant Level
SMCL - Secondary Maximum Contaminant Level
SWS - Iowa Statewide Standard for a Protected Groundwater Source (Health-Based)

µg/l - micrograms per liter
mg/L - milligrams per liter
mV - millivolts
µmhos/cm - micromhos per centimeter

*: For all parameters except chloride, sulfate, DO, and ORP, these columns reflect the number of samples since 2016, when unfiltered sample collection for metals analysis began. Additional historical data are included for chloride and sulfate, which were reported as totals prior to 2016. DO and ORP have been sampled as part of low-flow stabilization in the past, but were only required to be reported as part of the AWQR beginning in 2023.

**: Parameters calcium, lithium, molybdenum, TDS, and TSS were added to the sampling program in 2023. Prediction limits will be calculated once the minimum of 4 samples have been obtained.

Updated: BLR, 10/31/2024
Checked: RM, 11/5/2024

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Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
East Landfill	MW-9(3)	Field pH	SU	6.66	N/A
		Field Temperature	deg C	14.6	N/A
		Field Specific Conductance	µmhos/cm	732	N/A
		Field Dissolved Oxygen	mg/L	0.37	N/A
		Field Oxidation Potential	mV	12.8	N/A
		Barium	µg/l	180	N/A
		Calcium	mg/L	110	N/A
		Chloride	mg/L	26	N/A
		Cobalt	µg/l	1.0	N/A
		Iron	µg/l	720	N/A
		Lithium	µg/l	11	N/A
		Magnesium	µg/l	19000	N/A
		Manganese	µg/l	360	N/A
		Sulfate	mg/L	9.2	N/A
		Total Dissolved Solids	mg/L	360	N/A
		Total Suspended Solids	mg/L	8.4	N/A
	MW-10(3)	Field pH	SU	6.93	N/A
		Field Temperature	deg C	13.7	N/A
		Field Specific Conductance	µmhos/cm	566	N/A
		Field Dissolved Oxygen	mg/L	8.07	N/A
		Field Oxidation Potential	mV	142.6	N/A
		Barium	µg/l	130	N/A
		Calcium	mg/L	80	N/A
		Chloride	mg/L	2.4 J	N/A
		Cobalt	µg/l	0.48 J	N/A
		Iron	µg/l	210	N/A
		Lead	µg/l	0.31 J	N/A
		Lithium	µg/l	16	N/A
		Magnesium	µg/l	21000	N/A
		Manganese	µg/l	36	N/A
		Sulfate	mg/L	6.8	N/A
		Total Dissolved Solids	mg/L	280	N/A
		Total Suspended Solids	mg/L	19	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
East Landfill (continued)	MW-11AR	Field pH	SU	7.12	N/A
		Field Temperature	deg C	18.3	N/A
		Field Specific Conductance	µmhos/cm	966	N/A
		Field Dissolved Oxygen	mg/L	2.50	N/A
		Field Oxidation Potential	mV	134.4	N/A
		Barium	µg/l	38	203
		Boron	µg/l	420	815
		Calcium	mg/L	110	N/A
		Chloride	mg/L	19	46
		Cobalt	µg/l	0.63	5.0
		Iron	µg/l	130	3520
		Lithium	µg/l	19	N/A
		Manganese	µg/l	60	3050
		Molybdenum	µg/l	2.8	N/A
		Selenium	µg/l	2.3 J	4.0
		Sulfate	mg/L	120	120
		Total Dissolved Solids	mg/L	490	N/A
		Total Suspended Solids	mg/L	4.4	N/A
	MW-13(3)	Field pH	SU	6.81	N/A
		Field Temperature	deg C	15.2	N/A
		Field Specific Conductance	µmhos/cm	961	N/A
		Field Dissolved Oxygen	mg/L	2.41	N/A
		Field Oxidation Potential	mV	185.7	N/A
		Barium	µg/l	120	203
		Boron	µg/l	85 J	815
		Calcium	mg/L	150	N/A
		Cobalt	µg/l	0.47 J	5.0
		Iron	µg/l	280	3520
		Lead	µg/l	0.33 J	1.9
		Lithium	µg/l	19	N/A
		Magnesium	µg/l	23000	27400
		Manganese	µg/l	57	3050
		Total Dissolved Solids	mg/L	530	N/A
		Total Suspended Solids	mg/L	17	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
East Landfill (continued)	MW-14[3]	Field pH	SU	6.95	N/A
		Field Temperature	deg C	14.8	N/A
		Field Specific Conductance	µmhos/cm	676	N/A
		Field Dissolved Oxygen	mg/L	2.07	N/A
		Field Oxidation Potential	mV	143.5	N/A
		Boron	µg/l	670	815
		Calcium	mg/L	96	N/A
		Chloride	mg/L	2.5 J	46
		Lithium	µg/l	25	N/A
		Magnesium	µg/l	21000	27400
		Manganese	µg/l	81	3050
		Molybdenum	µg/l	2.3	N/A
		Selenium	µg/l	4.1 J	4.0
		Sulfate	mg/L	25	120
		Total Dissolved Solids	mg/L	350	N/A
		Total Suspended Solids	mg/L	2.8	N/A
	MW-18	Field pH	SU	6.81	N/A
		Field Temperature	deg C	12.3	N/A
		Field Specific Conductance	µmhos/cm	758	N/A
		Field Dissolved Oxygen	mg/L	0.56	N/A
		Field Oxidation Potential	mV	147.8	N/A
		Barium	µg/l	140	203
		Calcium	mg/L	120	N/A
		Chloride	mg/L	3.1 J	46
		Cobalt	µg/l	0.20 J	4.95
		Lithium	µg/l	16	N/A
		Magnesium	µg/l	18,000	27400
		Manganese	µg/l	7.2 J	3050
		Sulfate	mg/L	30	120
		Total Dissolved Solids	mg/L	380	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
East Landfill (continued)	MW-20	Field pH	SU	7.19	N/A
		Field Temperature	deg C	12.8	N/A
		Field Specific Conductance	µmhos/cm	990	N/A
		Field Dissolved Oxygen	mg/L	9.34	N/A
		Field Oxidation Potential	mV	174.7	N/A
		Arsenic	µg/l	0.94 J	1.60
		Barium	µg/l	90	203
		Calcium	mg/L	120	N/A
		Chloride	mg/L	23	46
		Lithium	µg/l	70	N/A
		Magnesium	µg/l	23000	27400
		Manganese	µg/l	3.8 J	3050
		Molybdenum	µg/l	600	N/A
		Total Dissolved Solids	mg/L	530	N/A
		Total Suspended Solids	mg/L	11	N/A
	MW-22	Field pH	SU	7.58	N/A
		Field Temperature	deg C	13.8	N/A
		Field Specific Conductance	µmhos/cm	956	N/A
		Field Dissolved Oxygen	mg/L	7.88	N/A
		Field Oxidation Potential	mV	152.8	N/A
		Arsenic	µg/l	--	1.60
		Barium	µg/l	--	203
		Beryllium	µg/l	--	0.330
		Boron	µg/l	--	815
		Calcium	mg/L	--	N/A
		Chloride	mg/L	--	46
		Cobalt	µg/l	--	4.95
		Iron	µg/l	--	3520
		Lead	µg/l	--	1.90
		Lithium	µg/l	--	N/A
		Magnesium	µg/l	--	27400
		Manganese	µg/l	--	3050
		Molybdenum	µg/l	--	N/A
		Selenium	µg/l	--	4
		Sulfate	mg/L	--	120
		Total Dissolved Solids	mg/L	--	N/A
		Total Suspended Solids	mg/L	--	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
East Landfill (continued)	MW-23	Field pH	SU	6.93	N/A
		Field Temperature	deg C	17.1	N/A
		Field Specific Conductance	µmhos/cm	830	N/A
		Field Dissolved Oxygen	mg/L	0.86	N/A
		Field Oxidation Potential	mV	117.8	N/A
		Barium	µg/l	110	203
		Boron	µg/l	110	815
		Calcium	mg/L	130	N/A
		Chloride	mg/L	3.2 J	46
		Cobalt	µg/l	0.19 J	4.95
		Iron	µg/l	84 J	3520
		Lithium	µg/l	34	N/A
		Magnesium	µg/l	24000	27400
		Manganese	µg/l	79	3050
		Molybdenum	µg/l	1.7 J	N/A
		Sulfate	mg/L	97	120
		Total Dissolved Solids	mg/L	460	N/A
		Total Suspended Solids	mg/L	3.0	N/A
West Landfill	MW-3	Field pH	SU	6.93	N/A
		Field Temperature	deg C	13.1	N/A
		Field Specific Conductance	µmhos/cm	849	N/A
		Field Dissolved Oxygen	mg/L	2.34	N/A
		Field Oxidation Potential	mV	159.5	N/A
		Barium	µg/l	140	163
		Boron	µg/l	1200	1340
		Calcium	mg/L	130	N/A
		Chloride	mg/L	15	52
		Iron	µg/l	40 J	5220
		Lithium	µg/l	18	N/A
		Magnesium	µg/l	18000	27600
		Manganese	µg/l	4.5 J	637
		Molybdenum	µg/l	6.1	N/A
		Sulfate	mg/L	93	175
		Total Dissolved Solids	mg/L	490	N/A
		Total Suspended Solids	mg/L	1.5 J	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
West Landfill (continued)	MW-4	Field pH	SU	6.84	N/A
		Field Temperature	deg C	14.0	N/A
		Field Specific Conductance	µmhos/cm	966	N/A
		Field Dissolved Oxygen	mg/L	0.22	N/A
		Field Oxidation Potential	mV	-93.0	N/A
		Barium	µg/l	140	163
		Calcium	mg/L	160	N/A
		Chloride	mg/L	14	52
		Cobalt	µg/l	0.39 J	3.58
		Iron	µg/l	3500	5220
		Lithium	µg/l	11	N/A
		Magnesium	µg/l	18000	27600
		Manganese	µg/l	500	637
		Molybdenum	µg/l	22	N/A
		Sulfate	mg/L	85	175
		Total Dissolved Solids	mg/L	540	N/A
		Total Suspended Solids	mg/L	12	N/A
	MW-5	Field pH	SU	6.35	N/A
		Field Temperature	deg C	13.2	N/A
		Field Specific Conductance	µmhos/cm	462.9	N/A
		Field Dissolved Oxygen	mg/L	4.86	N/A
		Field Oxidation Potential	mV	175.2	N/A
		Boron	µg/l	460	1340
		Calcium	mg/L	60	N/A
		Chloride	mg/L	5.1	52
		Cobalt	µg/l	0.62	3.58
		Iron	µg/l	76 J	5220
		Magnesium	µg/l	16000	27600
		Manganese	µg/l	6.8 J	637
		Sulfate	mg/L	39	175
		Total Dissolved Solids	mg/L	220	N/A
		Total Suspended Solids	mg/L	1.5 J	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
West Landfill (continued)	MW-7	Field pH	SU	7.00	N/A
		Field Temperature	deg C	11.0	N/A
		Field Specific Conductance	µmhos/cm	741	N/A
		Field Dissolved Oxygen	mg/L	4.75	N/A
		Field Oxidation Potential	mV	129.8	N/A
		Barium	µg/l	110	163
		Boron	µg/l	89 J	1340
		Calcium	mg/L	100	N/A
		Chloride	mg/L	23	52
		Lithium	µg/l	6.9 J	N/A
		Magnesium	µg/l	20000	27600
		Manganese	µg/l	4.8 J	637
		Selenium	µg/l	1.4 J	3
		Sulfate	mg/L	23	175
		Total Dissolved Solids	mg/L	340	N/A
		Total Suspended Solids	mg/L	2.3	N/A
	MW-8[3]	Field pH	SU	7.44	N/A
		Field Temperature	deg C	18.6	N/A
		Field Specific Conductance	µmhos/cm	800	N/A
		Field Dissolved Oxygen	mg/L	6.56	N/A
		Field Oxidation Potential	mV	142.7	N/A
		Barium	µg/l	130	163.0
		Calcium	mg/L	100	N/A
		Chloride	mg/L	22	51.9
		Iron	µg/l	86 J	5220.0
		Lithium	µg/l	6.3 J	N/A
		Magnesium	µg/l	21000	27600.0
		Manganese	µg/l	7.0 J	637.0
		Sulfate	mg/L	29	175.0
		Total Dissolved Solids	mg/L	370	N/A
		Total Suspended Solids	mg/L	15	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL
West Landfill (continued)	MW-19	Field pH	SU	7.02	N/A
		Field Temperature	deg C	12.2	N/A
		Field Specific Conductance	µmhos/cm	711	N/A
		Field Dissolved Oxygen	mg/L	4.45	N/A
		Field Oxidation Potential	mV	158.0	N/A
		Barium	µg/l	120	163
		Boron	µg/l	81 J	1340
		Calcium	mg/L	100	N/A
		Chloride	mg/L	20	52
		Lithium	µg/l	6.9 J	N/A
		Magnesium	µg/l	20,000	27600
		Manganese	µg/l	5.6 J	637
		Selenium	µg/l	4.2 J	3
		Sulfate	mg/L	24	175
		Total Dissolved Solids	mg/L	340	N/A
		Total Suspended Solids	mg/L	2.8	N/A
	MW-21	Field pH	SU	7.01	N/A
		Field Temperature	deg C	12.1	N/A
		Field Specific Conductance	µmhos/cm	884	N/A
		Field Dissolved Oxygen	mg/L	2.33	N/A
		Field Oxidation Potential	mV	83.0	N/A
		Barium	µg/l	100	163
		Calcium	mg/L	130	N/A
		Chloride	mg/L	21	52
		Lithium	µg/l	39	N/A
		Magnesium	µg/l	20000	27600
		Molybdenum	µg/l	210	N/A
		Sulfate	mg/L	120	175
		Total Dissolved Solids	mg/L	500	N/A
		Total Suspended Solids	mg/L	7.8	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No Immediately Preceding SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Comments:
1. This table includes results for wells/constituents that were below the UPL in 2024.
2. Results below the limit of quantitation (J flags) are estimated values and are not compared to the UPL or GPS. They are included in this table regardless of whether the estimated value is higher or lower than the UPL.
3. MW-9 and MW-10 are background wells for the East Landfill. MW-8, MW-13, and MW-14 are background wells for the West Landfill. UPLs do not apply for background wells.

µg/l - micrograms per liter
mg/L - milligrams per liter
mV - millivolts
µmhos/cm - micromhos per centimeter
J - Result is less than the reporting limit but greater than or equal to the minimum detection limit and the concentration is an approximate value.

Updated by: BLR, 10/30/2024
Checked by: RM, 11/6/2024

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Table 7
Summary of Ongoing and Newly Identified SSIs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Well	Constituent	Units	Most Recent Result	UPL	Action Level
East Landfill	MW-11AR	Magnesium	µg/l	38,000	27400	none
East Landfill	MW-13	Sulfate	mg/l	150	120	none
East Landfill	MW-20	Boron	µg/l	4,100	815	6,000
East Landfill	MW-20	Selenium	µg/l	21	4.0	50
East Landfill	MW-20	Sulfate	mg/l	150	120	none
West Landfill	MW-3	Selenium	µg/l	7.4	3.49	50
West Landfill	MW-4	Arsenic	µg/l	5.7	1.60	10
West Landfill	MW-4	Boron	µg/l	3,600	1340	6,000
West Landfill	MW-5	Barium	µg/l	170	163	2,000
West Landfill	MW-5	Selenium	µg/l	27	3.49	50
West Landfill	MW-21	Boron	µg/l	3,700	1340	6,000
West Landfill	MW-21	Selenium	µg/l	8.1	3.49	50

Comments:
1. This table includes results for wells/constituents that exceeded the UPL in 2024.
2. Results below the limit of quantitation (J flags) are estimated values and are not compared to the UPL or GPS.

UPL - Upper Prediction Limit
µg/l - micrograms per liter
mV - millivolts
mg/L - milligrams per liter
µmhos/cm - micromhos per centimeter

Updated by: RM, 11/6/2024
Checked by: BR, 11/6/2024

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Table 8
Historic UPL and Action Level Exceedances
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Key: gray =UPL exceedance; black =action level exceedance

	Well	Constituent	2016	2017	2018	2019	2020	2021	2022	2023	2024
East Landfill	MW-9	Manganese									
	MW-10	Lithium*									
	MW-11AR	Sulfate									
		Boron									
		Lead									
		Lithium*									
		Magnesium									
	MW-13	Lithium*									
		Sulfate									
	MW-14	Boron									
		Cobalt									
		Lithium*									
		Manganese									
	MW-18	Sulfate									
		Arsenic									
		Barium									
		Cobalt									
		Copper									
		Iron									
		Lead									
		Lithium*									
		Manganese									
	MW-20	Sulfate									
		Boron									
		Lithium*									
		Molybdenum*									
		Selenium									
	MW-22	Sulfate						Not sampled, insufficient volume	Not sampled, insufficient volume	Not sampled, insufficient volume	Not sampled, insufficient volume
		Boron									
		Lead									
		Magnesium									
		Selenium									
	MW-23	Sulfate									
		Boron									
		Lithium*									
West Landfill	MW-3	Lithium*									
		Selenium									
	MW-4	Arsenic									
		Barium									
		Boron									
		Iron									
		Manganese									
	MW-5	Arsenic									
		Barium									
		Cobalt									
		Copper									
		Iron									
		Lead									
		Manganese									
		Selenium									
	MW-8	Lead									
	MW-21	Sulfate									
		Boron									
		Lead									
		Lithium*									
		Molybdenum*									
		Selenium									

Comments:
1. UPLs were calculated annually beginning in 2019 when at least four sampling events with unfiltered (total) data.
2. For results in 2016-2018, prior to calculation of UPLs, the Statewide Standards for cobalt and manganese were used as the GWPS values. For 2019 and later, the UPLs based on background for cobalt and manganese exceeded the SWSs and the UPLs were used as the GWPS values.
*: Lithium and molybdenum were added to the monitoring program in 2023.

Updated by: RM, 11/6/2024
Checked by: BR, 11/6/2024

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Table 9
Historic Prediction Limits and Groundwater Protection Standards
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Constituent	Units	UPL 2019	UPL 2020	UPL 2021	UPL 2022	UPL 2023	UPL 2024	GWPS 2019	GWPS 2020	GWPS 2021	GWPS 2022	GWPS 2023	GWPS 2024
East Landfill	Arsenic	µg/L	1.11	1.31	0.88	0.88	1.60	1.60	10	10	10	10	10	10
	Barium	µg/L	186	185	185	184	203	203	2,000	2,000	2,000	2,000	2,000	2,000
	Beryllium	µg/L	0.27	0.27	0.27	0.27	0.33	0.330	4	4	4	4	4	4
	Boron	µg/L	110	110	110	110	815	815	6,000	6,000	6,000	6,000	6,000	6,000
	Chloride	mg/L	32.20	36.10	33.50	33.60	46.00	46.0	none	none	none	none	none	none
	Cobalt	µg/L	3.65	4.21	3.53	3.24	4.95	4.95	3.65	4.21	3.53	3.24	4.95	4.95
	Copper(1)	µg/L	3.38	3.45	3.59	3.75	N/A	N/A	1,300	1,300	1,300	1,300	N/A	N/A
	Iron	µg/L	1,680	1,790	1,480	3,200	3,520	3,520	none	none	none	none	none	none
	Lead	µg/L	0.55	0.55	0.55	0.55	1.90	1.90	15	15	15	15	15	15
	Magnesium	mg/L	29,500	29,700	29,000	27,800	27,400	27,400	none	none	none	none	none	none
	Manganese	µg/L	2,100	2,100	2,100	2,100	3,050	3,050	3,050	3,050	2,100	2,100	3,050	3,050
	Selenium	µg/L	1.00	1.00	1.60	1.60	4.00	4.00	50	50	50	50	50	50
	Sulfate	mg/L	44.00	44.00	44.00	44.00	120.00	120	none	none	none	none	none	none
	Zinc(1)	µg/L	14.70	16.50	62.10	56.90	N/A	N/A	2,000	2,000	2,000	2,000	N/A	N/A
West Landfill	Arsenic	µg/L	1.49	1.54	1.47	1.60	1.60	1.60	10	10	10	10	10	10
	Barium	µg/L	169	174	168	163	163	163	2,000	2,000	2,000	2,000	2,000	2,000
	Beryllium	µg/L	0.27	0.33	0.27	0.27	0.33	0.330	4	4	4	4	4	4
	Boron	µg/L	1,890	2,140	1,850	1,630	1,340	1340	6,000	6,000	6,000	6,000	6,000	6,000
	Chloride	mg/L	51.90	51.90	51.90	51.90	51.90	51.90	none	none	none	none	none	none
	Cobalt	µg/L	5.88	5.41	4.20	3.49	3.58	3.58	5.88	5.41	4.20	3.49	3.58	3.58
	Copper(1)	µg/L	5.30	6.45	5.68	5.55	N/A	N/A	1,300	1,300	1,300	1,300	N/A	N/A
	Iron	µg/L	11,800	9,900	8,410	5,940	5,220	5,220	none	none	none	none	none	none
	Lead	µg/L	3.30	2.83	2.24	1.89	2.55	2.55	15	15	15	15	15	15
	Magnesium	mg/L	30,200	29,800	29,200	28,200	27,600	27,600	none	none	none	none	none	none
	Manganese	µg/L	891	1,040	863	667	637	637	891	1,040	863	667	637	637
	Selenium	µg/L	5.03	5.24	4.50	3.71	3.49	3.49	50	50	50	50	50	50
	Sulfate	mg/L	104	109	110	173	175	175	none	none	none	none	none	none
	Zinc(1)	µg/L	15.60	16.10	15.80	14.50	N/A	N/A	2,000	2,000	2,000	2,000	N/A	N/A

(1) Copper and zinc were analyzed only at leachate wells in 2023 and 2024. Parameters calcium, fluoride, lithium, molybdenum, TDS, and TSS were added in 2023. UPLs will be calculated once the minimum of four samples for each parameter have been collected.

µg/l - micrograms per liter
mg/L - milligrams per liter
mV - millivolts
µmhos/cm - micromhos per centimeter
UPL - Upper Prediction Limit
GWPS - Groundwater Protection Standard

Updated by: RM, 11/4/2024
Checked by: BR, 11/6/2024

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Table 10
Groundwater Quality Trend Summary
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Well	Current GWPS Exceedances	Significant Trend
None	None	N/A

Comments:
Only well/constituent pairs with GWPS exceedances and with sufficient historical data for trend analysis (8 rounds) are included in this summary. Lithium and molybdenum trends are not included because only 2 rounds of data is available.

GWPS = Groundwater Protection Standard

Updated by: BR, 11/6/2024
Checked by: RM, 11/7/2024

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Table 11
Summary of Leachate Well, Underdrain, and Surface Water Point/Detected Constituent Pairs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Monitoring Point	Constituent	Units	September 2024
LW-01	Field pH	SU	7.36
	Field Temperature	deg C	18.9
	Field Specific Conductance	µmhos/cm	998
	Field Dissolved Oxygen	mg/l	4.01
	Field Oxidation Potential	mV	157.5
	Chloride	mg/l	3.0 J
	Fluoride	mg/l	0.41 J
	Sulfate	mg/l	44
	Arsenic	µg/l	3.5
	Barium	µg/l	150
	Boron	µg/l	590
	Calcium	mg/l	140
	Cobalt	µg/l	2.3
	Iron	µg/l	270
	Lithium	µg/l	32
	Molybdenum	µg/l	3.6
	Zinc	µg/l	11 J
	Total Dissolved Solids	mg/l	490
	Total Suspended Solids	mg/l	28
LW-04	Field pH	SU	8.99
	Field Temperature	deg C	17.7
	Field Specific Conductance	µmhos/cm	2,126
	Field Dissolved Oxygen	mg/l	3.85
	Field Oxidation Potential	mV	119.0

Table 11
Summary of Leachate Well, Underdrain, and Surface Water Point/Detected Constituent Pairs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Monitoring Point	Constituent	Units	September 2024
GCGWS	Field pH	SU	7.03
	Field Temperature	deg C	17.5
	Field Specific Conductance	μmhos/cm	1,436.0
	Chloride	mg/L	2.5 J
	Sulfate	mg/L	300
	Barium	μg/l	41
	Boron	μg/l	110
	Lithium	μg/L	29
	Magnesium	μg/l	48,000
	Manganese	μg/l	300
SW-1	Field pH	SU	7.83
	Field Temperature	deg C	14.2
	Field Specific Conductance	μmhos/cm	692
	Field Dissolved Oxygen	mg/l	8.76
	Field Oxidation Potential	mV	146.1
	Chloride	mg/l	27
	Sulfate	mg/l	24
	Arsenic	μg/l	0.84 J
	Barium	μg/l	160
	Calcium	mg/l	84
	Iron	μg/l	83 J
	Lithium	μg/l	7.2 J
	Magnesium	μg/l	25,000
	Manganese	μg/l	40
	Selenium	μg/l	1.5 J
	Total Dissolved Solids	mg/l	320
	Total Suspended Solids	mg/l	3.4

Table 11
Summary of Leachate Well, Underdrain, and Surface Water Point/Detected Constituent Pairs
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

Monitoring Point	Constituent	Units	September 2024
SW-2	Field pH	SU	7.74
	Field Temperature	deg C	14.0
	Field Specific Conductance	µmhos/cm	702
	Field Dissolved Oxygen	mg/l	8.42
	Field Oxidation Potential	mV	144.5
	Chloride	mg/l	25
	Sulfate	mg/l	22
	Arsenic	µg/l	0.93 J
	Barium	µg/l	170
	Calcium	mg/l	88
	Cobalt	µg/l	0.24 J
	Iron	µg/l	180
	Lithium	µg/l	7.2 J
	Magnesium	µg/l	24,000
	Manganese	µg/l	100
	Selenium	µg/l	1.4 J
	Total Dissolved Solids	mg/l	330
	Total Suspended Solids	mg/l	8.9

Notes:
(1): Insufficient liquid was present at LW-2, LW-3, LW-4, SW-3, and GWGCS for sample collection in 2024. LW-4 had enough liquid for field parameter measurements only.

µg/l - micrograms per liter
mV - millivolts
mg/L - milligrams per liter
µmhos/cm - micromhos per centimeter

Updated by: BR, 11/6/2024
Checked by: RM, 11/7/2024

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Table 12
Leachate Management Summary
2024 Annual Water Quality Report
Marshalltown East and West Closed Landfills
Permit Nos. 64-SDP-5-91C and 64-SDP-3-90C

	Leachate Depth (ft)				Leachate Elevation (ft amsl)			
Month	**LW-1**	**LW-2**	**LW-3**	**LW-4**	**LW-1**	**LW-2**	**LW-3**	**LW-4**
April 2024	2.15	DRY	DRY	0.88	892.39	DRY	DRY	913.36
September 2024	4.39	DRY	DRY	1.68	894.63	DRY	DRY	914.16

Updated by: RM, 11/7/2024
Checked by: BR, 11/7/2024

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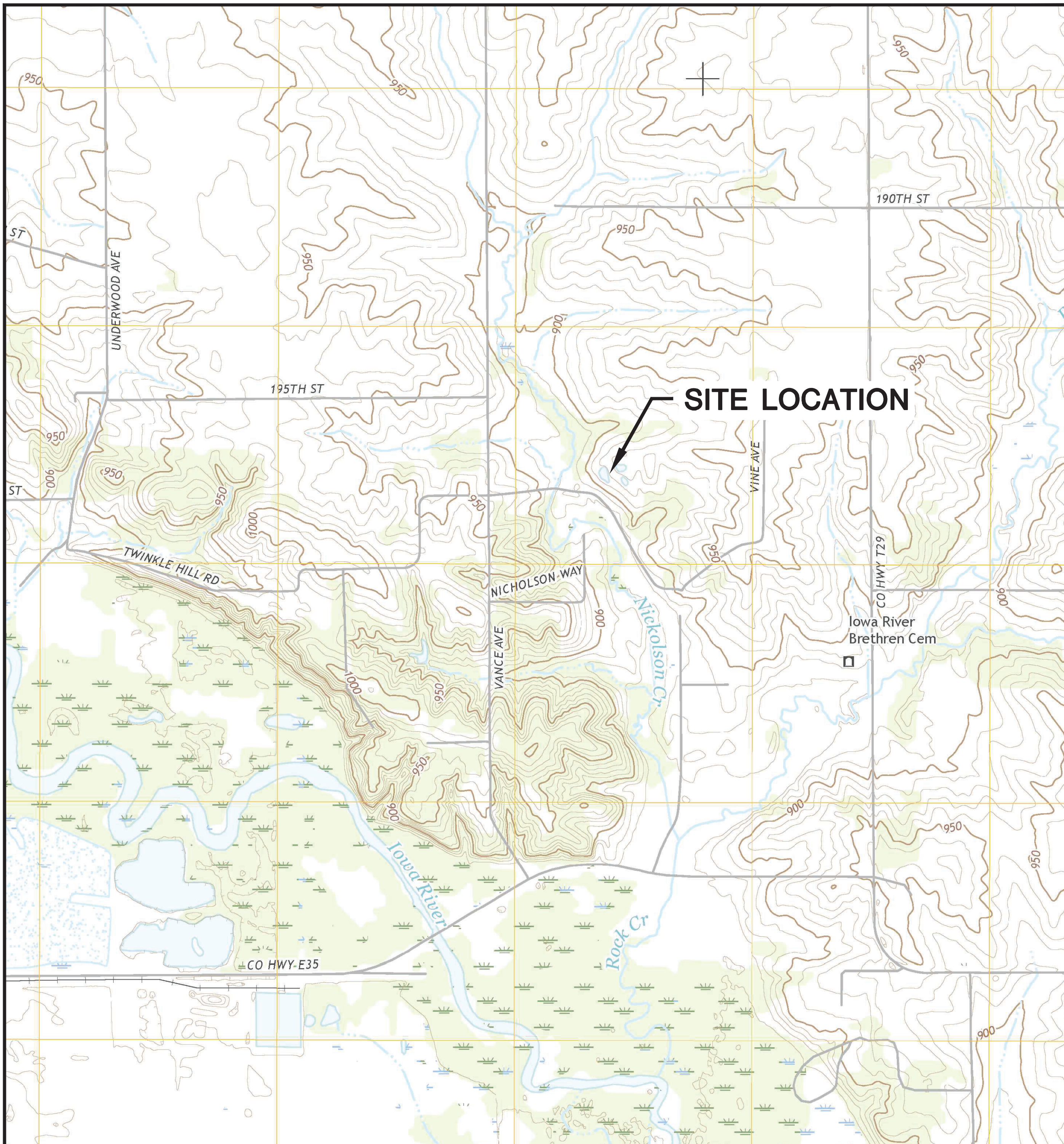
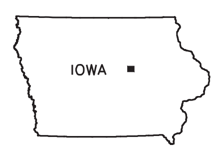
Figures



N

LE GRAND QUADRANGLE
IOWA
7.5 MINUTE SERIES (TOPOGRAPHIC)
2015
SCALE: 1" = 2,000'



CLIENT	ALLIANT ENERGY. INTERSTATE POWER AND LIGHT	SITE	MARSHALLTOWN EAST AND WEST CLOSED LANDFILLS MARSHALLTOWN, IOWA	SITE LOCATION MAP

PROJECT NO.	25216064.00	DRAWN BY:	AHB	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	10/28/16	CHECKED BY:	MDB			1
REVISED:	10/28/16	APPROVED BY:	TK 11/20/2017			

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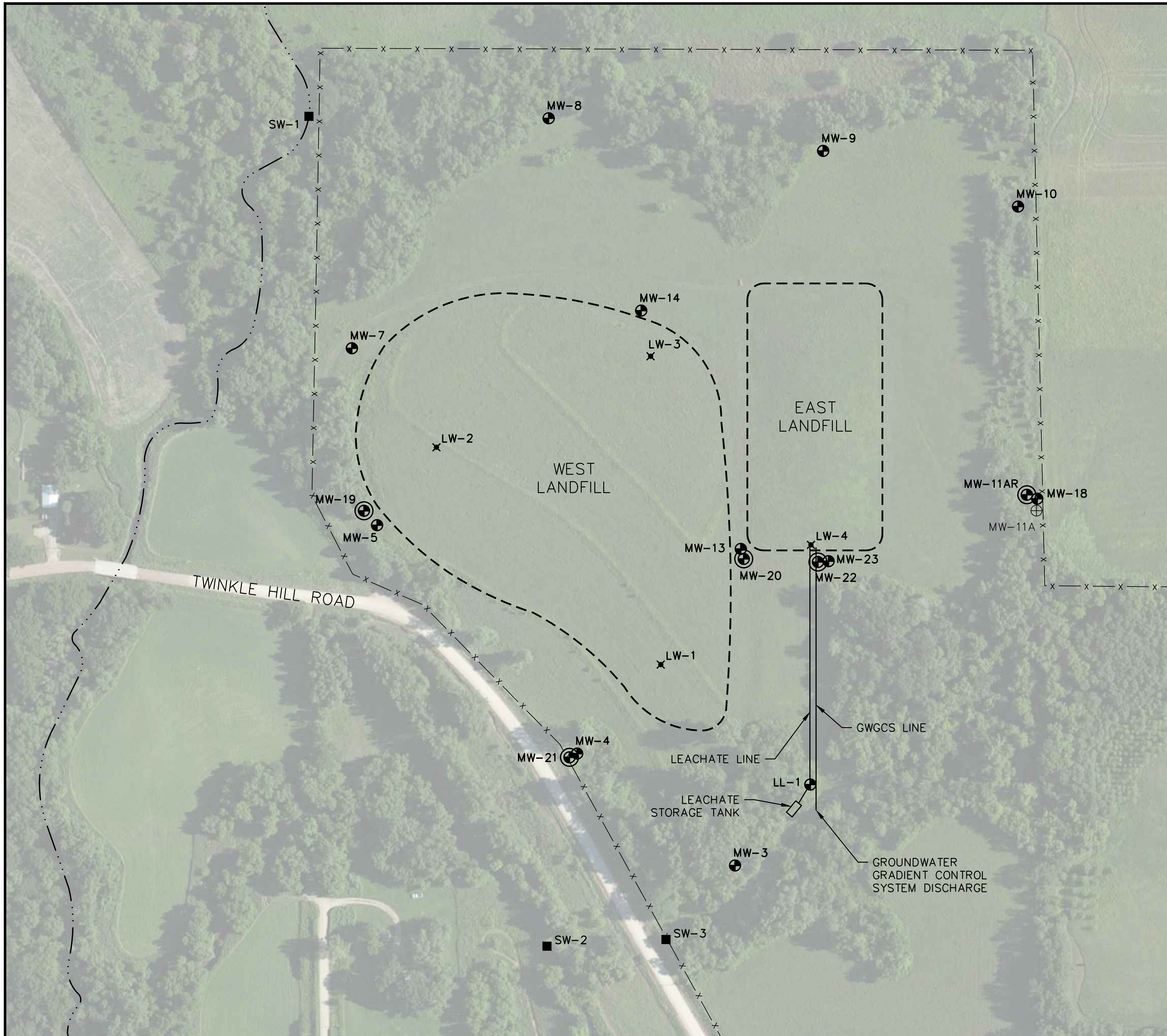
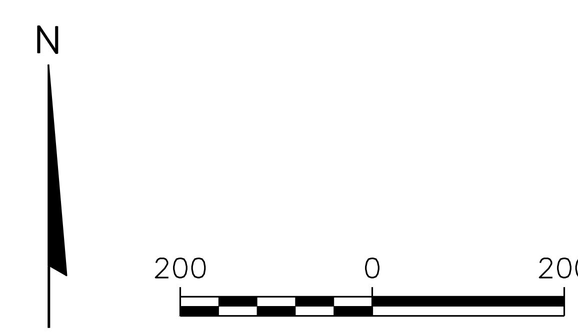


LEGEND

- APPROXIMATE LIMITS OF ASH DISPOSAL
- FENCE
- STREAM
- MONITORING WELL
- DEEP MONITORING WELL
- ABANDONED WELL
- LEACHATE HEAD WELL
- SURFACE WATER SAMPLING POINT

NOTES:

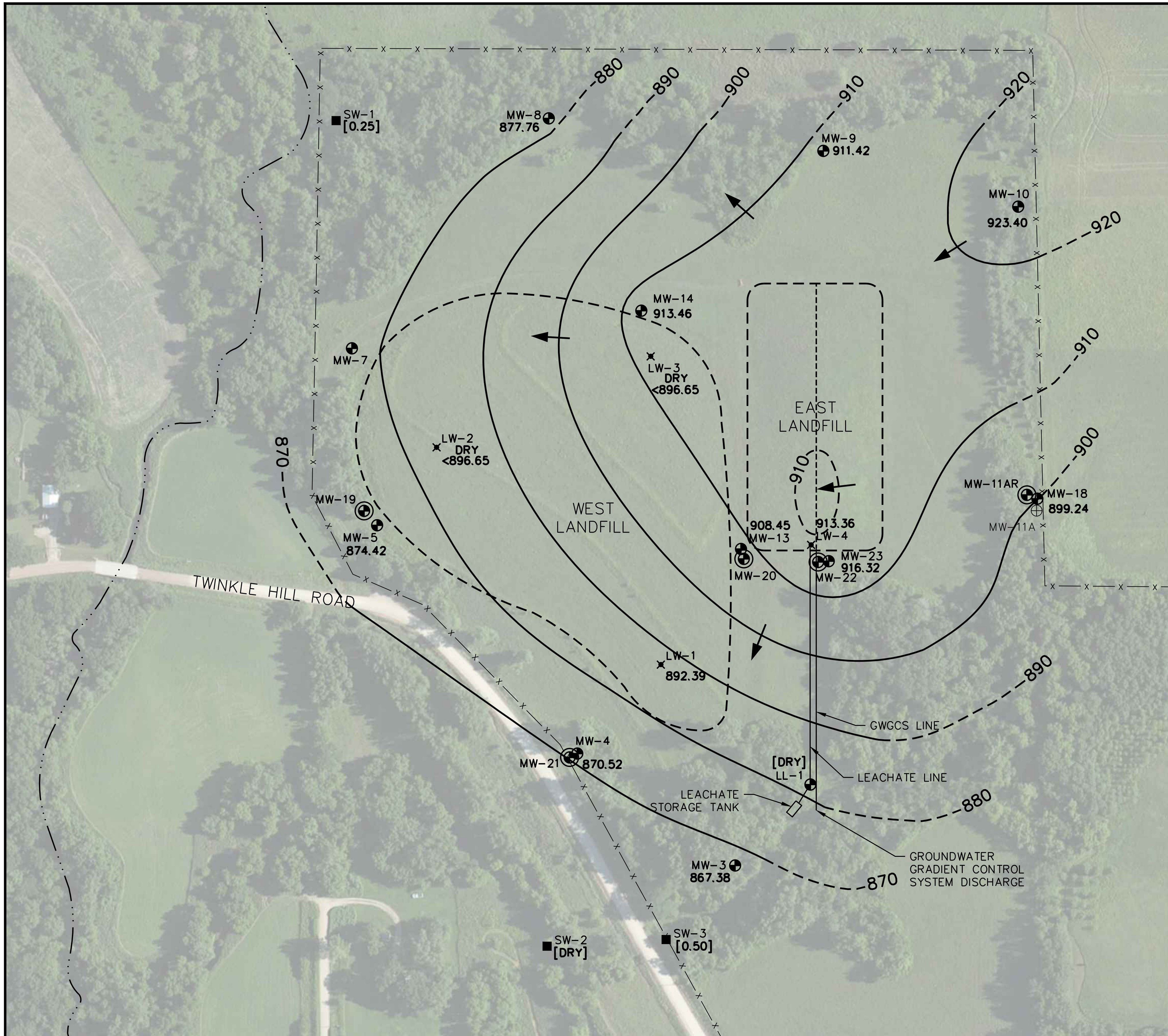
1. MONITORING WELL LOCATIONS ARE APPROXIMATE.



SCALE: 1" = 200'

PROJECT NO.	25219064.00	DRAWN BY:	BJM	ENGINEER: SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	CLIENT: ALLIANT ENERGY. INTERSTATE POWER AND LIGHT	SITE: MARSHALLTOWN EAST AND WEST CLOSED LANDFILLS MARSHALLTOWN, IOWA	MONITORING WELL LOCATIONS	FIGURE 2
DRAWN:	10/28/16	CHECKED BY:	KAK					
REVISED:	04/16/18	APPROVED BY:	TK 11/26/19					

I:\25219064.00\Drawings\Monitoring Well.dwg, 11/26/2019 9:33:43 AM



LEGEND

- APPROXIMATE LIMITS OF ASH DISPOSAL
- FENCE
- STREAM
- MONITORING WELL
- DEEP MONITORING WELL
- ABANDONED WELL
- LEACHATE HEAD WELL
- SURFACE WATER SAMPLING POINT
- 923.40 WATER TABLE ELEVATION
- WATER TABLE CONTOUR DASHED WHERE INFERRED (10' CONTOUR INTERVAL)
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- APPROXIMATE GROUNDWATER UNDERDRAIN PIPE LOCATION

NOTES:

1. MONITORING WELL LOCATIONS ARE APPROXIMATE.
2. WATER LEVELS MEASURED ON APRIL 2024.
3. LEACHATE WELLS LW-2 AND LW-3 WERE DRY ON APRIL 2024.
4. APPROXIMATE GROUNDWATER UNDERDRAIN PIPE LOCATION BASED ON JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. DRAWINGS DATED 8/9/1992. THESE DRAWINGS INDICATE AN UNDERDRAIN ELEVATION OF APPROXIMATELY 915' AT THE NORTH END OF THE EAST LANDFILL AND APPROXIMATELY 905' AT THE SOUTH END OF THE EAST LANDFILL.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25224064.00	DRAWN BY:	SB
DRAWN:	07/17/2024	CHECKED BY:	BRK
REVISED:	11/26/2024	APPROVED BY:	MDB 11/26/2024

ENGINEER: SCS ENGINEERS, 2830 DAIRY DRIVE MADISON, WI 53718-6751, PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY, INTERSTATE POWER AND LIGHT

SITE: MARSHALLTOWN EAST AND WEST CLOSED LANDFILLS, MARSHALLTOWN, IOWA

WATER TABLE CONTOUR MAP
APRIL 2024

FIGURE 3

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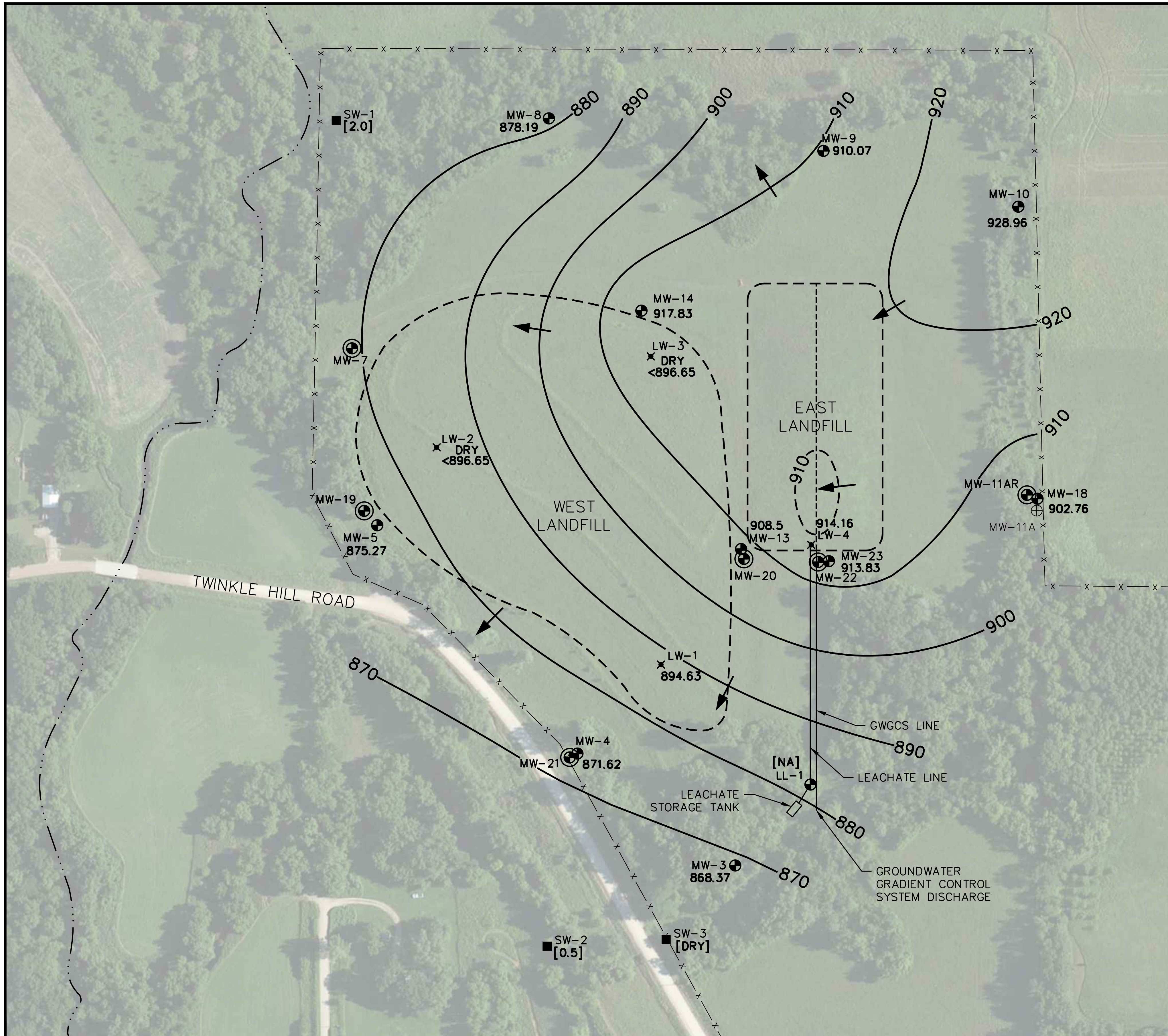

LEGEND

APPROXIMATE LIMITS OF ASH DISPOSAL
FENCE
STREAM
MONITORING WELL
DEEP MONITORING WELL
ABANDONED WELL
LEACHATE HEAD WELL
SURFACE WATER SAMPLING POINT
923.40 WATER TABLE ELEVATION
WATER TABLE CONTOUR LINE DASHED WHERE INFERRED (10' CONTOUR INTERVAL)
APPROXIMATE GROUNDWATER FLOW DIRECTION
APPROXIMATE GROUNDWATER UNDERDRAIN PIPE LOCATION

NOTES:

1. MONITORING WELL LOCATIONS ARE APPROXIMATE.
2. WATER LEVELS MEASURED ON SEPTEMBER 23–27, 2024.
3. LEACHATE WELLS LW–2 AND LW–3 WERE DRY IN SEPTEMBER 2024.
4. APPROXIMATE GROUNDWATER UNDERDRAIN PIPE LOCATION BASED ON JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. DRAWINGS DATED 8/9/1992. THESE DRAWINGS INDICATE AN UNDERDRAIN ELEVATION OF APPROXIMATELY 915' AT THE NORTH END OF THE EAST LANDFILL AND APPROXIMATELY 905' AT THE SOUTH END OF THE EAST LANDFILL.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25224064.00	DRAWN BY:	RAR/SB
DRAWN:	10/21/2024	CHECKED BY:	NLB/BRK
REVISED:	11/26/2024	APPROVED BY:	MDB 11/26/2024

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718–6751
PHONE: (608) 224–2830

CLIENT: ALLIANT ENERGY. INTERSTATE POWER AND LIGHT

SITE: MARSHALLTOWN EAST AND WEST CLOSED LANDFILLS
MARSHALLTOWN, IOWA

WATER TABLE CONTOUR MAP
SEPTEMBER 2024

FIGURE 4

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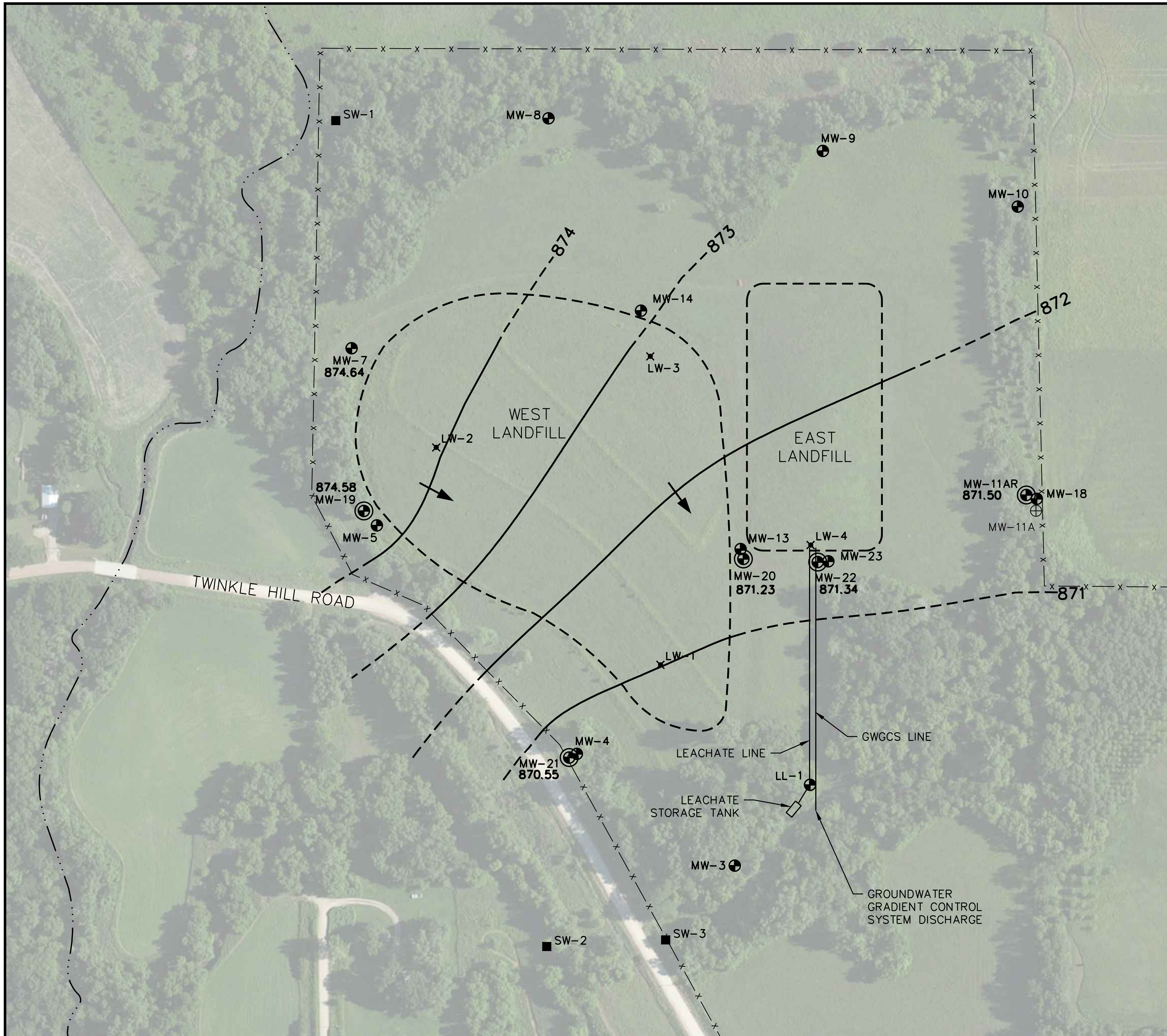

LEGEND

- APPROXIMATE LIMITS OF ASH DISPOSAL
- FENCE
- STREAM
- MONITORING WELL
- DEEP MONITORING WELL
- ABANDONED WELL
- LEACHATE HEAD WELL
- SURFACE WATER SAMPLING POINT
- **871.50** POTENTIOMETRIC SURFACE ELEVATION
- PIEZOMETER POTENTIOMETRIC SURFACE CONTOUR DASHED WHERE INFERRED (1' CONTOUR INTERVAL)
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. MONITORING WELL LOCATIONS ARE APPROXIMATE.
2. WATER LEVELS MEASURED ON APRIL 2024.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25224064.00	DRAWN BY:	SB
DRAWN:	10/30/2023	CHECKED BY:	BRK
REVISED:	07/18/2024	APPROVED BY:	MDB 11/26/2024

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY. INTERSTATE POWER AND LIGHT

SITE: MARSHALLTOWN EAST AND WEST CLOSED LANDFILLS MARSHALLTOWN, IOWA

PIEZOMETER POTENTIOMETRIC SURFACE MAP
APRIL 2024

FIGURE 5

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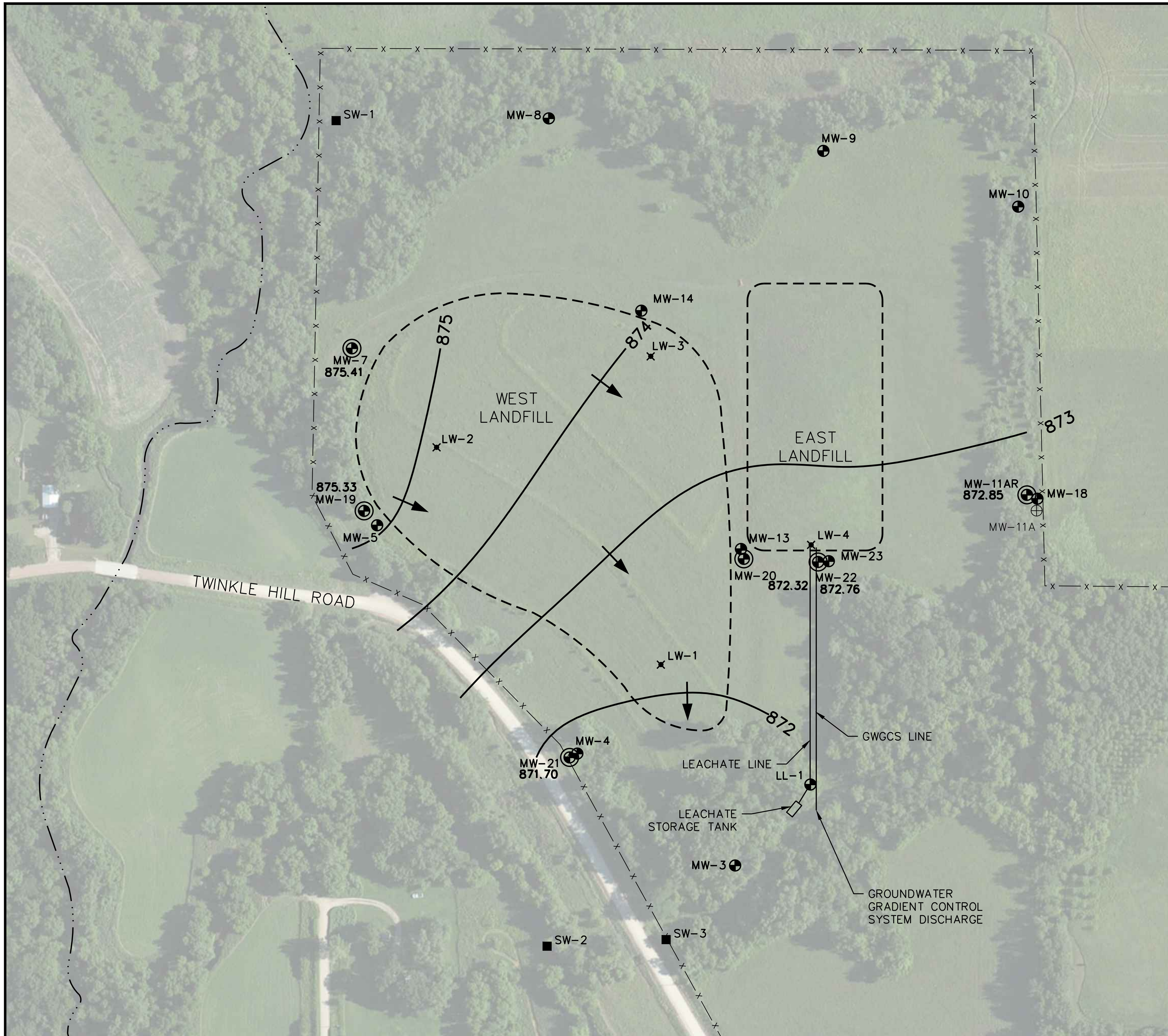

LEGEND

— — — —	APPROXIMATE LIMITS OF ASH DISPOSAL
— x — x —	FENCE
—— · · · ——	STREAM
	MONITORING WELL
	DEEP MONITORING WELL
	ABANDONED WELL
	LEACHATE HEAD WELL
	SURFACE WATER SAMPLING POINT
871.50	POTENTIOMETRIC SURFACE ELEVATION
——— — —	PIEZOMETER POTENTIOMETRIC SURFACE CONTOUR LINE DASHED WHERE INFERRED (5' CONTOUR INTERVAL)
——▶	APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. MONITORING WELL LOCATIONS ARE APPROXIMATE.
2. WATER LEVELS MEASURED ON SEPTEMBER 23–27, 2024.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25224064.00	DRAWN BY:	RAR
DRAWN:	10/21/2024	CHECKED BY:	BRK/NLB
REVISED:	11/08/2024	APPROVED BY:	BRK 11/08/2024

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY. INTERSTATE POWER AND LIGHT

SITE: MARSHALLTOWN EAST AND WEST CLOSED LANDFILLS
MARSHALLTOWN, IOWA

PIEZOMETER POTENTIOMETRIC SURFACE CONTOUR MAP
SEPTEMBER 2024

FIGURE
6

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11/8/2024 1:08:34 PM

Appendix A

Inspections

SEMIANNUAL FACILITY INSPECTION REPORT 2024
INTERSTATE POWER AND LIGHT COMPANY
MARSHALLTOWN EAST AND WEST CLOSED LANDFILL
PERMIT NO. 57-SDP-5-91C AND 57-SDP-3-90C

The semiannual inspections of the Interstate Power and Light Company (IPL) Marshalltown East and West Closed Landfill were conducted on April 8 and September 27, 2024. As required in the general provisions of the permits (Sanitary Disposal Permit No. 57-SDP-5-91C and 57-SDP-3-90C), inspections must be performed by, or under the direct supervision of, an Iowa registered engineer, and a brief report must be submitted to the Iowa Department of Natural Resources (IDNR).

SITE CONDITIONS

The Marshalltown East and West Closed Landfills were used for the disposal of coal combustion residue (CCR). No CCR or other waste has been placed at the site since 1995. The site is in generally good condition. Facility Inspection Reports for April and September 2024 are included in Attachment A.

SITE INSPECTIONS

On April 8 and September 27, 2024, staff from SCS Engineers (SCS) conducted site inspections under the supervision of Licensed Professional Engineer Eric Nelson, PE, of SCS. This inspection report discusses the items observed during the inspections.

Access Road and Perimeter Fencing

The access road at the entrance of the property and perimeter fencing were inspected during the site inspections. The access road and perimeter fencing were generally observed to be in good condition. During the April and September inspections, some tree limbs were observed to have fallen on the perimeter fence and one fallen branch impeded access by truck to the west landfill. High grass along the access road and near the east gate was observed during the September inspection and site access would be improved from mowing this grass back.

Erosion Control

The property was generally well vegetated. No erosional features were noticed on the landfill cover during the inspections.

Groundwater Wells

Groundwater wells were observed to be in generally good condition. One well lock was rusted and replaced during the September inspection.

IDNR Inspections

The most recent IDNR inspection of the facility was performed on December 14 and 15, 2014.

RM/lmh/MDB

I:\25224064.00\Deliverables\2024 AWQR\Appendix A - Inspections\1_Marshalltown Site Inspection Report 2024.docx

Attachment A

Site Inspection Forms

SCS ENGINEERS

SITE INSPECTION REPORT

Project:	IPL – Marshalltown East & West Closed Landfill	**Project #:**	25216064
Site:	Marshalltown East Closed Ash Landfill	**Permit number:**	64-SDP-5-91C
Date:	4/8/24	**Prepared by:**	
Weather:	60° Sunny	**On site/Off site:**	1400 ~~a.m.~~ 1600 p.m.
Personnel:	Tyler Stirling		
Equipment:			

Landfill Cover and Erosion Control (Provide description of cover condition, whether grass appears mowed, and any erosional features or other observed issues)
Photos Taken ☑ (check)

Notes: Good condition, mowed well

Primary Access Roads and Perimeter Fencing (Provide description of current road and perimeter fencing condition and if improvements are necessary) Photos Taken ☐ (check)
Draw/Note location of necessary improvements on the attached figure.

Notes: Tree still on fence, good condition otherwise

Leachate System Performance (Provide description of leachate system components (head wells, leachate tank) in need of improvements if necessary)
Photos Taken ☐ (check)

Notes: Good condition

Groundwater (Provide description of current groundwater wells in need of improvements if necessary)
Photos Taken ☐ (check)

Notes: Good condition

SITE INSPECTION REPORT

Miscellaneous Notes: N/a
Communications with Onsite Personnel: Jenny via call @ 1400 ↳ text offsite 1600

Signature: ______________________________

C:\Users\3510med\Desktop\Site Inspection Form.doc

SCS ENGINEERS

SITE INSPECTION REPORT

Project:	IPL – Marshalltown East & West Closed Landfill	**Project #:**	25216064
Site:	Marshalltown West Closed Ash Landfill	**Permit number:**	64-SDP-3-90C
Date:	9/27/24	**Prepared by:**	Michael Morgan
Weather:	Sunny 64°F	**On site/Off site:**	7:45 a.m. 11:00 am ~~p.m.~~

Personnel: Michael Morgan

Equipment:

Landfill Cover and Erosion Control (Provide description of cover condition, whether grass appears mowed, and any erosional features or other observed issues)
Photos Taken ☑ (check)

Notes: Grass is mowed, no erosion observed, no bare ground observed

Primary Access Roads and Perimeter Fencing (Provide description of current road and perimeter fencing condition and if improvements are necessary) Photos Taken ☑ (check)
Draw/Note location of necessary improvements on the attached figure.

Notes: West Gate access rd, fallen tree impeding truck ~~[illegible]~~ from accessing West Landfill.
Tree fallen on fence along Twinkle ~~[illegible]~~ Hill rd. near MW-21

Leachate System Performance (Provide description of leachate system components (head wells) in need of improvements if necessary)
Photos Taken ☐ (check)

Notes: No issue

Groundwater (Provide description of current groundwater wells in need of improvements if necessary)
Photos Taken ☐ (check)

Notes: No issues

SITE INSPECTION REPORT

Marshalltown West Closed Landfill

Miscellaneous Notes:

Communications with Onsite Personnel:

checked in with Jenny Coughlin daily upon arrival & departure from site.

Signature: [signature]

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SCS ENGINEERS

SITE INSPECTION REPORT

Project: IPL – Marshalltown East & West Closed Landfill **Project #:** 25216064

Site: Marshalltown East Closed Ash Landfill **Permit number:** 64-SDP-5-91C

Date: 9/27/24 **Prepared by:** Michael Morgan

Weather: Sunny 64 °F **On site/Off site:** 7:45 a.m. 11:00 am

Personnel: Michael Morgan

Equipment:

Landfill Cover and Erosion Control (Provide description of cover condition, whether grass appears mowed, and any erosional features or other observed issues)
Photos Taken ☑ (check)

Notes: Grass covers, mowed, no erosion observed

Primary Access Roads and Perimeter Fencing (Provide description of current road and perimeter fencing condition and if improvements are necessary) Photos Taken ☑ (check)
Draw/Note location of necessary improvements on the attached figure.

Notes: East Gate (on Twinkle Hill rd) - Grass not cut, gate won't open fully. overgrown vegetation along access rd from gate to East landfill that will need cut back

Leachate System Performance (Provide description of leachate system components (head wells, leachate tank) in need of improvements if necessary)
Photos Taken ☐ (check)

Notes: No issues observed

Groundwater (Provide description of current groundwater wells in need of improvements if necessary)
Photos Taken ☑ (check)

Notes: lock required for MW-22

SITE INSPECTION REPORT

Marshalltown East Closed Landfill

Miscellaneous Notes:

Communications with Onsite Personnel:

checked in & out with Jenny Coughlin daily

Signature: [signature]

Appendix B

Groundwater Sampling Field Sheets

Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL

Well No. MW-3 **Date** 9/24/24

Well Depth 21.59 **Sampling Device** YSI ProDSS Turbidity: MicroTPW

Water Level 15.51 **Other Info.** Sample Pro

Purge Volume **Pumping Rate** 250 ml/min

Sampling Personnel Michael Morgan

Color/Odor Clear

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
17:01	15.67	15.2	6.85	4.69	745	173.6	15.24	
17:06	16.03	14.1	6.86	2.94	818	171.4	10.23	
17:11	16.03	13.3	6.91	2.54	849	167.7	6.23	
17:16	16.05	13.2	6.92	2.41	855	164.3	5.50	
17:21	16.07	13.1	6.93	2.39	849	162.6	4.61	
17:26	16.02	13.1	6.93	2.37	848	161.0	4.60	
17:31	16.05	13.1	6.93	2.34	849	159.5	4.97	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start 17:00 Pump Stop 17:40

Fieldblank 16:50

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL
Well No. MW-4 **Date** 9/23/24
Well Depth — **Sampling Device** YSI = Pro DSS Turbidity = MicroTPW
Water Level 8.89 **Other Info.** Dedicated Bladder pump
Purge Volume **Pumping Rate** 200 ml/min
Sampling Personnel Michael Morgan
Color/Odor Orange then became clear. Slight anise smell

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10% or 3 < 0.5	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
14:23	9.16	13.6	7.33	2.58	1001	37.4	285.7	orange
14:28	9.01	14.1	6.93	1.11	996	-75.0	171.2	
14:33	9.06	14.3	6.85	0.72	990	-86.5	57.59	orange tint
14:38	8.97	14.5	6.85	0.56	989	-89.4	27.26	
14:43	8.96	14.5	6.84	0.41	982	-90.5	12.30	clear
14:48		14.5	6.84	0.35	979	-90.9	9.68	
14:53		14.2	6.84	0.29	975	-91.4	9.10	
14:58		14.0	6.84	0.25	970	-92.2	6.61	
15:03		14.0	6.84	0.24	968	-92.5	6.85	
15:08	▽	14.0	6.84	0.22	966	-930	6.72	SAMPLE

Type of Samples Collected:

Additional Notes: Old wasp ~~nest~~ nest present. Pump stop ~~for~~ at 15:20

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Document1

Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL
Well No. MW-5 **Date** 9/24/24
Well Depth — **Sampling Device** YSI Pro DSS Turbidity MicroTPW
Water Level 16.14 **Other Info.** Dedicated bladder Pump
Purge Volume **Pumping Rate** 200 ml/min
Sampling Personnel Michael Morgan
Color/Odor clear / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
15:35	16.40	16.0	7.34	7.41	484.1	146.3	8.96	
15:40	16.34	13.6	6.60	5.08	457.2	162.2	8.05	
15:45	16.30	13.5	6.45	4.92	460.3	167.7	8.10	
15:50	16.31	13.4	6.41	4.88	461.4	170.6	7.26	
15:55	16.32	13.3	6.37	4.88	462.1	173.2	7.65	
16:00	16.33	13.2	6.35	4.86	462.9	175.2	6.98	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start 15:34 Pump Stop 16:12

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL
Well No. MW-7 **Date** 9/~~24~~ 25/24
Well Depth 42.69 **Sampling Device** YSI Pro DSS Turbidity MicroTPW
Water Level 28.44 **Other Info.** Sample Pro
Purge Volume **Pumping Rate** 350 ml/min
Sampling Personnel Michael Morgan
Color/Odor clear w/ slight oily sheen / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
10:09	28.48	15.2	7.48	5.01	752	107.9	11.30	
10:14	28.49	11.5	6.99	3.29	739	172.9	9.62	
10:19	28.48	11.3	6.86	3.37	732	175.1	8.83	
10:24	28.44	11.0	6.87	3.63	733	167.3	7.65	
10:29	28.45	11.0	6.92	3.92	734	156.1	7.12	
10:34	28.46	11.0	6.96	4.12	735	147.9	6.68	
10:39	28.48	11.0	6.98	4.32	737	140.1	7.06	
10:44	28.50	11.0	6.99	4.51	738	134.7	6.12	
10:49	28.48	11.0	7.00	4.63	739	131.9	6.42	
10:54	28.49	11.0	7.00	4.75	741	129.8	6.28	SAMPLE

Type of Samples Collected:

Additional Notes: Lge Yellow Jacket nest - no lock on well - Soaked well with wasp & hornet spray at 16:20 on 9/24/24
Pump Start 10:07 9/25 Pump Stop: 11:01 lock added - 0641 key

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00
Site Marshalltown E&W CC
Well No. MW-8
Date 9/26/24
Well Depth 29.18
Sampling Device YSI PRO DSS Turbidity Micro TPW
Water Level 24.34
Other Info. Bailer
Purge Volume
Pumping Rate
Sampling Personnel Michael Morgan
Color/Odor slightly cloudy /

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
14:45	24.44	18.6	7.44	6.56	800	142.7	17.06	

Type of Samples Collected:

Additional Notes: Wasp Nest unable to draw water. Did not hear pump contact water during descent. Tubing too short for water level?
Bailed dry 13:00 on 9/25/24 Sample 14:45 9/26/24

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00
Site Marshalltown E & W CL
Well No. MW-9
Date 9/24/24
Well Depth 20.11
Sampling Device YSI ProDSS Turbidity: MicroTPW
Water Level 7.97
Other Info. Sample Pro
Purge Volume
Pumping Rate 200 ml/min
Sampling Personnel Michael Morgan
Color/Odor clear / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (μs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10% 3 reading <0.5	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
11:47	8.66	14.8	7.15	2.42	856	133.4	16.39	
11:52	9.52	13.9	6.85	0.72	841	155.1	13.52	
11:57	9.40	14.7	6.78	0.64	837	153.2	11.97	
12:02	9.29	14.9	6.80	0.59	833	140.0	12.39	
12:07	9.25	14.8	6.79	0.57	827	123.9	13.78	
12:12	9.24	14.8	6.79	0.58	823	104.2	14.40	
12:17	9.24	14.7	6.78	0.61	821	76.2	11.34	
12:22	9.30	14.7	6.77	0.62	818	53.6	11.07	
12:27	9.33	14.6	6.76	0.61	813	37.5	10.60	
12:32	9.34	14.6	6.76	0.61	810	29.7	10.77	
12:37	9.36	14.6	6.75	0.60	796	22.6	9.91	
12:42	9.35	14.7	6.74	0.58	785	19.9	9.77	

Type of Samples Collected:

Additional Notes: Pump Start 11:46 Pump Stop 13:02

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. MW-9 Cont... **Date** 9/24/24

Well Depth ______ **Sampling Device** ______

Water Level ______ **Other Info.** ______

Purge Volume ______ **Pumping Rate** ______

Sampling Personnel ______

Color/Odor ______

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
12:47	9.39	14.6	6.71	0.52	766	17.5	8.32	
12:52	9.41	14.6	6.69	0.44	749	15.4	8.31	
12:57	9.41	14.5	6.67	0.40	740	14.2	8.19	
13:02	9.42	14.6	6.66	0.37	732	12.8	8.14	SAMPLE

Type of Samples Collected: ______

Additional Notes: ______

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\ r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. MW-10 **Date** 9/24/24

Well Depth 19.82 **Sampling Device** YSI Pro DSS Turbidity: Micro TPW

Water Level 12.23 **Other Info.** Sample Pro

Purge Volume **Pumping Rate** 200 ml/min

Sampling Personnel Michael Morgan

Color/Odor Yellow/brown tint /slightly earthy

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
13:59	12.28	15.9	7.20	7.80	566	139.4	24.85	
14:04	12.38	14.3	7.02	8.15	546	143.5	39.37	
14:09	12.45	14.0	6.98	8.12	546	142.1	31.41	
14:14	12.50	13.8	6.93	8.13	546	141.5	26.81	
14:19	12.55	13.8	6.92	8.12	551	141.5	20.74	
14:24	12.57	13.7	6.92	8.11	559	142.0	19.38	
14:29	12.61	13.7	6.93	8.07	566	142.6	18.93	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start 13:55 Pump Stop - 14:47
cut in air line ~ 5 ft from bend - already taped but required retaping

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL
Well No. MW-11AR **Date** 9/25/24
Well Depth 57.49 **Sampling Device** YSI Pro DSS Turbidity: Micro TPW
Water Level 49.68 **Other Info.** Sample Pro
Purge Volume **Pumping Rate** 100 ml/min
Sampling Personnel Michael Morgan
Color/Odor * clear / none * Small particulates in water

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
14:23	50.62	20.3	7.21	4.61	968	160.2	20.36	
14:28	51.14	13.9	7.16	2.22	961	160.6	16.41	
14:33	51.22	14.8	7.13	2.26	950	159.0	16.84	
14:38	51.30	16.3	7.12	2.42	954	155.0	17.23	
14:43	51.34	18.3	7.11	2.58	957	150.2	19.89	
14:48	51.40	20.3	7.11	2.60	964	144.5	26.83	
14:53	51.47	21.0	7.11	2.61	969	142.4	24.87	
14:58	51.48	20.5	7.11	2.60	974	142.2	26.19	
15:03	51.50	19.8	7.11	2.53	976	142.1	25.05	
15:08	51.53	18.9	7.11	2.47	975	142.0	23.24	
15:13	51.54	18.3	7.11	2.46	971	141.4	19.65	
15:18	51.58	18.0	7.12	2.46	966	139.1	18.18	

Type of Samples Collected:

Additional Notes: Pump Start = 14:20 Pump Stop = 16:08

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00
Site Marshalltown E & W CL
Well No. MW-11AR conf...
Date 9/25/24
Well Depth
Sampling Device
Water Level
Other Info.
Purge Volume
Pumping Rate
Sampling Personnel Michael Morgan
Color/Odor

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
15:23	51.61	18.3	7.12	2.50	966	134.4	18.78	SAMPLE

Type of Samples Collected:

Additional Notes:

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\ r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL

Well No. MW-13 **Date** 9/26/24

Well Depth 22.57 **Sampling Device** YSI Pro DSS Turbidity Micro TPW

Water Level ~~[illegible]~~ 12.25 **Other Info.** Sample Pro

Purge Volume **Pumping Rate** 200 ml/min

Sampling Personnel Michael Morgan

Color/Odor clear / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
9:44	12.31	14.5	6.95	3.51	989	206.2	30.42	cloudy light brown
9:49	12.58	14.2	6.75	2.46	972	213.3	43.67	
9:54	12.67	14.8	6.76	2.52	963	209.2	31.39	
9:59	12.71	15.1	6.79	2.51	960	203.9	19.12	
10:04	12.76	15.2	6.81	2.48	960	197.7	10.50	clear
10:09	12.79	15.2	6.81	2.45	962	192.5	7.68	
10:14	12.80	15.2	6.81	2.43	960	189.4	8.27	
10:19	12.82	15.2	6.81	2.41	961	185.7	8.20	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start 9:43 Pump Stop 10:26

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00
Site Marshalltown E&W CL
Well No. MW-14
Date YSI Pro DSS Turbidity MicroTPW
Well Depth 22.71
Sampling Device 9/25/24
Water Level 11.65
Other Info. Sample Pro
Purge Volume
Pumping Rate 400 ml/min
Sampling Personnel Michael Morgan
Color/Odor clear / slightly earthy

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
16:48	11.83	14.5	7.20	2.09	785	151.6	48.51	cloudy light brown
16:53	12.46	13.5	7.02	2.15	729	152.3	35.08	
16:58	12.69	13.8	7.01	2.80	654	150.9	21.24	
17:03	12.74	14.6	6.99	2.67	652	149.7	12.57	color = clear
17:08	12.91	14.9	6.97	2.40	665	148.1	9.79	
17:13	13.04	15.0	6.96	2.26	671	146.7	8.91	
17:18	13.11	15.0	6.95	2.13	676	145.0	8.88	
17:23	13.23	14.8	6.95	2.07	676	143.5	8[illegible].43	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start 16:47 Pump Stop: 17:36

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\ r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL

Well No. MW-18 **Date** 9/25/24

Well Depth — **Sampling Device** YSI Pro DSS Turbidity: Micro TPW

Water Level 18.87 **Other Info.** Dedicated bladder pump

Purge Volume **Pumping Rate** 300ml/min

Sampling Personnel Michael Morgan

Color/Odor clear /

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10% 3 < 0.5	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
13:08	19.29	13.1	7.25	5.33	786	164.4	13.29	
13:13	19.28	12.0	6.90	1.96	772	169.1	9.17	
13:18	19.37	12.2	6.84	1.36	769	165.6	6.50	
13:23	19.58	12.2	6.83	1.15	769	163.5	5.90	
13:28	19.59	12.0	6.82	1.01	768	161.8	5.04	
13:33	19.63	11.8	6.82	0.83	767	160.0	6.60	
13:38	19.58	11.7	6.81	0.67	764	158.1	5.76	
13:43	19.62	12.1	6.81	0.59	762	155.1	5.00	
13:48	19.64	12.1	6.81	0.55	759	151.1	5.43	
13:53	19.64	12.3	6.81	0.56	758	147.8	5.38	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start = 13:07 Pump Stop = 14:00

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3 \pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL
Well No. MW-19 **Date** 9/25/24
Well Depth 39.87 **Sampling Device** YSI Pro DSS Turbidity Micro TPW
Water Level 16.13 **Other Info.** Sample Pro
Purge Volume **Pumping Rate** 250 ml/min
Sampling Personnel Michael Morgan
Color/Odor clear / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
11:37	16.15	14.9	7.22	5.56	714	152.9	8.23	
11:42	16.13	12.5	7.10	4.76	711	156.4	8.04	
11:47	16.14	12.3	7.06	4.66	712	157.5	8.80	
11:52	16.14	12.2	7.04	4.64	711	157.8	7.02	
11:57	16.15	12.3	7.03	4.51	710	158.0	6.37	
12:02	16.13	12.2	7.03	4.44	709	158.0	6.81	
12:07	16.14	12.2	7.02	4.45	711	158.0	6.36	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start = 11:35 Pump Stop = 12:16

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. MW-20 **Date** 9/26/24

Well Depth 80.72 **Sampling Device** Sample Pro

Water Level 48.54 **Other Info.** Pro DSS YSI Turbidity Micro TPW

Purge Volume **Pumping Rate** 200 ml/min

Sampling Personnel Michael Morgan

Color/Odor clear / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
10:51	48.44	17.0	7.30	5.68	1017	173.0	18.93	
10:56	48.41	14.1	7.21	2.71	1034	174.0	12.10	
11:01	48.31	13.5	7.16	2.83	1013	172.6	11.12	
11:06	48.28	13.4	7.14	3.73	1001	171.6	9.76	
11:11	48.23	13.1	7.14	4.92	999	171.0	8.42	
11:16	48.28	13.0	7.16	6.02	993	171.0	6.51	
11:21	48.34	12.9	7.17	7.26	992	171.3	9.52	
11:26	48.25	12.9	7.18	8.11	992	172.2	7.33	
11:31	48.26	12.9	7.18	8.61	993	172.9	7.62	
11:36	48.40	12.7	7.19	9.05	991	173.7	7.96	
11:41	48.37	12.8	7.19	9.34	990	174.7	7.83	SAMPLE

Type of Samples Collected:

Additional Notes: wasp nest, used wasp & hornet spray at 9:30 am
Pump Start 10:47 Pump Stop 11:50

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL

Well No. MW-21 **Date** 9/23/24

Well Depth 35.75 **Sampling Device** YSI Pro DSS Turbidity MicroTPW

Water Level 8.41 **Other Info.** Sample Pro pump

Purge Volume **Pumping Rate** 400 ml/min

Sampling Personnel Michael Morgan

Color/Odor brown tint / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
15:39	8.46	26.9	7.36	7.28	811	127.6	26.31	
15:44	8.55	14.6	7.21	4.73	869	82.1	27.32	
15:49	8.44	13.7	7.12	3.04	897	76.9	41.14	
15:54	8.52	13.3	7.06	2.59	905	73.7	45.10	
15:59	8.45	13.2	7.06	2.47	898	72.9	39.77	
16:04		12.4	7.04	2.37	903	74.4	37.10	
16:09		12.3	7.04	2.32	902	74.9	35.58	
16:14		12.3	7.03	2.31	900	76.1	20.83	
16:19		12.3	7.02	2.31	896	77.5	18.42	
16:24		12.2	7.02	2.32	893	79.2	12.73	
16:29		12.2	7.01	2.31	888	80.5	10.90	
16:34		12.2	7.01	2.31	887	81.9	10.45	

Type of Samples Collected:

Additional Notes: Pump Start = 15:37 Pump Stop = 16:49

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL
Well No. MW-21 cont... **Date** 9/23/24
Well Depth ______ **Sampling Device** ______
Water Level ______ **Other Info.** ______
Purge Volume ______ **Pumping Rate** ______
Sampling Personnel Michael Morgan
Color/Odor ______

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
16:39	8.45	12.1	7.01	2.33	884	83.0	10.27	SAMPLE

Type of Samples Collected: ______

Additional Notes: ______

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. MW-22 **Date** 9/26/24 & 9/27/24

Well Depth 55.72 **Sampling Device** YSI ProDSS Turbidity Micro TPW

Water Level 53.87 **Other Info.** Sample Pro

Purge Volume **Pumping Rate**

Sampling Personnel Michael Morgan

Color/Odor clear w detritus /

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (μs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
9:25	53.93	13.8	7.58	7.88	956	152.8	2899	

Type of Samples Collected: Not enough water for Sample

Additional Notes: Wasp Nest - Sprayed w Alconox 12:15 No Lock
low water level, bailed dry 14:20 on 9/26/24
Parameters collected 9/27/24 at 9:25 am

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. MW-23 **Date** 9/26/24

Well Depth 20.14 **Sampling Device** YSI Pro DSS Turbidity Micro TPW

Water Level 12.81 **Other Info.** Sample Pro

Purge Volume **Pumping Rate** 300 ml/min

Sampling Personnel Michael Morgan

Color/Odor slightly cloudy then clear / slight iodine smell

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10% OR 3 <0.5	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
12:27	12.98	16.4	7.09	2.45	1664	165.0	11.95	
12:32	13.32	15.5	6.98	1.19	1133	135.0	14.69	
12:37	13.92	15.9	6.98	1.80	862	123.0	18.41	
12:42	14.39	15.9	6.94	1.13	749	119.9	10.52	clear
12:47	14.52	17.2	6.92	1.02	767	119.2	10.94	Reduced pump rate
12:52	14.72	17.2	6.92	0.92	811	118.8	10.29	
12:57	14.86	17.3	6.92	0.87	823	118.3	10.74	
13:02	15.00	17.1	6.93	0.86	830	117.8	10.31	SAMPLE

Type of Samples Collected:

Additional Notes: Pump Start 12:26 Pump Stop 13:18

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\ r^3$

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Groundwater Sampling Log

Project No. 25224064.00
Site Marshalltown B&W CL
Well No. GWGCS
Date 9/26/24
Well Depth
Sampling Device YSI Pro DSS, Turbidity: MicroTPW
Water Level ~5-10"
Other Info.
Purge Volume
Pumping Rate
Sampling Personnel Michael Morgan
Color/Odor clear / smell like landfill

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
17:20	~5-10"	17.5	7.03	3.36	1436	164.8	5.95	

Type of Samples Collected:

Additional Notes: No water flow at yellow pole but was flowing ~20' downstream.

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

DNR

SURFACE WATER SAMPLING FORM

Site Name: Marshalltown E&W CL
Permit No.:
Surface Monitoring Point No.: SW-1
Date/Time: 9/27/24 10:05
Sampler Name: Michael Morgan

A. TYPE OF MONITORING POINT

- [x] Stream
- [ ] Road Ditch
- [ ] Drainage Ditch
- [ ] Open Tile
- [ ] Tile with Riser
- [ ] Other (describe)

B. PURPOSE OF MONITORING POINT

- [x] Upstream
- [ ] Within Landfill
- [ ] Downstream
- [ ] Other (describe)

C. MONITORING POINT CONDITIONS

Condition commentary/field notes: Stream that runs along western side of landfill, outside perimeter. Deer tracks at monitoring point - use it as crossing point.

Was monitoring point dry? No
Too little water to sample? No
Was water flowing? [x] Yes [ ] No
If yes, estimate quantity
If yes, estimate depth 2' at deepest
Was water discolored? [ ] Yes [x] No
If yes, describe
Does water have odor? [ ] Yes [ ] No
If yes, describe
Was ground discolored? [ ] Yes [x] No
If yes, describe
Litter present? [ ] Yes [x] No
If yes, describe

D. FIELD MEASUREMENT

Weather Conditions Sunny, 64°F

Field Measurements (after stabilization):

Temperature 14.2°C Units
Equipment Used
pH 7.83 Equipment Used YSI Pro DSS
Specific Conditions Units
Equipment Used NTU = 9.07, DO mg/L = 8.76, SPC uS/cm = 692
ORP mV = 146.1

SURFACE WATER SAMPLING FORM

Site Name Marshalltown E & W Closed Landfill	Permit No.
Surface Monitoring Point No. SW-2	Date/Time 9/27/24 8:50am
Name of person sampling Michael Morgan	

A. TYPE OF MONITORING POINT	
☒ Stream	☐ Open Tile
☐ Road Ditch	☐ Tile with Riser
☐ Drainage Ditch	☐ Other (describe)

B. PURPOSE OF MONITORING POINT	
☐ Upstream	☒ Downstream
☐ Within Landfill	☐ Other (describe)

C. MONITORING POINT CONDITIONS	
General description/condition of monitoring point Slow flow, duckweed present in patches. Ground muddy & frequented by wildlife	
Was monitoring point dry? No	Too little water to sample? No
Was water flowing?	☑ YES ☐ NO
If yes, estimate quantity	If yes, estimate depth ~ 6"
Was water discolored?	☐ YES ☑ NO
If yes, describe	
Does water have odor?	☐ YES ☑ NO
If yes, describe	
Was ground discolored?	☐ YES ☑ NO
If yes, describe	
Litter present?	☐ YES ☑ NO
If yes, describe	

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E. 9th St, Des Moines, IA 50319.
Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

D. FIELD MEASUREMENT	
Weather Conditions sunny, 56°F	
Field Measurements (after stabilization):	
Temperature 14.0 °C	Units
Equipment Used	
D. FIELD MEASUREMENT (continued)	
pH	
Equipment Used	
Specific Conditions	Units
Equipment Used	

Comments

NTU = 9.09

DO mg/L = 8.42

SPC µS/cm = 702

pH = 7.74

ORP mV = 144.5

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature [signature]		Date 9/27/24
Telephone 515-631-0778	Fax	Email mamorgan@scsengineers.com

NOTE: Attach 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E. 9th St, Des Moines, IA 50319.
Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

SURFACE WATER SAMPLING FORM

Site Name Marshalltown E & W CL	**Permit No.**
Surface Monitoring Point No. SW - 3	**Date/Time** 9/27/24 8:05 AM
Name of person sampling Michael Morgan	

A. TYPE OF MONITORING POINT	
☐ **Stream**	☐ **Open Tile**
☒ **Road Ditch**	☐ **Tile with Riser**
☐ **Drainage Ditch**	☐ **Other (describe)**

B. PURPOSE OF MONITORING POINT	
☐ **Upstream**	☒ **Downstream**
☐ **Within Landfill**	☐ **Other (describe)**

C. MONITORING POINT CONDITIONS	
General description/condition of monitoring point Road ditch at East Gate on Tuttle rd. No Staff gauge. Thick grass.	
Was monitoring point dry? Yes	**Too little water to sample?**
Was water flowing?	☐ **YES** ☐ **NO**
If yes, estimate quantity	**If yes, estimate depth**
Was water discolored?	☐ **YES** ☐ **NO**
If yes, describe	
Does water have odor?	☐ **YES** ☐ **NO**
If yes, describe	
Was ground discolored?	☐ **YES** ☐ **NO**
If yes, describe	
Litter present?	☒ **YES** ☐ **NO**
If yes, describe Food product litter, small amount, pic taken	

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Questions? Call or Email: Nina Koger Environmental Engineer Sr., 515-725-8309, nina.koger@dnr.iowa.gov

D. FIELD MEASUREMENT	
Weather Conditions 53° F, clear	
Field Measurements (after stabilization):	
Temperature	Units
Equipment Used	
D. FIELD MEASUREMENT (continued)	
pH	
Equipment Used	
Specific Conditions	Units
Equipment Used	

Comments

Downstream of Groundwater Gradient Control System Discharge ?

No Sample

CERTIFICATION

I certify under penalty of law I believe the information reported above is true, accurate and complete.

Signature [signature]		Date 9/27/24
Telephone 515-631-0778	Fax	Email mamorgan@scsengineers.com

NOTE: Attach 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

Please mail completed form to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E. 9th St, Des Moines, IA 50319.
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Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL
Well No. LW-1 **Date** 9/26/24
Well Depth 16.72 **Sampling Device** Bailer
Water Level 12.46 **Other Info.** YSI Pro Dss, Turbidity: Micro TPW
Purge Volume **Pumping Rate**
Sampling Personnel Michael Morgan
Color/Odor clear / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
15:50	12.46	18.9	7.36	4.01	998	157.5	21.30	

Type of Samples Collected:

Additional Notes: well casing doesn't fully close

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E&W CL

Well No. LW-2 **Date** 9/26/24

Well Depth 37.72 **Sampling Device** Bailer

Water Level — **Other Info.**

Purge Volume **Pumping Rate**

Sampling Personnel

Color/Odor

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	

Type of Samples Collected:

Additional Notes: Well dry No Sample

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi\ r^3$

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SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. LW-3 **Date** 9/26/24

Well Depth 45.74 **Sampling Device** Bailer

Water Level — **Other Info.**

Purge Volume **Pumping Rate**

Sampling Personnel

Color/Odor

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	

Type of Samples Collected:

Additional Notes: Well dry No Sample

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

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SCS ENGINEERS

Groundwater Sampling Log

Project No. 25224064.00 **Site** Marshalltown E & W CL

Well No. LW-4 **Date** 9/26/24

Well Depth 25.38 **Sampling Device** Bailer

Water Level 23.72 **Other Info.** YSI Pro DSS, Turbidity: Micro TPW

Purge Volume **Pumping Rate**

Sampling Personnel Michael Morgan

Color/Odor cloudy w black particulate / none

Time	Water Level	Temp.	pH	DO (mg/L)	Conductivity (µs/cm)	ORP	Turbidity	Notes
Stability Requirements:		+/- 3%	+/- 0.1 unit	±/- 10%	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	
16:30	23.72	17.7	8.99	3.85	2126	119.0	97.14	

Type of Samples Collected: No Sample

Additional Notes: Not enough liquid for a sample

Information: 2 in = 617 ml/ft, 4 in = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$, $Vol_{sphere} = 4/3\pi r^3$

Appendix C

Laboratory Analytical Report

Environment Testing

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ANALYTICAL REPORT

PREPARED FOR

Attn: Meghan Blodgett
SCS Engineers
2830 Dairy Drive
Madison, Wisconsin 53718

Generated 10/14/2024 5:11:34 PM Revision 1

JOB DESCRIPTION

Marshalltown - 25224064

JOB NUMBER

310-291606-1

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls IA 50613

See page two for job notes and contact information.

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

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Revision 1

Authorized for release by
Sandie Fredrick, Senior Project Manager
Sandra.Fredrick@et.eurofinsus.com
(920)261-1660

Table of Contents

Case Narrative

Job ID: 310-291606-1 — Eurofins Cedar Falls

Job Narrative
310-291606-1

Revision
The report being provided is a revision of the original report sent on 10/11/2024. The report (revision 1) is being revised due to: Updated Metals List per client.

Receipt
The samples were received on 9/27/2024 4:55 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.9º C, 2.6º C and 5.1º C.

HPLC/IC
Method 9056A: The following samples were diluted due to the nature of the sample matrix: GWGCS (310-291606-16), SW-1 (310-291606-17) and SW-2 (310-291606-18). Elevated reporting limits (RLs) are provided.

Method 9056A: The following samples were diluted due to the nature of the sample matrix: MW-5 (310-291606-3), MW-7 (310-291606-4), MW-8 (310-291606-5), MW-9 (310-291606-6), MW-10 (310-291606-7), MW-11AR (310-291606-8), MW-13 (310-291606-9), MW-19 (310-291606-12), MW-20 (310-291606-13) and MW-21 (310-291606-14). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-291606-1	MW-3	Water	09/24/24 17:31	09/27/24 16:55
310-291606-2	MW-4	Water	09/23/24 15:08	09/27/24 16:55
310-291606-3	MW-5	Water	09/24/24 16:00	09/27/24 16:55
310-291606-4	MW-7	Water	09/25/24 10:54	09/27/24 16:55
310-291606-5	MW-8	Water	09/26/24 14:45	09/27/24 16:55
310-291606-6	MW-9	Water	09/24/24 13:02	09/27/24 16:55
310-291606-7	MW-10	Water	09/24/24 14:29	09/27/24 16:55
310-291606-8	MW-11AR	Water	09/25/24 15:23	09/27/24 16:55
310-291606-9	MW-13	Water	09/26/24 10:19	09/27/24 16:55
310-291606-10	MW-14	Water	09/25/24 17:23	09/27/24 16:55
310-291606-11	MW-18	Water	09/25/24 13:53	09/27/24 16:55
310-291606-12	MW-19	Water	09/25/24 12:07	09/27/24 16:55
310-291606-13	MW-20	Water	09/26/24 11:41	09/27/24 16:55
310-291606-14	MW-21	Water	09/23/24 16:39	09/27/24 16:55
310-291606-15	MW-23	Water	09/26/24 13:02	09/27/24 16:55
310-291606-16	GWGCS	Water	09/26/24 17:20	09/27/24 16:55
310-291606-17	SW-1	Water	09/27/24 10:05	09/27/24 16:55
310-291606-18	SW-2	Water	09/27/24 08:50	09/27/24 16:55
310-291606-19	LW-01	Water	09/26/24 15:50	09/27/24 16:55
310-291606-20	Field Blank	Water	09/24/24 16:50	09/27/24 16:55

Detection Summary

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: MW-3 — Lab Sample ID: 310-291606-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	15		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	93		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	140		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	1200		100	76	ug/L	1		6020B	Total/NA
Calcium	130		0.50	0.19	mg/L	1		6020B	Total/NA
Iron	40	J	100	36	ug/L	1		6020B	Total/NA
Lithium	18		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	18000		500	150	ug/L	1		6020B	Total/NA
Manganese	4.5	J	10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	6.1		2.0	1.3	ug/L	1		6020B	Total/NA
Selenium	7.4		5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	1.5	J	1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	490		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	868.37				ft	1		Field Sampling	Total/NA
Field pH	6.93				SU	1		Field Sampling	Total/NA
Field Conductivity	849				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	13.1				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	4.97				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-4 — Lab Sample ID: 310-291606-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	14		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	85		5.0	2.1	mg/L	5		9056A	Total/NA
Arsenic	5.7		2.0	0.53	ug/L	1		6020B	Total/NA
Barium	140		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	3600		400	300	ug/L	4		6020B	Total/NA
Calcium	160		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.39	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	3500		400	140	ug/L	4		6020B	Total/NA
Lithium	11		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	18000		2000	600	ug/L	4		6020B	Total/NA
Manganese	500		40	14	ug/L	4		6020B	Total/NA
Molybdenum	22		2.0	1.3	ug/L	1		6020B	Total/NA
Total Suspended Solids	12		3.8	2.8	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	540		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	871.62				ft	1		Field Sampling	Total/NA
Field pH	6.84				SU	1		Field Sampling	Total/NA
Field Conductivity	966				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.0				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	6.72				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-5 — Lab Sample ID: 310-291606-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	5.1		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	39		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	170		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	460		100	76	ug/L	1		6020B	Total/NA
Calcium	60		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.62		0.50	0.17	ug/L	1		6020B	Total/NA
Iron	76	J	100	36	ug/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-5 (Continued)

Lab Sample ID: 310-291606-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Magnesium	16000		500	150	ug/L	1		6020B	Total/NA
Manganese	6.8	J	10	3.6	ug/L	1		6020B	Total/NA
Selenium	27		5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	1.5	J	1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	220		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	875.27				ft	1		Field Sampling	Total/NA
Field pH	6.35				SU	1		Field Sampling	Total/NA
Field Conductivity	462.9				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	13.2				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	6.98				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-7

Lab Sample ID: 310-291606-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	23		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	23		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	110		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	89	J	100	76	ug/L	1		6020B	Total/NA
Calcium	100		0.50	0.19	mg/L	1		6020B	Total/NA
Lithium	6.9	J	10	2.5	ug/L	1		6020B	Total/NA
Magnesium	20000		500	150	ug/L	1		6020B	Total/NA
Manganese	4.8	J	10	3.6	ug/L	1		6020B	Total/NA
Selenium	1.4	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	2.3		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	340		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	875.41				ft	1		Field Sampling	Total/NA
Field pH	7.00				SU	1		Field Sampling	Total/NA
Field Conductivity	741				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	11.0				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	6.28				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-8

Lab Sample ID: 310-291606-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	22		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	29		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	130		2.0	0.66	ug/L	1		6020B	Total/NA
Calcium	100		0.50	0.19	mg/L	1		6020B	Total/NA
Iron	86	J	100	36	ug/L	1		6020B	Total/NA
Lithium	6.3	J	10	2.5	ug/L	1		6020B	Total/NA
Magnesium	21000		500	150	ug/L	1		6020B	Total/NA
Manganese	7.0	J	10	3.6	ug/L	1		6020B	Total/NA
Total Suspended Solids	15		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	370		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	878.19				ft	1		Field Sampling	Total/NA
Field pH	7.44				SU	1		Field Sampling	Total/NA
Field Conductivity	800				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	18.6				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	17.06				NTU	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Client Sample ID: MW-9 — Lab Sample ID: 310-291606-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	26		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	9.2		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	180		2.0	0.66	ug/L	1		6020B	Total/NA
Calcium	110		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	1.0		0.50	0.17	ug/L	1		6020B	Total/NA
Iron	720		100	36	ug/L	1		6020B	Total/NA
Lithium	11		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	19000		500	150	ug/L	1		6020B	Total/NA
Manganese	360		10	3.6	ug/L	1		6020B	Total/NA
Total Suspended Solids	8.4		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	360		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	910.07				ft	1		Field Sampling	Total/NA
Field pH	6.66				SU	1		Field Sampling	Total/NA
Field Conductivity	732				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.6				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	8.14				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-10 — Lab Sample ID: 310-291606-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2.4	J	5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	6.8		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	130		2.0	0.66	ug/L	1		6020B	Total/NA
Calcium	80		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.48	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	210		100	36	ug/L	1		6020B	Total/NA
Lead	0.31	J	0.50	0.26	ug/L	1		6020B	Total/NA
Lithium	16		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	21000		500	150	ug/L	1		6020B	Total/NA
Manganese	36		10	3.6	ug/L	1		6020B	Total/NA
Total Suspended Solids	19		2.5	1.9	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	280		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	928.96				ft	1		Field Sampling	Total/NA
Field pH	6.93				SU	1		Field Sampling	Total/NA
Field Conductivity	566				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	13.7				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	18.93				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-11AR — Lab Sample ID: 310-291606-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	19		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	120		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	38		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	420		100	76	ug/L	1		6020B	Total/NA
Calcium	110		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.63		0.50	0.17	ug/L	1		6020B	Total/NA
Iron	130		100	36	ug/L	1		6020B	Total/NA
Lithium	19		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	38000		500	150	ug/L	1		6020B	Total/NA
Manganese	60		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	2.8		2.0	1.3	ug/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Job ID: 310-291606-1
Project/Site: Marshalltown - 25224064

Client Sample ID: MW-11AR (Continued) — Lab Sample ID: 310-291606-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Selenium	2.3	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	4.4		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	490		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	872.85				ft	1		Field Sampling	Total/NA
Field pH	7.12				SU	1		Field Sampling	Total/NA
Field Conductivity	966				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	18.3				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	18.78				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-13 — Lab Sample ID: 310-291606-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.38	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	150		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	120		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	85	J	100	76	ug/L	1		6020B	Total/NA
Calcium	150		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.47	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	280		100	36	ug/L	1		6020B	Total/NA
Lead	0.33	J	0.50	0.26	ug/L	1		6020B	Total/NA
Lithium	19		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	23000		500	150	ug/L	1		6020B	Total/NA
Manganese	57		10	3.6	ug/L	1		6020B	Total/NA
Total Suspended Solids	17		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	530		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	908.50				ft	1		Field Sampling	Total/NA
Field pH	6.81				SU	1		Field Sampling	Total/NA
Field Conductivity	961				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	15.2				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	8.20				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-14 — Lab Sample ID: 310-291606-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2.5	J	5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.68	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	25		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	58		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	670		100	76	ug/L	1		6020B	Total/NA
Calcium	96		0.50	0.19	mg/L	1		6020B	Total/NA
Lithium	25		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	21000		500	150	ug/L	1		6020B	Total/NA
Manganese	81		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	2.3		2.0	1.3	ug/L	1		6020B	Total/NA
Selenium	4.1	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	2.8		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	350		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	917.83				ft	1		Field Sampling	Total/NA
Field pH	6.95				SU	1		Field Sampling	Total/NA
Field Conductivity	676				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.8				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	8.43				NTU	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: MW-18

Lab Sample ID: 310-291606-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3.1	J	5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.40	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	30		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	140		2.0	0.66	ug/L	1		6020B	Total/NA
Calcium	120		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.20	J	0.50	0.17	ug/L	1		6020B	Total/NA
Lithium	16		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	18000		500	150	ug/L	1		6020B	Total/NA
Manganese	7.2	J	10	3.6	ug/L	1		6020B	Total/NA
Total Dissolved Solids	380		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	902.76				ft	1		Field Sampling	Total/NA
Field pH	6.81				SU	1		Field Sampling	Total/NA
Field Conductivity	758				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	12.3				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	5.38				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-19

Lab Sample ID: 310-291606-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	20		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	24		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	120		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	81	J	100	76	ug/L	1		6020B	Total/NA
Calcium	100		0.50	0.19	mg/L	1		6020B	Total/NA
Lithium	6.9	J	10	2.5	ug/L	1		6020B	Total/NA
Magnesium	20000		500	150	ug/L	1		6020B	Total/NA
Manganese	5.6	J	10	3.6	ug/L	1		6020B	Total/NA
Selenium	4.2	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	2.8		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	340		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	875.33				ft	1		Field Sampling	Total/NA
Field pH	7.02				SU	1		Field Sampling	Total/NA
Field Conductivity	711				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	12.2				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	6.36				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-20

Lab Sample ID: 310-291606-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	23		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	150		5.0	2.1	mg/L	5		9056A	Total/NA
Arsenic	0.94	J	2.0	0.53	ug/L	1		6020B	Total/NA
Barium	90		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	4100		100	76	ug/L	1		6020B	Total/NA
Calcium	120		0.50	0.19	mg/L	1		6020B	Total/NA
Lithium	70		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	23000		500	150	ug/L	1		6020B	Total/NA
Manganese	3.8	J	10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	600		2.0	1.3	ug/L	1		6020B	Total/NA
Selenium	21		5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	11		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	530		50	42	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-20 (Continued)

Lab Sample ID: 310-291606-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Groundwater Elevation	872.32				ft	1		Field Sampling	Total/NA
Field pH	7.19				SU	1		Field Sampling	Total/NA
Field Conductivity	990				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	12.8				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	7.83				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-21

Lab Sample ID: 310-291606-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	21		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	120		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	100		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	3700		400	300	ug/L	4		6020B	Total/NA
Calcium	130		0.50	0.19	mg/L	1		6020B	Total/NA
Lithium	39		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	20000		2000	600	ug/L	4		6020B	Total/NA
Molybdenum	210		2.0	1.3	ug/L	1		6020B	Total/NA
Selenium	8.1		5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	7.8		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	500		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	844.36				ft	1		Field Sampling	Total/NA
Field pH	7.01				SU	1		Field Sampling	Total/NA
Field Conductivity	884				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	12.1				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	10.27				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-23

Lab Sample ID: 310-291606-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3.2	J	5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.76	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	97		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	110		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	110		100	76	ug/L	1		6020B	Total/NA
Calcium	130		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.19	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	84	J	100	36	ug/L	1		6020B	Total/NA
Lithium	34		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	24000		500	150	ug/L	1		6020B	Total/NA
Manganese	79		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	1.7	J	2.0	1.3	ug/L	1		6020B	Total/NA
Total Suspended Solids	3.0		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	460		50	42	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	913.83				ft	1		Field Sampling	Total/NA
Field pH	6.93				SU	1		Field Sampling	Total/NA
Field Conductivity	830				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	17.1				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	10.31				NTU	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: GWGCS

Lab Sample ID: 310-291606-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	2.5	J	5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	300		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	41		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	110		100	76	ug/L	1		6020B	Total/NA
Calcium	210		0.50	0.19	mg/L	1		6020B	Total/NA
Lithium	29		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	48000		500	150	ug/L	1		6020B	Total/NA
Manganese	300		10	3.6	ug/L	1		6020B	Total/NA
Total Dissolved Solids	840		50	42	mg/L	1		SM 2540C	Total/NA
Field pH	7.03				SU	1		Field Sampling	Total/NA
Field Conductivity	1436				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	17.5				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	5.95				NTU	1		Field Sampling	Total/NA

Client Sample ID: SW-1

Lab Sample ID: 310-291606-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	27		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	24		5.0	2.1	mg/L	5		9056A	Total/NA
Arsenic	0.84	J	2.0	0.53	ug/L	1		6020B	Total/NA
Barium	160		2.0	0.66	ug/L	1		6020B	Total/NA
Calcium	84		0.50	0.19	mg/L	1		6020B	Total/NA
Iron	83	J	100	36	ug/L	1		6020B	Total/NA
Lithium	7.2	J	10	2.5	ug/L	1		6020B	Total/NA
Magnesium	25000		500	150	ug/L	1		6020B	Total/NA
Manganese	40		10	3.6	ug/L	1		6020B	Total/NA
Selenium	1.5	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	3.4		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	320		50	42	mg/L	1		SM 2540C	Total/NA
Field pH	7.83				SU	1		Field Sampling	Total/NA
Field Conductivity	692				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.2				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	9.07				NTU	1		Field Sampling	Total/NA

Client Sample ID: SW-2

Lab Sample ID: 310-291606-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	25		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	22		5.0	2.1	mg/L	5		9056A	Total/NA
Arsenic	0.93	J	2.0	0.53	ug/L	1		6020B	Total/NA
Barium	170		2.0	0.66	ug/L	1		6020B	Total/NA
Calcium	88		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.24	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	180		100	36	ug/L	1		6020B	Total/NA
Lithium	7.2	J	10	2.5	ug/L	1		6020B	Total/NA
Magnesium	24000		500	150	ug/L	1		6020B	Total/NA
Manganese	100		10	3.6	ug/L	1		6020B	Total/NA
Selenium	1.4	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	8.9		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	330		50	42	mg/L	1		SM 2540C	Total/NA
Field pH	7.74				SU	1		Field Sampling	Total/NA
Field Conductivity	702				umhos/cm	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Job ID: 310-291606-1
Project/Site: Marshalltown - 25224064

Client Sample ID: SW-2 (Continued)
Lab Sample ID: 310-291606-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Field Temperature	14.0				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	9.09				NTU	1		Field Sampling	Total/NA

Client Sample ID: LW-01
Lab Sample ID: 310-291606-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	3.0	J	5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.41	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	44		5.0	2.1	mg/L	5		9056A	Total/NA
Arsenic	3.5		2.0	0.53	ug/L	1		6020B	Total/NA
Barium	150		2.0	0.66	ug/L	1		6020B	Total/NA
Boron	590		100	76	ug/L	1		6020B	Total/NA
Cadmium	0.41		0.20	0.10	ug/L	1		6020B	Total/NA
Calcium	140		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	2.3		0.50	0.17	ug/L	1		6020B	Total/NA
Iron	270		100	36	ug/L	1		6020B	Total/NA
Lithium	32		10	2.5	ug/L	1		6020B	Total/NA
Molybdenum	3.6		2.0	1.3	ug/L	1		6020B	Total/NA
Zinc	11	J	20	9.7	ug/L	1		6020B	Total/NA
Total Suspended Solids	28		1.9	1.4	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	490		50	42	mg/L	1		SM 2540C	Total/NA
Field pH	7.36				SU	1		Field Sampling	Total/NA
Field Conductivity	998				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	18.9				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	21.30				NTU	1		Field Sampling	Total/NA

Client Sample ID: Field Blank
Lab Sample ID: 310-291606-20

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-3

Date Collected: 09/24/24 17:31
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-1

Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	15		5.0	2.3	mg/L			10/01/24 18:36	5
Fluoride	<0.38		1.0	0.38	mg/L			10/01/24 18:36	5
Sulfate	93		5.0	2.1	mg/L			10/01/24 18:36	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:28	1
Barium	140		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:28	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:28	1
Boron	1200		100	76	ug/L		10/01/24 09:30	10/07/24 15:28	1
Calcium	130		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:28	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:28	1
Iron	40	J	100	36	ug/L		10/01/24 09:30	10/08/24 16:46	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:28	1
Lithium	18		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:28	1
Magnesium	18000		500	150	ug/L		10/01/24 09:30	10/08/24 16:46	1
Manganese	4.5	J	10	3.6	ug/L		10/01/24 09:30	10/08/24 16:46	1
Molybdenum	6.1		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:28	1
Selenium	7.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	1.5	J	1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	490		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	868.37				ft			09/24/24 17:31	1
Field pH	6.93				SU			09/24/24 17:31	1
Field Conductivity	849				umhos/cm			09/24/24 17:31	1
Field Temperature	13.1				Degrees C			09/24/24 17:31	1
Field Turbidity	4.97				NTU			09/24/24 17:31	1

Client Sample ID: MW-4
Date Collected: 09/23/24 15:08
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-2
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**14**		5.0	2.3	mg/L			10/01/24 19:13	5
Fluoride	<0.38		1.0	0.38	mg/L			10/01/24 19:13	5
Sulfate	**85**		5.0	2.1	mg/L			10/01/24 19:13	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**5.7**		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:45	1
Barium	**140**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:45	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:45	1
Boron	**3600**		400	300	ug/L		10/01/24 09:30	10/08/24 16:57	4
Calcium	**160**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:45	1
Cobalt	**0.39**	**J**	0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:45	1
Iron	**3500**		400	140	ug/L		10/01/24 09:30	10/08/24 16:57	4
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:45	1
Lithium	**11**		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:45	1
Magnesium	**18000**		2000	600	ug/L		10/01/24 09:30	10/08/24 16:57	4
Manganese	**500**		40	14	ug/L		10/01/24 09:30	10/08/24 16:57	4
Molybdenum	**22**		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:45	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**12**		3.8	2.8	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**540**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**871.62**				ft			09/23/24 15:08	1
Field pH	**6.84**				SU			09/23/24 15:08	1
Field Conductivity	**966**				umhos/cm			09/23/24 15:08	1
Field Temperature	**14.0**				Degrees C			09/23/24 15:08	1
Field Turbidity	**6.72**				NTU			09/23/24 15:08	1

Client Sample Results

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: MW-5

Lab Sample ID: 310-291606-3

Date Collected: 09/24/24 16:00
Date Received: 09/27/24 16:55

Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**5.1**		5.0	2.3	mg/L			10/02/24 14:16	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 14:16	5
Sulfate	**39**		5.0	2.1	mg/L			10/02/24 14:16	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:47	1
Barium	**170**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:47	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:47	1
Boron	**460**		100	76	ug/L		10/01/24 09:30	10/07/24 15:47	1
Calcium	**60**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:47	1
Cobalt	**0.62**		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:47	1
Iron	**76**	**J**	100	36	ug/L		10/01/24 09:30	10/08/24 17:01	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:47	1
Lithium	<2.5		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:47	1
Magnesium	**16000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:01	1
Manganese	**6.8**	**J**	10	3.6	ug/L		10/01/24 09:30	10/08/24 17:01	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:47	1
Selenium	**27**		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**1.5**	**J**	1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**220**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**875.27**				ft			09/24/24 16:00	1
Field pH	**6.35**				SU			09/24/24 16:00	1
Field Conductivity	**462.9**				umhos/cm			09/24/24 16:00	1
Field Temperature	**13.2**				Degrees C			09/24/24 16:00	1
Field Turbidity	**6.98**				NTU			09/24/24 16:00	1

Client Sample ID: MW-7

Date Collected: 09/25/24 10:54
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-4
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**23**		5.0	2.3	mg/L			10/02/24 14:28	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 14:28	5
Sulfate	**23**		5.0	2.1	mg/L			10/02/24 14:28	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:49	1
Barium	**110**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:49	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:49	1
Boron	**89**	**J**	100	76	ug/L		10/01/24 09:30	10/07/24 15:49	1
Calcium	**100**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:49	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:49	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 17:20	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:49	1
Lithium	**6.9**	**J**	10	2.5	ug/L		10/01/24 09:30	10/07/24 15:49	1
Magnesium	**20000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:20	1
Manganese	**4.8**	**J**	10	3.6	ug/L		10/01/24 09:30	10/08/24 17:20	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:49	1
Selenium	**1.4**	**J**	5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**2.3**		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**340**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**875.41**				ft			09/25/24 10:54	1
Field pH	**7.00**				SU			09/25/24 10:54	1
Field Conductivity	**741**				umhos/cm			09/25/24 10:54	1
Field Temperature	**11.0**				Degrees C			09/25/24 10:54	1
Field Turbidity	**6.28**				NTU			09/25/24 10:54	1

Client Sample ID: MW-8

Lab Sample ID: 310-291606-5
Date Collected: 09/26/24 14:45
Matrix: Water
Date Received: 09/27/24 16:55

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**22**		5.0	2.3	mg/L			10/02/24 14:39	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 14:39	5
Sulfate	**29**		5.0	2.1	mg/L			10/02/24 14:39	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:51	1
Barium	**130**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:51	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:51	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 15:51	1
Calcium	**100**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:51	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:51	1
Iron	**86**	**J**	100	36	ug/L		10/01/24 09:30	10/08/24 17:23	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:51	1
Lithium	**6.3**	**J**	10	2.5	ug/L		10/01/24 09:30	10/07/24 15:51	1
Magnesium	**21000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:23	1
Manganese	**7.0**	**J**	10	3.6	ug/L		10/01/24 09:30	10/08/24 17:23	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:51	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**15**		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**370**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**878.19**				ft			09/26/24 14:45	1
Field pH	**7.44**				SU			09/26/24 14:45	1
Field Conductivity	**800**				umhos/cm			09/26/24 14:45	1
Field Temperature	**18.6**				Degrees C			09/26/24 14:45	1
Field Turbidity	**17.06**				NTU			09/26/24 14:45	1

Client Sample ID: MW-9
Lab Sample ID: 310-291606-6

Date Collected: 09/24/24 13:02
Matrix: Water
Date Received: 09/27/24 16:55

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**26**		5.0	2.3	mg/L			10/02/24 14:51	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 14:51	5
Sulfate	**9.2**		5.0	2.1	mg/L			10/02/24 14:51	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:54	1
Barium	**180**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:54	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:54	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 15:54	1
Calcium	**110**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:54	1
Cobalt	**1.0**		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:54	1
Iron	**720**		100	36	ug/L		10/01/24 09:30	10/08/24 17:27	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:54	1
Lithium	**11**		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:54	1
Magnesium	**19000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:27	1
Manganese	**360**		10	3.6	ug/L		10/01/24 09:30	10/08/24 17:27	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:54	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:54	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**8.4**		1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**360**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**910.07**				ft			09/24/24 13:02	1
Field pH	**6.66**				SU			09/24/24 13:02	1
Field Conductivity	**732**				umhos/cm			09/24/24 13:02	1
Field Temperature	**14.6**				Degrees C			09/24/24 13:02	1
Field Turbidity	**8.14**				NTU			09/24/24 13:02	1

Client Sample ID: MW-10
Date Collected: 09/24/24 14:29
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-7
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**2.4**	**J**	5.0	2.3	mg/L			10/02/24 15:03	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 15:03	5
Sulfate	**6.8**		5.0	2.1	mg/L			10/02/24 15:03	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:56	1
Barium	**130**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:56	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:56	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 15:56	1
Calcium	**80**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:56	1
Cobalt	**0.48**	**J**	0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:56	1
Iron	**210**		100	36	ug/L		10/01/24 09:30	10/08/24 17:31	1
Lead	**0.31**	**J**	0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:56	1
Lithium	**16**		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:56	1
Magnesium	**21000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:31	1
Manganese	**36**		10	3.6	ug/L		10/01/24 09:30	10/08/24 17:31	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:56	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**19**		2.5	1.9	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**280**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**928.96**				ft			09/24/24 14:29	1
Field pH	**6.93**				SU			09/24/24 14:29	1
Field Conductivity	**566**				umhos/cm			09/24/24 14:29	1
Field Temperature	**13.7**				Degrees C			09/24/24 14:29	1
Field Turbidity	**18.93**				NTU			09/24/24 14:29	1

Client Sample ID: MW-11AR
Date Collected: 09/25/24 15:23
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-8
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**19**		5.0	2.3	mg/L			10/02/24 15:14	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 15:14	5
Sulfate	**120**		5.0	2.1	mg/L			10/02/24 15:14	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:58	1
Barium	**38**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:58	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:58	1
Boron	**420**		100	76	ug/L		10/01/24 09:30	10/07/24 15:58	1
Calcium	**110**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:58	1
Cobalt	**0.63**		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:58	1
Iron	**130**		100	36	ug/L		10/01/24 09:30	10/08/24 17:35	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:58	1
Lithium	**19**		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:58	1
Magnesium	**38000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:35	1
Manganese	**60**		10	3.6	ug/L		10/01/24 09:30	10/08/24 17:35	1
Molybdenum	**2.8**		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:58	1
Selenium	**2.3**	**J**	5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:58	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**4.4**		1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**490**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**872.85**				ft			09/25/24 15:23	1
Field pH	**7.12**				SU			09/25/24 15:23	1
Field Conductivity	**966**				umhos/cm			09/25/24 15:23	1
Field Temperature	**18.3**				Degrees C			09/25/24 15:23	1
Field Turbidity	**18.78**				NTU			09/25/24 15:23	1

Client Sample Results

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: MW-13

Date Collected: 09/26/24 10:19
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-9
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.3		5.0	2.3	mg/L			10/02/24 15:26	5
Fluoride	**0.38**	**J**	1.0	0.38	mg/L			10/02/24 15:26	5
Sulfate	**150**		5.0	2.1	mg/L			10/02/24 15:26	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:00	1
Barium	**120**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:00	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:00	1
Boron	**85**	**J**	100	76	ug/L		10/01/24 09:30	10/07/24 16:00	1
Calcium	**150**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:00	1
Cobalt	**0.47**	**J**	0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:00	1
Iron	**280**		100	36	ug/L		10/01/24 09:30	10/08/24 17:38	1
Lead	**0.33**	**J**	0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:00	1
Lithium	**19**		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:00	1
Magnesium	**23000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:38	1
Manganese	**57**		10	3.6	ug/L		10/01/24 09:30	10/08/24 17:38	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:00	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**17**		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**530**		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**908.50**				ft			09/26/24 10:19	1
Field pH	**6.81**				SU			09/26/24 10:19	1
Field Conductivity	**961**				umhos/cm			09/26/24 10:19	1
Field Temperature	**15.2**				Degrees C			09/26/24 10:19	1
Field Turbidity	**8.20**				NTU			09/26/24 10:19	1

Client Sample ID: MW-14

Date Collected: 09/25/24 17:23
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-10

Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**2.5**	**J**	5.0	2.3	mg/L			10/02/24 15:37	5
Fluoride	**0.68**	**J**	1.0	0.38	mg/L			10/02/24 15:37	5
Sulfate	**25**		5.0	2.1	mg/L			10/02/24 15:37	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:02	1
Barium	**58**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:02	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:02	1
Boron	**670**		100	76	ug/L		10/01/24 09:30	10/07/24 16:02	1
Calcium	**96**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:02	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:02	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 17:42	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:02	1
Lithium	**25**		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:02	1
Magnesium	**21000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:42	1
Manganese	**81**		10	3.6	ug/L		10/01/24 09:30	10/08/24 17:42	1
Molybdenum	**2.3**		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:02	1
Selenium	**4.1**	**J**	5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**2.8**		1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**350**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**917.83**				ft			09/25/24 17:23	1
Field pH	**6.95**				SU			09/25/24 17:23	1
Field Conductivity	**676**				umhos/cm			09/25/24 17:23	1
Field Temperature	**14.8**				Degrees C			09/25/24 17:23	1
Field Turbidity	**8.43**				NTU			09/25/24 17:23	1

Client Sample ID: MW-18

Lab Sample ID: 310-291606-11
Matrix: Water

Date Collected: 09/25/24 13:53
Date Received: 09/27/24 16:55

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.1	J	5.0	2.3	mg/L			10/02/24 15:49	5
Fluoride	0.40	J	1.0	0.38	mg/L			10/02/24 15:49	5
Sulfate	30		5.0	2.1	mg/L			10/02/24 15:49	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:05	1
Barium	140		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:05	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:05	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 16:05	1
Calcium	120		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:05	1
Cobalt	0.20	J	0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:05	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 17:46	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:05	1
Lithium	16		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:05	1
Magnesium	18000		500	150	ug/L		10/01/24 09:30	10/08/24 17:46	1
Manganese	7.2	J	10	3.6	ug/L		10/01/24 09:30	10/08/24 17:46	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:05	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:05	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	<1.4		1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	380		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	902.76				ft			09/25/24 13:53	1
Field pH	6.81				SU			09/25/24 13:53	1
Field Conductivity	758				umhos/cm			09/25/24 13:53	1
Field Temperature	12.3				Degrees C			09/25/24 13:53	1
Field Turbidity	5.38				NTU			09/25/24 13:53	1

Client Sample ID: MW-19
Date Collected: 09/25/24 12:07
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-12
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**20**		5.0	2.3	mg/L			10/02/24 16:01	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 16:01	5
Sulfate	**24**		5.0	2.1	mg/L			10/02/24 16:01	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:18	1
Barium	**120**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:18	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:18	1
Boron	**81**	**J**	100	76	ug/L		10/01/24 09:30	10/07/24 16:18	1
Calcium	**100**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:18	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:18	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 17:53	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:18	1
Lithium	**6.9**	**J**	10	2.5	ug/L		10/01/24 09:30	10/07/24 16:18	1
Magnesium	**20000**		500	150	ug/L		10/01/24 09:30	10/08/24 17:53	1
Manganese	**5.6**	**J**	10	3.6	ug/L		10/01/24 09:30	10/08/24 17:53	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:18	1
Selenium	**4.2**	**J**	5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**2.8**		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**340**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**875.33**				ft			09/25/24 12:07	1
Field pH	**7.02**				SU			09/25/24 12:07	1
Field Conductivity	**711**				umhos/cm			09/25/24 12:07	1
Field Temperature	**12.2**				Degrees C			09/25/24 12:07	1
Field Turbidity	**6.36**				NTU			09/25/24 12:07	1

Client Sample ID: MW-20
Lab Sample ID: 310-291606-13
Date Collected: 09/26/24 11:41
Matrix: Water
Date Received: 09/27/24 16:55

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	23		5.0	2.3	mg/L			10/02/24 16:35	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 16:35	5
Sulfate	150		5.0	2.1	mg/L			10/02/24 16:35	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.94	J	2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:20	1
Barium	90		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:20	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:20	1
Boron	4100		100	76	ug/L		10/01/24 09:30	10/07/24 16:20	1
Calcium	120		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:20	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:20	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 18:12	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:20	1
Lithium	70		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:20	1
Magnesium	23000		500	150	ug/L		10/01/24 09:30	10/08/24 18:12	1
Manganese	3.8	J	10	3.6	ug/L		10/01/24 09:30	10/08/24 18:12	1
Molybdenum	600		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:20	1
Selenium	21		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:20	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	11		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	530		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	872.32				ft			09/26/24 11:41	1
Field pH	7.19				SU			09/26/24 11:41	1
Field Conductivity	990				umhos/cm			09/26/24 11:41	1
Field Temperature	12.8				Degrees C			09/26/24 11:41	1
Field Turbidity	7.83				NTU			09/26/24 11:41	1

Client Sample ID: MW-21
Date Collected: 09/23/24 16:39
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-14
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**21**		5.0	2.3	mg/L			10/02/24 16:47	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 16:47	5
Sulfate	**120**		5.0	2.1	mg/L			10/02/24 16:47	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:22	1
Barium	**100**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:22	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:22	1
Boron	**3700**		400	300	ug/L		10/01/24 09:30	10/08/24 18:16	4
Calcium	**130**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:22	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:22	1
Iron	<140		400	140	ug/L		10/01/24 09:30	10/08/24 18:16	4
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:22	1
Lithium	**39**		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:22	1
Magnesium	**20000**		2000	600	ug/L		10/01/24 09:30	10/08/24 18:16	4
Manganese	<14		40	14	ug/L		10/01/24 09:30	10/08/24 18:16	4
Molybdenum	**210**		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:22	1
Selenium	**8.1**		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**7.8**		1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	**500**		50	42	mg/L			09/30/24 16:53	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**844.36**				ft			09/23/24 16:39	1
Field pH	**7.01**				SU			09/23/24 16:39	1
Field Conductivity	**884**				umhos/cm			09/23/24 16:39	1
Field Temperature	**12.1**				Degrees C			09/23/24 16:39	1
Field Turbidity	**10.27**				NTU			09/23/24 16:39	1

Client Sample ID: MW-23
Lab Sample ID: 310-291606-15
Date Collected: 09/26/24 13:02
Matrix: Water
Date Received: 09/27/24 16:55

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.2	J	5.0	2.3	mg/L			10/02/24 16:59	5
Fluoride	0.76	J	1.0	0.38	mg/L			10/02/24 16:59	5
Sulfate	97		5.0	2.1	mg/L			10/02/24 16:59	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:24	1
Barium	110		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:24	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:24	1
Boron	110		100	76	ug/L		10/01/24 09:30	10/07/24 16:24	1
Calcium	130		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:24	1
Cobalt	0.19	J	0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:24	1
Iron	84	J	100	36	ug/L		10/01/24 09:30	10/08/24 18:19	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:24	1
Lithium	34		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:24	1
Magnesium	24000		500	150	ug/L		10/01/24 09:30	10/08/24 18:19	1
Manganese	79		10	3.6	ug/L		10/01/24 09:30	10/08/24 18:19	1
Molybdenum	1.7	J	2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:24	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:24	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	3.0		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	460		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	913.83				ft			09/26/24 13:02	1
Field pH	6.93				SU			09/26/24 13:02	1
Field Conductivity	830				umhos/cm			09/26/24 13:02	1
Field Temperature	17.1				Degrees C			09/26/24 13:02	1
Field Turbidity	10.31				NTU			09/26/24 13:02	1

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: GWGCS
Date Collected: 09/26/24 17:20
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-16
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**2.5**	**J**	5.0	2.3	mg/L			10/02/24 14:38	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 14:38	5
Sulfate	**300**		5.0	2.1	mg/L			10/02/24 14:38	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:26	1
Barium	**41**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:26	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:26	1
Boron	**110**		100	76	ug/L		10/01/24 09:30	10/07/24 16:26	1
Calcium	**210**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:26	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:26	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 18:23	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:26	1
Lithium	**29**		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:26	1
Magnesium	**48000**		500	150	ug/L		10/01/24 09:30	10/08/24 18:23	1
Manganese	**300**		10	3.6	ug/L		10/01/24 09:30	10/08/24 18:23	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:26	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:26	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	<1.4		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**840**		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	ND				ft			09/26/24 17:20	1
Field pH	**7.03**				SU			09/26/24 17:20	1
Field Conductivity	**1436**				umhos/cm			09/26/24 17:20	1
Field Temperature	**17.5**				Degrees C			09/26/24 17:20	1
Field Turbidity	**5.95**				NTU			09/26/24 17:20	1

Client Sample ID: SW-1 | Lab Sample ID: 310-291606-17

Date Collected: 09/27/24 10:05 | **Matrix: Water**
Date Received: 09/27/24 16:55

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**27**		5.0	2.3	mg/L			10/02/24 15:38	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 15:38	5
Sulfate	**24**		5.0	2.1	mg/L			10/02/24 15:38	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.84**	**J**	2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:29	1
Barium	**160**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:29	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:29	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 16:29	1
Calcium	**84**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:29	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:29	1
Iron	**83**	**J**	100	36	ug/L		10/01/24 09:30	10/08/24 18:27	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:29	1
Lithium	**7.2**	**J**	10	2.5	ug/L		10/01/24 09:30	10/07/24 16:29	1
Magnesium	**25000**		500	150	ug/L		10/01/24 09:30	10/08/24 18:27	1
Manganese	**40**		10	3.6	ug/L		10/01/24 09:30	10/08/24 18:27	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:29	1
Selenium	**1.5**	**J**	5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**3.4**		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**320**		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	ND				ft			09/27/24 10:05	1
Field pH	**7.83**				SU			09/27/24 10:05	1
Field Conductivity	**692**				umhos/cm			09/27/24 10:05	1
Field Temperature	**14.2**				Degrees C			09/27/24 10:05	1
Field Turbidity	**9.07**				NTU			09/27/24 10:05	1

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: SW-2
Date Collected: 09/27/24 08:50
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-18
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**25**		5.0	2.3	mg/L			10/02/24 15:50	5
Fluoride	<0.38		1.0	0.38	mg/L			10/02/24 15:50	5
Sulfate	**22**		5.0	2.1	mg/L			10/02/24 15:50	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.93**	**J**	2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:31	1
Barium	**170**		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:31	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:31	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 16:31	1
Calcium	**88**		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:31	1
Cobalt	**0.24**	**J**	0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:31	1
Iron	**180**		100	36	ug/L		10/01/24 09:30	10/08/24 18:31	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:31	1
Lithium	**7.2**	**J**	10	2.5	ug/L		10/01/24 09:30	10/07/24 16:31	1
Magnesium	**24000**		500	150	ug/L		10/01/24 09:30	10/08/24 18:31	1
Manganese	**100**		10	3.6	ug/L		10/01/24 09:30	10/08/24 18:31	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:31	1
Selenium	**1.4**	**J**	5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**8.9**		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	**330**		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	ND				ft			09/27/24 08:50	1
Field pH	**7.74**				SU			09/27/24 08:50	1
Field Conductivity	**702**				umhos/cm			09/27/24 08:50	1
Field Temperature	**14.0**				Degrees C			09/27/24 08:50	1
Field Turbidity	**9.09**				NTU			09/27/24 08:50	1

Client Sample ID: LW-01

Date Collected: 09/26/24 15:50
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-19

Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.0	J	5.0	2.3	mg/L			10/02/24 16:02	5
Fluoride	0.41	J	1.0	0.38	mg/L			10/02/24 16:02	5
Sulfate	44		5.0	2.1	mg/L			10/02/24 16:02	5

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<1.0		2.0	1.0	ug/L		10/01/24 09:30	10/07/24 16:33	1
Arsenic	3.5		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:33	1
Barium	150		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:33	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:33	1
Boron	590		100	76	ug/L		10/01/24 09:30	10/07/24 16:33	1
Cadmium	0.41		0.20	0.10	ug/L		10/01/24 09:30	10/07/24 16:33	1
Calcium	140		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:33	1
Chromium	<1.2		5.0	1.2	ug/L		10/01/24 09:30	10/07/24 16:33	1
Cobalt	2.3		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:33	1
Copper	<1.8		5.0	1.8	ug/L		10/01/24 09:30	10/07/24 16:33	1
Iron	270		100	36	ug/L		10/01/24 09:30	10/07/24 16:33	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:33	1
Lithium	32		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:33	1
Molybdenum	3.6		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:33	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:33	1
Thallium	<0.57		1.0	0.57	ug/L		10/01/24 09:30	10/07/24 16:33	1
Zinc	11	J	20	9.7	ug/L		10/01/24 09:30	10/07/24 16:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	28		1.9	1.4	mg/L			09/30/24 11:53	1
Total Dissolved Solids (SM 2540C)	490		50	42	mg/L			10/01/24 16:09	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	ND				ft			09/26/24 15:50	1
Field pH	7.36				SU			09/26/24 15:50	1
Field Conductivity	998				umhos/cm			09/26/24 15:50	1
Field Temperature	18.9				Degrees C			09/26/24 15:50	1
Field Turbidity	21.30				NTU			09/26/24 15:50	1

Client Sample ID: Field Blank

Date Collected: 09/24/24 16:50
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-20

Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.45		1.0	0.45	mg/L			10/02/24 16:14	1
Fluoride	<0.075		0.20	0.075	mg/L			10/02/24 16:14	1
Sulfate	<0.42		1.0	0.42	mg/L			10/02/24 16:14	1

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 16:35	1
Barium	<0.66		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 16:35	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 16:35	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 16:35	1
Calcium	<0.19		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 16:35	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 16:35	1
Copper	<1.8		5.0	1.8	ug/L		10/01/24 09:30	10/07/24 16:35	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/08/24 18:34	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 16:35	1
Lithium	<2.5		10	2.5	ug/L		10/01/24 09:30	10/07/24 16:35	1
Magnesium	<150		500	150	ug/L		10/01/24 09:30	10/08/24 18:34	1
Manganese	<3.6		10	3.6	ug/L		10/01/24 09:30	10/08/24 18:34	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 16:35	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 16:35	1
Zinc	<9.7		20	9.7	ug/L		10/01/24 09:30	10/07/24 16:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	<1.4		1.9	1.4	mg/L			09/30/24 10:18	1
Total Dissolved Solids (SM 2540C)	<42		50	42	mg/L			09/30/24 16:53	1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Sample Results

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-435132/3
Matrix: Water
Analysis Batch: 435132

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.45		1.0	0.45	mg/L			10/01/24 13:55	1
Fluoride	<0.075		0.20	0.075	mg/L			10/01/24 13:55	1
Sulfate	<0.42		1.0	0.42	mg/L			10/01/24 13:55	1

Lab Sample ID: LCS 310-435132/4
Matrix: Water
Analysis Batch: 435132

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.81		mg/L		98	90 - 110
Fluoride	2.00	1.93		mg/L		96	90 - 110
Sulfate	10.0	10.1		mg/L		101	90 - 110

Lab Sample ID: 310-291606-1 MS
Matrix: Water
Analysis Batch: 435132

Client Sample ID: MW-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	15		25.0	37.8		mg/L		91	80 - 120
Fluoride	<0.38		5.00	4.96		mg/L		99	80 - 120
Sulfate	93		25.0	117		mg/L		94	80 - 120

Lab Sample ID: 310-291606-1 MSD
Matrix: Water
Analysis Batch: 435132

Client Sample ID: MW-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	15		25.0	38.1		mg/L		92	80 - 120	1	15
Fluoride	<0.38		5.00	5.01		mg/L		100	80 - 120	1	15
Sulfate	93		25.0	118		mg/L		98	80 - 120	1	15

Lab Sample ID: MB 310-435161/3
Matrix: Water
Analysis Batch: 435161

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.45		1.0	0.45	mg/L			10/02/24 14:13	1
Fluoride	<0.075		0.20	0.075	mg/L			10/02/24 14:13	1
Sulfate	<0.42		1.0	0.42	mg/L			10/02/24 14:13	1

Lab Sample ID: LCS 310-435161/4
Matrix: Water
Analysis Batch: 435161

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	10.0		mg/L		100	90 - 110
Fluoride	2.00	2.08		mg/L		104	90 - 110
Sulfate	10.0	10.4		mg/L		104	90 - 110

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: 310-291606-16 MS
Matrix: Water
Analysis Batch: 435161

Client Sample ID: GWGCS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	2.5	J	25.0	26.2		mg/L		95	80 - 120
Fluoride	<0.38		5.00	5.49		mg/L		110	80 - 120
Sulfate	300		25.0	323	4	mg/L		98	80 - 120

Lab Sample ID: 310-291606-16 MSD
Matrix: Water
Analysis Batch: 435161

Client Sample ID: GWGCS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	2.5	J	25.0	26.3		mg/L		96	80 - 120	1	15
Fluoride	<0.38		5.00	5.60		mg/L		112	80 - 120	2	15
Sulfate	300		25.0	323	4	mg/L		100	80 - 120	0	15

Lab Sample ID: MB 310-435164/3
Matrix: Water
Analysis Batch: 435164

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.45		1.0	0.45	mg/L			10/02/24 12:09	1
Fluoride	<0.075		0.20	0.075	mg/L			10/02/24 12:09	1
Sulfate	<0.42		1.0	0.42	mg/L			10/02/24 12:09	1

Lab Sample ID: LCS 310-435164/4
Matrix: Water
Analysis Batch: 435164

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	10.0		mg/L		100	90 - 110
Fluoride	2.00	1.99		mg/L		100	90 - 110
Sulfate	10.0	10.3		mg/L		103	90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-434732/1-A
Matrix: Water
Analysis Batch: 435490

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 434732

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<1.0		2.0	1.0	ug/L		10/01/24 09:30	10/07/24 15:24	1
Arsenic	<0.53		2.0	0.53	ug/L		10/01/24 09:30	10/07/24 15:24	1
Barium	<0.66		2.0	0.66	ug/L		10/01/24 09:30	10/07/24 15:24	1
Beryllium	<0.33		1.0	0.33	ug/L		10/01/24 09:30	10/07/24 15:24	1
Boron	<76		100	76	ug/L		10/01/24 09:30	10/07/24 15:24	1
Cadmium	<0.10		0.20	0.10	ug/L		10/01/24 09:30	10/07/24 15:24	1
Calcium	<0.19		0.50	0.19	mg/L		10/01/24 09:30	10/07/24 15:24	1
Chromium	<1.2		5.0	1.2	ug/L		10/01/24 09:30	10/07/24 15:24	1
Cobalt	<0.17		0.50	0.17	ug/L		10/01/24 09:30	10/07/24 15:24	1
Copper	<1.8		5.0	1.8	ug/L		10/01/24 09:30	10/07/24 15:24	1
Iron	<36		100	36	ug/L		10/01/24 09:30	10/07/24 15:24	1
Lead	<0.26		0.50	0.26	ug/L		10/01/24 09:30	10/07/24 15:24	1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 310-434732/1-A
Matrix: Water
Analysis Batch: 435490

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 434732

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<2.5		10	2.5	ug/L		10/01/24 09:30	10/07/24 15:24	1
Molybdenum	<1.3		2.0	1.3	ug/L		10/01/24 09:30	10/07/24 15:24	1
Selenium	<1.4		5.0	1.4	ug/L		10/01/24 09:30	10/07/24 15:24	1
Thallium	<0.57		1.0	0.57	ug/L		10/01/24 09:30	10/07/24 15:24	1
Zinc	<9.7		20	9.7	ug/L		10/01/24 09:30	10/07/24 15:24	1

Lab Sample ID: MB 310-434732/1-A
Matrix: Water
Analysis Batch: 435616

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 434732

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	<150		500	150	ug/L		10/01/24 09:30	10/08/24 16:39	1
Manganese	<3.6		10	3.6	ug/L		10/01/24 09:30	10/08/24 16:39	1

Lab Sample ID: LCS 310-434732/2-A
Matrix: Water
Analysis Batch: 435490

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	200	226		ug/L		113	80 - 120
Arsenic	200	221		ug/L		110	80 - 120
Barium	100	110		ug/L		110	80 - 120
Beryllium	100	101		ug/L		101	80 - 120
Boron	200	201		ug/L		100	80 - 120
Cadmium	100	103		ug/L		103	80 - 120
Calcium	2.00	1.98		mg/L		99	80 - 120
Chromium	100	99.9		ug/L		100	80 - 120
Cobalt	100	116		ug/L		116	80 - 120
Copper	200	227		ug/L		113	80 - 120
Lead	200	219		ug/L		109	80 - 120
Lithium	200	212		ug/L		106	80 - 120
Molybdenum	200	209		ug/L		105	80 - 120
Selenium	400	414		ug/L		103	80 - 120
Thallium	100	99.8		ug/L		100	80 - 120
Zinc	200	213		ug/L		107	80 - 120

Lab Sample ID: LCS 310-434732/2-A
Matrix: Water
Analysis Batch: 435616

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Cadmium	100	98.5		ug/L		98	80 - 120
Chromium	100	108		ug/L		108	80 - 120
Iron	200	208		ug/L		104	80 - 120
Magnesium	2000	2090		ug/L		104	80 - 120
Manganese	100	101		ug/L		101	80 - 120
Thallium	100	83.1		ug/L		83	80 - 120

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: 310-291606-1 MS
Matrix: Water
Analysis Batch: 435490

Client Sample ID: MW-3
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	<1.0		200	229		ug/L		114	75 - 125
Arsenic	<0.53		200	223		ug/L		112	75 - 125
Barium	140		100	252		ug/L		113	75 - 125
Beryllium	<0.33		100	105		ug/L		105	75 - 125
Boron	1200		200	1410	4	ug/L		116	75 - 125
Cadmium	<0.10		100	105		ug/L		105	75 - 125
Calcium	130		2.00	130	4	mg/L		200	75 - 125
Chromium	1.5	J	100	100		ug/L		98	75 - 125
Cobalt	<0.17		100	113		ug/L		113	75 - 125
Copper	<1.8		200	217		ug/L		109	75 - 125
Iron	53	J *+ F1	200	287		ug/L		117	75 - 125
Lead	<0.26		200	212		ug/L		106	75 - 125
Lithium	18		200	235		ug/L		109	75 - 125
Molybdenum	6.1		200	214		ug/L		104	75 - 125
Selenium	7.4		400	427		ug/L		105	75 - 125
Thallium	<0.57		100	89.8		ug/L		90	75 - 125
Zinc	<9.7		200	202		ug/L		101	75 - 125

Lab Sample ID: 310-291606-1 MS
Matrix: Water
Analysis Batch: 435616

Client Sample ID: MW-3
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Iron	40	J	200	233		ug/L		97	75 - 125
Magnesium	18000		2000	18800	4	ug/L		53	75 - 125
Manganese	4.5	J	100	99.9		ug/L		95	75 - 125

Lab Sample ID: 310-291606-1 MSD
Matrix: Water
Analysis Batch: 435490

Client Sample ID: MW-3
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony	<1.0		200	240		ug/L		120	75 - 125	5	20
Arsenic	<0.53		200	230		ug/L		115	75 - 125	3	20
Barium	140		100	256		ug/L		117	75 - 125	2	20
Beryllium	<0.33		100	109		ug/L		109	75 - 125	4	20
Boron	1200		200	1450	4	ug/L		138	75 - 125	3	20
Cadmium	<0.10		100	107		ug/L		107	75 - 125	1	20
Calcium	130		2.00	129	4	mg/L		121	75 - 125	1	20
Chromium	1.5	J	100	104		ug/L		103	75 - 125	4	20
Cobalt	<0.17		100	117		ug/L		117	75 - 125	3	20
Copper	<1.8		200	222		ug/L		111	75 - 125	2	20
Iron	53	J *+ F1	200	307	F1	ug/L		127	75 - 125	7	20
Lead	<0.26		200	220		ug/L		110	75 - 125	4	20
Lithium	18		200	239		ug/L		110	75 - 125	1	20
Molybdenum	6.1		200	220		ug/L		107	75 - 125	3	20
Selenium	7.4		400	437		ug/L		108	75 - 125	2	20
Thallium	<0.57		100	96.0		ug/L		96	75 - 125	7	20
Zinc	<9.7		200	206		ug/L		103	75 - 125	2	20

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: 310-291606-1 MSD
Matrix: Water
Analysis Batch: 435616
Client Sample ID: MW-3
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Iron	40	J	200	265		ug/L		112	75 - 125	13	20
Magnesium	18000		2000	19300	4	ug/L		79	75 - 125	3	20
Manganese	4.5	J	100	106		ug/L		102	75 - 125	6	20

Lab Sample ID: 310-291606-11 DU
Matrix: Water
Analysis Batch: 435490
Client Sample ID: MW-18
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Antimony	<1.0		<1.0		ug/L		NC	20
Arsenic	<0.53		<0.53		ug/L		NC	20
Barium	140		142		ug/L		1	20
Beryllium	<0.33		<0.33		ug/L		NC	20
Boron	<76		<76		ug/L		NC	20
Cadmium	<0.10		<0.10		ug/L		NC	20
Calcium	120		121		mg/L		2	20
Chromium	<1.2		<1.2		ug/L		NC	20
Cobalt	0.20	J	<0.17		ug/L		NC	20
Copper	<1.8		<1.8		ug/L		NC	20
Lead	<0.26		<0.26		ug/L		NC	20
Lithium	16		16.3		ug/L		0.1	20
Molybdenum	<1.3		<1.3		ug/L		NC	20
Selenium	<1.4		<1.4		ug/L		NC	20
Thallium	<0.57		<0.57		ug/L		NC	20
Zinc	<9.7		<9.7		ug/L		NC	20

Lab Sample ID: 310-291606-11 DU
Matrix: Water
Analysis Batch: 435616
Client Sample ID: MW-18
Prep Type: Total/NA
Prep Batch: 434732

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	<36		<36		ug/L		NC	20
Magnesium	18000		16800		ug/L		5	20
Manganese	7.2	J	6.76	J	ug/L		6	20

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-434684/1
Matrix: Water
Analysis Batch: 434684
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.7		5.0	3.7	mg/L			09/30/24 10:18	1

Lab Sample ID: LCS 310-434684/2
Matrix: Water
Analysis Batch: 434684
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	94.0		mg/L		94	81 - 116

QC Sample Results

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Method: I-3765-85 - Residue, Non-filterable (TSS)

Lab Sample ID: MB 310-434706/1
Matrix: Water
Analysis Batch: 434706

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.7		5.0	3.7	mg/L			09/30/24 11:53	1

Lab Sample ID: LCS 310-434706/2
Matrix: Water
Analysis Batch: 434706

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	99.0		mg/L		99	81 - 116

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-434758/1
Matrix: Water
Analysis Batch: 434758

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<42		50	42	mg/L			09/30/24 16:53	1

Lab Sample ID: LCS 310-434758/2
Matrix: Water
Analysis Batch: 434758

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	1030		mg/L		103	88 - 110

Lab Sample ID: 310-291606-4 DU
Matrix: Water
Analysis Batch: 434758

Client Sample ID: MW-7
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	340		350		mg/L		2	16

Lab Sample ID: MB 310-434893/1
Matrix: Water
Analysis Batch: 434893

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<42		50	42	mg/L			10/01/24 16:09	1

Lab Sample ID: LCS 310-434893/2
Matrix: Water
Analysis Batch: 434893

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	1040		mg/L		104	88 - 110

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: 310-291606-15 DU
Matrix: Water
Analysis Batch: 434893

Client Sample ID: MW-23
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	460		474		mg/L		3	16

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

HPLC/IC

Analysis Batch: 435132

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	9056A	
310-291606-2	MW-4	Total/NA	Water	9056A	
MB 310-435132/3	Method Blank	Total/NA	Water	9056A	
LCS 310-435132/4	Lab Control Sample	Total/NA	Water	9056A	
310-291606-1 MS	MW-3	Total/NA	Water	9056A	
310-291606-1 MSD	MW-3	Total/NA	Water	9056A	

Analysis Batch: 435161

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-16	GWGCS	Total/NA	Water	9056A	
310-291606-17	SW-1	Total/NA	Water	9056A	
310-291606-18	SW-2	Total/NA	Water	9056A	
310-291606-19	LW-01	Total/NA	Water	9056A	
310-291606-20	Field Blank	Total/NA	Water	9056A	
MB 310-435161/3	Method Blank	Total/NA	Water	9056A	
LCS 310-435161/4	Lab Control Sample	Total/NA	Water	9056A	
310-291606-16 MS	GWGCS	Total/NA	Water	9056A	
310-291606-16 MSD	GWGCS	Total/NA	Water	9056A	

Analysis Batch: 435164

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-3	MW-5	Total/NA	Water	9056A	
310-291606-4	MW-7	Total/NA	Water	9056A	
310-291606-5	MW-8	Total/NA	Water	9056A	
310-291606-6	MW-9	Total/NA	Water	9056A	
310-291606-7	MW-10	Total/NA	Water	9056A	
310-291606-8	MW-11AR	Total/NA	Water	9056A	
310-291606-9	MW-13	Total/NA	Water	9056A	
310-291606-10	MW-14	Total/NA	Water	9056A	
310-291606-11	MW-18	Total/NA	Water	9056A	
310-291606-12	MW-19	Total/NA	Water	9056A	
310-291606-13	MW-20	Total/NA	Water	9056A	
310-291606-14	MW-21	Total/NA	Water	9056A	
310-291606-15	MW-23	Total/NA	Water	9056A	
MB 310-435164/3	Method Blank	Total/NA	Water	9056A	
LCS 310-435164/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 434732

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	3005A	
310-291606-2	MW-4	Total/NA	Water	3005A	
310-291606-3	MW-5	Total/NA	Water	3005A	
310-291606-4	MW-7	Total/NA	Water	3005A	
310-291606-5	MW-8	Total/NA	Water	3005A	
310-291606-6	MW-9	Total/NA	Water	3005A	
310-291606-7	MW-10	Total/NA	Water	3005A	
310-291606-8	MW-11AR	Total/NA	Water	3005A	
310-291606-9	MW-13	Total/NA	Water	3005A	
310-291606-10	MW-14	Total/NA	Water	3005A	

Metals (Continued)

Prep Batch: 434732 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-11	MW-18	Total/NA	Water	3005A	
310-291606-12	MW-19	Total/NA	Water	3005A	
310-291606-13	MW-20	Total/NA	Water	3005A	
310-291606-14	MW-21	Total/NA	Water	3005A	
310-291606-15	MW-23	Total/NA	Water	3005A	
310-291606-16	GWGCS	Total/NA	Water	3005A	
310-291606-17	SW-1	Total/NA	Water	3005A	
310-291606-18	SW-2	Total/NA	Water	3005A	
310-291606-19	LW-01	Total/NA	Water	3005A	
310-291606-20	Field Blank	Total/NA	Water	3005A	
MB 310-434732/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-434732/2-A	Lab Control Sample	Total/NA	Water	3005A	
310-291606-1 MS	MW-3	Total/NA	Water	3005A	
310-291606-1 MSD	MW-3	Total/NA	Water	3005A	
310-291606-11 DU	MW-18	Total/NA	Water	3005A	

Analysis Batch: 435490

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	6020B	434732
310-291606-2	MW-4	Total/NA	Water	6020B	434732
310-291606-3	MW-5	Total/NA	Water	6020B	434732
310-291606-4	MW-7	Total/NA	Water	6020B	434732
310-291606-5	MW-8	Total/NA	Water	6020B	434732
310-291606-6	MW-9	Total/NA	Water	6020B	434732
310-291606-7	MW-10	Total/NA	Water	6020B	434732
310-291606-8	MW-11AR	Total/NA	Water	6020B	434732
310-291606-9	MW-13	Total/NA	Water	6020B	434732
310-291606-10	MW-14	Total/NA	Water	6020B	434732
310-291606-11	MW-18	Total/NA	Water	6020B	434732
310-291606-12	MW-19	Total/NA	Water	6020B	434732
310-291606-13	MW-20	Total/NA	Water	6020B	434732
310-291606-14	MW-21	Total/NA	Water	6020B	434732
310-291606-15	MW-23	Total/NA	Water	6020B	434732
310-291606-16	GWGCS	Total/NA	Water	6020B	434732
310-291606-17	SW-1	Total/NA	Water	6020B	434732
310-291606-18	SW-2	Total/NA	Water	6020B	434732
310-291606-19	LW-01	Total/NA	Water	6020B	434732
310-291606-20	Field Blank	Total/NA	Water	6020B	434732
MB 310-434732/1-A	Method Blank	Total/NA	Water	6020B	434732
LCS 310-434732/2-A	Lab Control Sample	Total/NA	Water	6020B	434732
310-291606-1 MS	MW-3	Total/NA	Water	6020B	434732
310-291606-1 MSD	MW-3	Total/NA	Water	6020B	434732
310-291606-11 DU	MW-18	Total/NA	Water	6020B	434732

Analysis Batch: 435616

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	6020B	434732
310-291606-2	MW-4	Total/NA	Water	6020B	434732
310-291606-3	MW-5	Total/NA	Water	6020B	434732
310-291606-4	MW-7	Total/NA	Water	6020B	434732
310-291606-5	MW-8	Total/NA	Water	6020B	434732

Metals (Continued)

Analysis Batch: 435616 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-6	MW-9	Total/NA	Water	6020B	434732
310-291606-7	MW-10	Total/NA	Water	6020B	434732
310-291606-8	MW-11AR	Total/NA	Water	6020B	434732
310-291606-9	MW-13	Total/NA	Water	6020B	434732
310-291606-10	MW-14	Total/NA	Water	6020B	434732
310-291606-11	MW-18	Total/NA	Water	6020B	434732
310-291606-12	MW-19	Total/NA	Water	6020B	434732
310-291606-13	MW-20	Total/NA	Water	6020B	434732
310-291606-14	MW-21	Total/NA	Water	6020B	434732
310-291606-15	MW-23	Total/NA	Water	6020B	434732
310-291606-16	GWGCS	Total/NA	Water	6020B	434732
310-291606-17	SW-1	Total/NA	Water	6020B	434732
310-291606-18	SW-2	Total/NA	Water	6020B	434732
310-291606-20	Field Blank	Total/NA	Water	6020B	434732
MB 310-434732/1-A	Method Blank	Total/NA	Water	6020B	434732
LCS 310-434732/2-A	Lab Control Sample	Total/NA	Water	6020B	434732
310-291606-1 MS	MW-3	Total/NA	Water	6020B	434732
310-291606-1 MSD	MW-3	Total/NA	Water	6020B	434732
310-291606-11 DU	MW-18	Total/NA	Water	6020B	434732

General Chemistry

Analysis Batch: 434684

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	I-3765-85	
310-291606-2	MW-4	Total/NA	Water	I-3765-85	
310-291606-3	MW-5	Total/NA	Water	I-3765-85	
310-291606-6	MW-9	Total/NA	Water	I-3765-85	
310-291606-7	MW-10	Total/NA	Water	I-3765-85	
310-291606-8	MW-11AR	Total/NA	Water	I-3765-85	
310-291606-10	MW-14	Total/NA	Water	I-3765-85	
310-291606-11	MW-18	Total/NA	Water	I-3765-85	
310-291606-14	MW-21	Total/NA	Water	I-3765-85	
310-291606-20	Field Blank	Total/NA	Water	I-3765-85	
MB 310-434684/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-434684/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 434706

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-4	MW-7	Total/NA	Water	I-3765-85	
310-291606-5	MW-8	Total/NA	Water	I-3765-85	
310-291606-9	MW-13	Total/NA	Water	I-3765-85	
310-291606-12	MW-19	Total/NA	Water	I-3765-85	
310-291606-13	MW-20	Total/NA	Water	I-3765-85	
310-291606-15	MW-23	Total/NA	Water	I-3765-85	
310-291606-16	GWGCS	Total/NA	Water	I-3765-85	
310-291606-17	SW-1	Total/NA	Water	I-3765-85	
310-291606-18	SW-2	Total/NA	Water	I-3765-85	
310-291606-19	LW-01	Total/NA	Water	I-3765-85	
MB 310-434706/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-434706/2	Lab Control Sample	Total/NA	Water	I-3765-85	

QC Association Summary

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

General Chemistry

Analysis Batch: 434758

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	SM 2540C	
310-291606-2	MW-4	Total/NA	Water	SM 2540C	
310-291606-3	MW-5	Total/NA	Water	SM 2540C	
310-291606-4	MW-7	Total/NA	Water	SM 2540C	
310-291606-5	MW-8	Total/NA	Water	SM 2540C	
310-291606-6	MW-9	Total/NA	Water	SM 2540C	
310-291606-7	MW-10	Total/NA	Water	SM 2540C	
310-291606-8	MW-11AR	Total/NA	Water	SM 2540C	
310-291606-10	MW-14	Total/NA	Water	SM 2540C	
310-291606-11	MW-18	Total/NA	Water	SM 2540C	
310-291606-12	MW-19	Total/NA	Water	SM 2540C	
310-291606-14	MW-21	Total/NA	Water	SM 2540C	
310-291606-20	Field Blank	Total/NA	Water	SM 2540C	
MB 310-434758/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-434758/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-291606-4 DU	MW-7	Total/NA	Water	SM 2540C	

Analysis Batch: 434893

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-9	MW-13	Total/NA	Water	SM 2540C	
310-291606-13	MW-20	Total/NA	Water	SM 2540C	
310-291606-15	MW-23	Total/NA	Water	SM 2540C	
310-291606-16	GWGCS	Total/NA	Water	SM 2540C	
310-291606-17	SW-1	Total/NA	Water	SM 2540C	
310-291606-18	SW-2	Total/NA	Water	SM 2540C	
310-291606-19	LW-01	Total/NA	Water	SM 2540C	
MB 310-434893/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-434893/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-291606-15 DU	MW-23	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 435016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-1	MW-3	Total/NA	Water	Field Sampling	
310-291606-2	MW-4	Total/NA	Water	Field Sampling	
310-291606-3	MW-5	Total/NA	Water	Field Sampling	
310-291606-4	MW-7	Total/NA	Water	Field Sampling	
310-291606-5	MW-8	Total/NA	Water	Field Sampling	
310-291606-6	MW-9	Total/NA	Water	Field Sampling	
310-291606-7	MW-10	Total/NA	Water	Field Sampling	
310-291606-8	MW-11AR	Total/NA	Water	Field Sampling	
310-291606-9	MW-13	Total/NA	Water	Field Sampling	
310-291606-10	MW-14	Total/NA	Water	Field Sampling	

Analysis Batch: 435018

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-11	MW-18	Total/NA	Water	Field Sampling	
310-291606-12	MW-19	Total/NA	Water	Field Sampling	
310-291606-13	MW-20	Total/NA	Water	Field Sampling	
310-291606-14	MW-21	Total/NA	Water	Field Sampling	

Field Service / Mobile Lab (Continued)

Analysis Batch: 435018 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-291606-15	MW-23	Total/NA	Water	Field Sampling	
310-291606-16	GWGCS	Total/NA	Water	Field Sampling	
310-291606-17	SW-1	Total/NA	Water	Field Sampling	
310-291606-18	SW-2	Total/NA	Water	Field Sampling	
310-291606-19	LW-01	Total/NA	Water	Field Sampling	

Lab Chronicle

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: MW-3

Lab Sample ID: 310-291606-1
Date Collected: 09/24/24 17:31
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435132	HE7K	EET CF	10/01/24 18:36
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 16:46
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:28
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/24/24 17:31

Client Sample ID: MW-4

Lab Sample ID: 310-291606-2
Date Collected: 09/23/24 15:08
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435132	HE7K	EET CF	10/01/24 19:13
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		4	435616	NFT2	EET CF	10/08/24 16:57
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:45
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/23/24 15:08

Client Sample ID: MW-5

Lab Sample ID: 310-291606-3
Date Collected: 09/24/24 16:00
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 14:16
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:01
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:47
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/24/24 16:00

Client Sample ID: MW-7

Lab Sample ID: 310-291606-4
Date Collected: 09/25/24 10:54
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 14:28

Client Sample ID: MW-7

Lab Sample ID: 310-291606-4

Date Collected: 09/25/24 10:54

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:20
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:49
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/25/24 10:54

Client Sample ID: MW-8

Lab Sample ID: 310-291606-5

Date Collected: 09/26/24 14:45

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 14:39
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:23
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:51
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/26/24 14:45

Client Sample ID: MW-9

Lab Sample ID: 310-291606-6

Date Collected: 09/24/24 13:02

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 14:51
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:27
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:54
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/24/24 13:02

Client Sample ID: MW-10

Lab Sample ID: 310-291606-7

Date Collected: 09/24/24 14:29

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 15:03
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:31

Lab Chronicle

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: MW-10

Lab Sample ID: 310-291606-7
Date Collected: 09/24/24 14:29
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:56
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/24/24 14:29

Client Sample ID: MW-11AR

Lab Sample ID: 310-291606-8
Date Collected: 09/25/24 15:23
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 15:14
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:35
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 15:58
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/25/24 15:23

Client Sample ID: MW-13

Lab Sample ID: 310-291606-9
Date Collected: 09/26/24 10:19
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 15:26
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:38
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:00
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/26/24 10:19

Client Sample ID: MW-14

Lab Sample ID: 310-291606-10
Date Collected: 09/25/24 17:23
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 15:37
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:42
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:02

Lab Chronicle

Client: SCS Engineers | Job ID: 310-291606-1
Project/Site: Marshalltown - 25224064

Client Sample ID: MW-14
Lab Sample ID: 310-291606-10
Date Collected: 09/25/24 17:23
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435016	BJ0R	EET CF	09/25/24 17:23

Client Sample ID: MW-18
Lab Sample ID: 310-291606-11
Date Collected: 09/25/24 13:53
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 15:49
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:46
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:05
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/25/24 13:53

Client Sample ID: MW-19
Lab Sample ID: 310-291606-12
Date Collected: 09/25/24 12:07
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 16:01
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 17:53
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:18
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/25/24 12:07

Client Sample ID: MW-20
Lab Sample ID: 310-291606-13
Date Collected: 09/26/24 11:41
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 16:35
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 18:12
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:20
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09

Client Sample ID: MW-20

Lab Sample ID: 310-291606-13

Date Collected: 09/26/24 11:41

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/26/24 11:41

Client Sample ID: MW-21

Lab Sample ID: 310-291606-14

Date Collected: 09/23/24 16:39

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 16:47
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		4	435616	NFT2	EET CF	10/08/24 18:16
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:22
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/23/24 16:39

Client Sample ID: MW-23

Lab Sample ID: 310-291606-15

Date Collected: 09/26/24 13:02

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435164	HE7K	EET CF	10/02/24 16:59
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 18:19
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:24
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/26/24 13:02

Client Sample ID: GWGCS

Lab Sample ID: 310-291606-16

Date Collected: 09/26/24 17:20

Matrix: Water

Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435161	WZC8	EET CF	10/02/24 14:38
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 18:23
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:26
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/26/24 17:20

Client Sample ID: SW-1

Lab Sample ID: 310-291606-17

Date Collected: 09/27/24 10:05
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435161	WZC8	EET CF	10/02/24 15:38
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 18:27
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:29
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/27/24 10:05

Client Sample ID: SW-2

Lab Sample ID: 310-291606-18

Date Collected: 09/27/24 08:50
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435161	WZC8	EET CF	10/02/24 15:50
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 18:31
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:31
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/27/24 08:50

Client Sample ID: LW-01

Lab Sample ID: 310-291606-19

Date Collected: 09/26/24 15:50
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	435161	WZC8	EET CF	10/02/24 16:02
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:33
Total/NA	Analysis	I-3765-85		1	434706	DGU1	EET CF	09/30/24 11:53
Total/NA	Analysis	SM 2540C		1	434893	MDU9	EET CF	10/01/24 16:09
Total/NA	Analysis	Field Sampling		1	435018	BJ0R	EET CF	09/26/24 15:50

Client Sample ID: Field Blank

Lab Sample ID: 310-291606-20

Date Collected: 09/24/24 16:50
Matrix: Water
Date Received: 09/27/24 16:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		1	435161	WZC8	EET CF	10/02/24 16:14
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435616	NFT2	EET CF	10/08/24 18:34

Lab Chronicle

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Client Sample ID: Field Blank
Date Collected: 09/24/24 16:50
Date Received: 09/27/24 16:55

Lab Sample ID: 310-291606-20
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3005A			434732	F5MW	EET CF	10/01/24 09:30
Total/NA	Analysis	6020B		1	435490	NFT2	EET CF	10/07/24 16:35
Total/NA	Analysis	I-3765-85		1	434684	DGU1	EET CF	09/30/24 10:18
Total/NA	Analysis	SM 2540C		1	434758	MDU9	EET CF	09/30/24 16:53

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: SCS Engineers
Job ID: 310-291606-1
Project/Site: Marshalltown - 25224064

Laboratory: Eurofins Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

Method Summary

Client: SCS Engineers
Project/Site: Marshalltown - 25224064

Job ID: 310-291606-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
I-3765-85	Residue, Non-filterable (TSS)	USGS	EET CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET CF
Field Sampling	Field Sampling	EPA	EET CF
3005A	Preparation, Total Metals	SW846	EET CF

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

USGS = "Methods For Analysis Of Water And Fluvial Sediments", USGS, 1989

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

eurofins | Environment Testing America

310-291606 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: SGS			
City/State: CITY	STATE	Project:	
Receipt Information			
Date/Time Received:	DATE 9/27/24	TIME 1655	Received By: XB
Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee ☒ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other:______			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	☒ Yes ☐ No	*If yes:* Cooler ID:	
Multiple Coolers?	☒ Yes ☐ No	*If yes:* Cooler # 1 of 3	
Cooler Custody Seals Present?	☐ Yes ☒ No	*If yes:* Cooler custody seals intact? ☐ Yes ☐ No	
Sample Custody Seals Present?	☐ Yes ☒ No	*If yes:* Sample custody seals intact? ☐ Yes ☐ No	
Trip Blank Present?	☐ Yes ☒ No	*If yes:* Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other:______ ☐ NONE			
Thermometer ID: R		Correction Factor (°C): 0	
• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): 2.6		Corrected Temp (°C): 2.6	
• **Sample Container Temperature**			
Container(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):			
Corrected Temp (°C):			

Exceptions Noted

1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No
   a) *If yes:* Is there evidence that the chilling process began? ☐ Yes ☐ No

2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No

NOTE. If yes, contact PM before proceeding. If no, proceed with login

Additional Comments

Document CED-P-SAM-FRM45521
Revision 26
Date: 27 Jan 2022

Eurofins Cedar Falls

General temperature criteria is 0 to 6°C
Bacteria temperature criteria is 0 to 10°C

eurofins | Environment Testing America

Place COC scanning label here

Cooler/Sample Receipt and Temperature Log Form

Client Information

Client: SCS

City/State: CITY STATE | Project:

Receipt Information

Date/Time Received: DATE 9/27/24 TIME 1655 | Received By: XB

Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee
☒ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other:

Condition of Cooler/Containers

Sample(s) received in Cooler?	☒ Yes	☐ No	*If yes:* Cooler ID:
Multiple Coolers?	☒ Yes	☐ No	*If yes:* Cooler # 2 of 3
Cooler Custody Seals Present?	☐ Yes	☒ No	*If yes:* Cooler custody seals intact? ☐ Yes ☐ No
Sample Custody Seals Present?	☐ Yes	☒ No	*If yes:* Sample custody seals intact? ☐ Yes ☐ No
Trip Blank Present?	☐ Yes	☒ No	*If yes:* Which VOA samples are in cooler? ↓

Temperature Record

Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other: ☐ NONE

Thermometer ID: R | Correction Factor (°C): 0

• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature

Uncorrected Temp (°C): 5.1 | Corrected Temp (°C): 5.1

• **Sample Container Temperature**

	CONTAINER 1	CONTAINER 2
Container(s) used:		
Uncorrected Temp (°C):		
Corrected Temp (°C):		

Exceptions Noted

1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No
   a) *If yes:* Is there evidence that the chilling process began? ☐ Yes ☐ No

2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No

NOTE: If yes, contact PM before proceeding. If no, proceed with login

Additional Comments

Document CED-P-SAM-FRM45521
Revision 26
Date 27 Jan 2022

Eurofins Cedar Falls

General temperature criteria is 0 to 6°C
Bacteria temperature criteria is 0 to 10°C

eurofins | Environment Testing America

Place COC scanning label here

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: SCS			
City/State: CITY	STATE	Project:	
Receipt Information			
Date/Time Received:	DATE 9/27/24	TIME 1655	Received By: KB
Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee			
☒ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other:________			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	☒ Yes ☐ No	*If yes:* Cooler ID:	
Multiple Coolers?	☒ Yes ☐ No	*If yes:* Cooler # 3 of 3	
Cooler Custody Seals Present?	☐ Yes ☒ No	*If yes:* Cooler custody seals intact? ☐ Yes ☐ No	
Sample Custody Seals Present?	☐ Yes ☒ No	*If yes:* Sample custody seals intact? ☐ Yes ☐ No	
Trip Blank Present?	☐ Yes ☒ No	*If yes:* Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other:________ ☐ NONE			
Thermometer ID: R		Correction Factor (°C): 0	
• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): 1.9		Corrected Temp (°C): 1.9	
• **Sample Container Temperature**			
Container(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling?	☐ Yes ☐ No		
a) *If yes:* Is there evidence that the chilling process began?	☐ Yes ☐ No		
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?)	☐ Yes ☐ No		
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			

Document CED-P-SAM-FRM45521
Revision 26
Date 27 Jan 2022

Eurofins Cedar Falls

General temperature criteria is 0 to 6°C
Bacteria temperature criteria is 0 to 10°C

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Phone. 319-277-2401 Fax: 319-277-2425

Chain of Custody Record

TestAmerica Des Moines SC
214

eurofins

Client Information	Sampler: Michael Morgan	Lab PM: Fredrick, Sandie	Carrier Tracking No(s):	COC No: 310-95577-13815 1
Client Contact: Michael Morgan	Phone: 515 631 0778	E-Mail: Sandra Fredrick@et.eurofinsus.com	State of Origin:	Page: Page 1 of 3
Company: SCS Engineers	PWSID:			Job #:
Address: 1690 All State Court Suite 100	Due Date Requested.			
City: West Des Moines	TAT Requested (days):			
State, Zip: IA, 50265	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 25224064			
Email: mmorgan@scsengineers.com	WO #:			
Project Name: Marshalltown - 25224064	Project #: 31011020			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
D - HNO3
N - None

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B - Metals (16)	9056A_ORGFM_28D - Chloride/Fluoride/Sulfate	2540C_Calcd, I_3765_85	Total Number of containers	Special Instructions/Note:
				Preservation Code:			D	N	N		
MW-3	9/24/24	17 31	G	Water			X	X	X		
MW-4	9/23/24	15:08	G	Water			X	X	X		
MW-5	9/24/24	16:00	G	Water			X	X	X		
MW-7	9/25/24	10 54	G	Water			X	X	X		
MW-8	9/26/24	14 45	G	Water			X	X	X		
MW-9	9/24/24	13:02	G	Water			X	X	X		
MW-10	9/24/24	14 29	G	Water			X	X	X		
MW-11AR	9/25/24	15 23	G	Water			X	X	X		
MW-13	9/26/24	10 19	G	Water			X	X	X		
MW-14	9/25/24	17:23	G	Water			X	X	X		
MW-18	9/25/24	13:53	G	Water			X	X	X		

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Michael Morgan	Date/Time: 9/27/24 14:00	Company: SCS	Received by: CGC	Date/Time: 9-27-24 1655	Company: Eurofins
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No. | Cooler Temperature(s) °C and Other Remarks:

Ver 05/06/2024

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Phone. 319-277-2401 Fax: 319-277-2425

Chain of Custody Record

TestAmerica Des Moines SC
214

eurofins

Client Information	Sampler: Michael Morgan	Lab PM: Fredrick, Sandie	Carrier Tracking No(s).	COC No: 310-95577-13815 2
Client Contact: Michael Morgan	Phone: 515-631-0778	E-Mail: Sandra.Fredrick@et.eurofinsus.com	State of Origin:	Page: Page 2 of 3
Company: SCS Engineers	PWSID:	Analysis Requested		Job #:
Address: 1690 All State Court Suite 100	Due Date Requested:			Preservation Codes: D - HNO3, N - None
City: West Des Moines	TAT Requested (days):			
State, Zip: IA, 50265	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 25224064			
Email: mmorgan@scsengineers.com	WO #:			
Project Name: Marshalltown - 25224064	Project #: 31011020			
Site:	SSOW#:			Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B - Metals (16)	9056A_ORGFM_28D - Chloride/Fluoride/Sulfate	2540C_Calcd, I_3765_85	Total Number of containers	Special Instructions/Note:
				Preservation Code:			D	N	N		
MW-19	9/25/24	12:07	G	Water			X	X	X		
MW-20	9/26/24	11:41	G	Water			X	X	X		
MW-21	9/23/24	16:39	G	Water			X	X	X		
[redacted]				Water							
MW-23	9/26/24	13:02	G	Water			X	X	X		
GWGCS	9/26/24	17:20	G	Water			X	X	X		
SW-1	9/27/24	10:05	G	Water			X	X	X		
SW-2	9/27/24	08 50	G	Water			X	X	X		
[redacted]				Water							
LW-01	9/26/24	15.50	G	Water			X	X	X		
[redacted]				Water							

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ______ Months*

Deliverable Requested I, II, III, IV, Other (specify)

Special Instructions/QC Requirements.

Empty Kit Relinquished by:	Date:	Time.	Method of Shipment:		
Relinquished by: Michael Morgan	Date/Time: 9/27/24 14 00	Company: SCS	Received by: CGC	Date/Time: 9-27-24 1655	Company: Eurofins
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks:

Ver: 05/06/2024

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Phone. 319-277-2401 Fax: 319-277-2425

Chain of Custody Record

TestAmerica Des Moines SC
214

eurofins

Client Information	Sampler: Michael Morgan	Lab PM: Fredrick, Sandie	Carrier Tracking No(s):	COC No: 310-95577-13815 3
Client Contact: Michael Morgan	Phone: 515 631 0778	E-Mail: Sandra Fredrick@et.eurofinsus.com	State of Origin:	Page: Page 3 of 3
Company: SCS Engineers	PWSID:	**Analysis Requested**		Job #:
Address: 1690 All State Court Suite 100	**Due Date Requested:**			**Preservation Codes:** D - HNO3 N - None
City: West Des Moines	**TAT Requested (days):**			
State, Zip: IA, 50265	**Compliance Project:** Δ Yes Δ No			
Phone:	PO #: 25224064			
Email: mmorgan@scsengineers com	WO #:			
Project Name: Marshalltown - 25224064	Project #: 31011020			
Site:	SSOW#:			Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B - Metals (15)	9056A_ORGFM_28D - Chloride/Fluoride/Sulfate	2540C_Calcd, I_3765_85	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	N	N		
[redacted]				Water							
[redacted]				Water							
Field Blank	9/24/24	16:50	G	Water			X	X	X		
				Water							

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested I, II, III, IV, Other (specify)

Special Instructions/QC Requirements.

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Michael Morgan	9/27/24 14:00	SCS	CGe	9.27.24 1655	Eurofins

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks:

Ver 05/06/2024

Table 1. Sampling Points and Parameters - State Sampling Program
Groundwater Monitoring - Marshalltown East and West Closed Landfills / SCS Engineers Project #25224064

Parameter*	GROUNDWATER																	SURFACE WATER			LEACHATE							
	MW-3	MW-4	MW-5	MW-7	MW-8	MW-9	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	Groundwater Gradient Control system (GWGCS)	SW-1	SW-2	SW-3	LL-1	LW-01	LW-02	LW-03	LW-04	Leachate Collection Tank	Field Blank	TOTAL
Arsenic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Barium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Beryllium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Boron	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Calcium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Cobalt	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Copper																						X	X	X	X		X	5
Iron	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Lead	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Lithium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Magnesium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Manganese	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Molybdenum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Selenium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Zinc																						X	X	X	X		X	5
Chloride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Fluoride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Sulfate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
TDS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
TSS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	25
Field Parameters																												
pH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Conductance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Dissolved Oxygen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
ORP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Groundwater or Leachate Elevation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Leachate or Surface Water Depth																		X	X	X		X	X	X	X			7
Well Depth	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Turbidity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Color	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24
Odor	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			24

Notes: X = Monitoring point is sampled for this parameter

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-291606-1

Login Number: 291606
List Number: 1
Creator: Collins, Charlotte G

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Groundwater Monitoring Results - Field Parameters
Marshalltown Closed Landfill / SCS Engineers Project #25224064.00
September 2024

Sample	Sample Date	GW Elevation (feet amsl)	Leachate Elevation (ft amsl)	Surface Water Depth (ft)	Temperature (Deg. C)	pH (Std. Units)	Specific Conductivity (µs/cm)	Turbidity (NTU)
MW-3	9/24/2024	868.37	--	--	13.1	6.93	849	4.97
MW-4	9/23/2024	871.62	--	--	14.0	6.84	966	6.72
MW-5	9/24/2024	875.27	--	--	13.2	6.35	462.9	6.98
MW-7	9/25/2024	875.41	--	--	11.0	7.00	741	6.28
MW-8	9/26/2024	878.19	--	--	18.6	7.44	800	17.06
MW-9	9/24/2024	910.07	--	--	14.6	6.66	732	8.14
MW-10	9/24/2024	928.96	--	--	13.7	6.93	566	18.93
MW-11AR	9/25/2024	872.85	--	--	18.3	7.12	966	18.78
MW-13	9/26/2024	908.50	--	--	15.2	6.81	961	8.20
MW-14	9/25/2024	917.83	--	--	14.8	6.95	676	8.43
MW-18	9/25/2024	902.76	--	--	12.3	6.81	758	5.38
MW-19	9/25/2024	875.33	--	--	12.2	7.02	711	6.36
MW-20	9/26/2024	872.32	--	--	12.8	7.19	990	7.83
MW-21	9/23/2024	844.36	--	--	12.1	7.01	884	10.27
MW-23	9/26/2024	913.83	--	--	17.1	6.93	830	10.31
SW-1	9/27/2024	--	--	2'	14.2	7.83	692	9.07
SW-2	9/27/2024	--	--	0.5'	14.0	7.74	702	9.09
LW-1	9/26/2024	--	894.63	--	18.9	7.36	998	21.30
GWGCS	9/26/2024	--	--	0.83'	17.5	7.03	1436	5.95

Abbreviations:
mg/L = milligrams per liter
mV = millivolts
amsl = above mean sea level
-- = not measured

Notes:
None

Created by: NDK Date: 10/6/2021
Last revision by: BLR Date: 10/2/2024
Checked by: Date:

C:\Users\hld0\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\NZ4FP3C5\[2409_Marshalltown_Field.xlsx]GW Field Parameters

Appendix D

Summary of Groundwater Chemistry – Pre-2019

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

ARSENIC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20
ARSENIC, DISSOLVED	1993-Sep						<5	<5		<5	<5	<5		<5
ARSENIC, DISSOLVED	1994-Feb	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	11
ARSENIC, DISSOLVED	1994-Apr	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5
ARSENIC, DISSOLVED	1994-Jul	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5
ARSENIC, DISSOLVED	1994-Oct	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5
ARSENIC, DISSOLVED	1995-Apr													<5
ARSENIC, DISSOLVED	1996-Apr													1.4
ARSENIC, DISSOLVED	1996-Oct													<5
ARSENIC, DISSOLVED	1997-Apr													1
ARSENIC, DISSOLVED	1997-Oct													1.9
ARSENIC, DISSOLVED	1998-Apr													<1
ARSENIC, DISSOLVED	1998-Oct													<1
ARSENIC, DISSOLVED	1999-Sep													<1
ARSENIC, DISSOLVED	2000-Sep	<1	4.2	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2001-Sep	<1	3.6	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2002-Sep	<1	3.1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2003-Sep	<1	2.9	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2004-Sep	<1	3.5	2.2	<1	<1	<1	<1		<1	<1	1.7	<1	<1
ARSENIC, DISSOLVED	2005-Sep	<1	3	<1	<1	<1	<1	<1	<1	1.9	1.5	<1	1.6	<1
ARSENIC, DISSOLVED	2006-Sep	<1	2.12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2007-Sep	<1	2.99	3.24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2008-Sep	<1	3.15	4.29	<1	<1	1.41	<1	<1	<1	<1	<1	<1	<1
ARSENIC, DISSOLVED	2009-Sep	<1	4.27	3.06	<1	<1	1.33	<1	<1	<1	<1	1.08	<1	<1
ARSENIC, DISSOLVED	2010-Sep	<1	2.32	1.35	<1	<1	<1	<1	<1	<1	<1	1.87	<1	<1
ARSENIC, DISSOLVED	2011-Sep	<2	3.72	<1	<1	<1	<2	<2	<2	<2	<2	<2	<1	<2
ARSENIC, DISSOLVED	2012-Sep	<2	1.44	1.33	<2	<1	<2	<2	<1	<2	<2	<2	<2	<1
ARSENIC, DISSOLVED	2013-Apr													
ARSENIC, DISSOLVED	2013-Sep	<1	2.6	1.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.9
ARSENIC, DISSOLVED	2014-Sep	<1	2.4	7.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.1
ARSENIC, DISSOLVED	2015-Sep	1.3	3.1	2.7	<1	<1	1.1	<1	1.1	<1	<1	1.3	<1	5.3
ARSENIC, DISSOLVED	2016-Sep			0.24		0.4		0.13						1
ARSENIC	2013-Sep													
ARSENIC	2014-Sep													
ARSENIC	2015-Sep													
ARSENIC	2016-Sep	0.52	6	4.2	0.25	0.63	0.55	0.14	0.94	0.38	0.64	1.2	0.26	1.3
ARSENIC	2017-Sep	0.68	5.9	1.2	0.32	0.29	0.26	0.17	<0.052	0.16	1.6	0.32	0.41	1.4
ARSENIC	2018-Sep	0.35	18.7	2.1	0.38	0.55	0.3	0.36	1.7	0.33	0.38	4.4	0.41	1.2

GW Standard:
MCL = 10

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

ARSENIC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
ARSENIC, DISSOLVED	1993-Sep		<5	<5									
ARSENIC, DISSOLVED	1994-Feb	5	7	<5									
ARSENIC, DISSOLVED	1994-Apr	<5	<5	<5									
ARSENIC, DISSOLVED	1994-Jul	<5	<5	<5									
ARSENIC, DISSOLVED	1994-Oct	<5	<5	<5									
ARSENIC, DISSOLVED	1995-Apr		<5										
ARSENIC, DISSOLVED	1996-Apr		<1										
ARSENIC, DISSOLVED	1996-Oct	<5	<5										
ARSENIC, DISSOLVED	1997-Apr												
ARSENIC, DISSOLVED	1997-Oct												
ARSENIC, DISSOLVED	1998-Apr												
ARSENIC, DISSOLVED	1998-Oct												
ARSENIC, DISSOLVED	1999-Sep	1.1	1.2										
ARSENIC, DISSOLVED	2000-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2001-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2002-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2003-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2004-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2005-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2006-Sep	<1	<1	<2									
ARSENIC, DISSOLVED	2007-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2008-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2009-Sep	<1	<1	<1									
ARSENIC, DISSOLVED	2010-Sep	<1	<1	<2									
ARSENIC, DISSOLVED	2011-Sep	<2	<2	<6									
ARSENIC, DISSOLVED	2012-Sep	<2		<1	<1	1.95	<1						1.94
ARSENIC, DISSOLVED	2013-Apr				<1							39.3	5.48
ARSENIC, DISSOLVED	2013-Sep	<1	1	<1		1	<1						
ARSENIC, DISSOLVED	2014-Sep	<1	<1	<1	<1	<1	<1						
ARSENIC, DISSOLVED	2015-Sep	1.5	2	<1	1.1	1.8	1.6						
ARSENIC, DISSOLVED	2016-Sep												
ARSENIC	2013-Sep				<1								4.9
ARSENIC	2014-Sep								3.2				2.6
ARSENIC	2015-Sep								5.4				2.2
ARSENIC	2016-Sep	0.8	0.41	0.32		0.57	0.76		45.2				8.9
ARSENIC	2017-Sep	0.58	0.58	0.29	0.22	1.4	3.2		6.8				52
ARSENIC	2018-Sep	0.57	0.49	0.25	0.27	0.76	0.86		2.6				72.7

GW Standard:
MCL = 10

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

BARIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20
BARIUM, DISSOLVED	1993-Sep						<500	<500		<500	<500	<500		<500
BARIUM, DISSOLVED	1994-Apr	<500	<500	<500	<500	<500	<500	<500		<500	<500	<500	<500	<500
BARIUM, DISSOLVED	1994-Feb	<500	<500	<500	<500	<500	<500	<500		<500	<500	<500	<500	<500
BARIUM, DISSOLVED	1994-Jul	123	107	142	118	154	118	150		131	97	94	139	76
BARIUM, DISSOLVED	1994-Oct	106	104	116	121	160	106	152		128	96	87	140	74
BARIUM, DISSOLVED	1999-Sep	93	88	109	107	145	108	157		122	85	81	118	97
BARIUM, DISSOLVED	2000-Sep	89	79	68	102	128	128	150		110	56	99	117	80
BARIUM, DISSOLVED	2001-Sep	106	94	63	105	137	125	130		119	60	152	118	93
BARIUM, DISSOLVED	2002-Sep	98	84	74	110	126	136	154		104	70	157	121	79
BARIUM, DISSOLVED	2003-Sep	98	82	69	108	128	147	143		111	73	74	122	90
BARIUM, DISSOLVED	2004-Sep	115	96	78	105	129	146	129		106	72	265	116	95
BARIUM, DISSOLVED	2005-Sep	116	96	72	104	128	133	155	44	98	57	150	148	95
BARIUM, DISSOLVED	2006-Sep	110	93.1	86.2	116	126	164	169	26.8	72.6	67.5	81.5	117	91
BARIUM, DISSOLVED	2007-Sep	117	107	74.5	113	137	173	134	25.8	92.9	68.5	119	116	104
BARIUM, DISSOLVED	2008-Sep	114	112	104	113	167	176	143	28.4	94.5	70.7	167	118	109
BARIUM, DISSOLVED	2009-Sep	123	103	102	107	149	160	143	24.8	95.4	65.1	182	117	105
BARIUM, DISSOLVED	2010-Sep	124	92.6	113	108	150	170	136	22.4	72.1	63.7	173	110	92.2
BARIUM, DISSOLVED	2011-Sep	117	106	125	107	158	159	143	24.7	104	64.6	208	118	239
BARIUM, DISSOLVED	2012-Sep	124	95.1	161	119	154	168	171	31.4	100	70.2	117	135	96
BARIUM, DISSOLVED	2013-Apr													
BARIUM, DISSOLVED	2013-Sep	147	100	113	109	150	201	135	31.5	89.4	58.8	171	121	114
BARIUM, DISSOLVED	2014-Sep	105	104	197	104	133	181	132	23.2	55.3	66.4	<10	119	85.5
BARIUM, DISSOLVED	2015-Sep	113	110	110	116	126	174	121	28.6	78.7	59.5	154	118	117
BARIUM, DISSOLVED	2016-Sep			170		110		150						96
BARIUM	2013-Sep													
BARIUM	2014-Sep													
BARIUM	2015-Sep													
BARIUM	2016-Sep	123	114	183	106	114	158	151	30.1	91.2	62.1	176	123	96.5
BARIUM	2017-Sep	112	102	118	110	135	138	149	<0.095	101	108	200	124	99.1
BARIUM	2018-Sep	123	187	143	98.9	118	157	131	35.6	90.4	55.1	242	122	87.3

GW Standard:
MCL = 2000

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

BARIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
BARIUM, DISSOLVED	1993-Sep		<500	<500									
BARIUM, DISSOLVED	1994-Apr	<500	<500	<500									
BARIUM, DISSOLVED	1994-Feb	<500	<500	<500									
BARIUM, DISSOLVED	1994-Jul	108	87	<50									
BARIUM, DISSOLVED	1994-Oct	108	61	20									
BARIUM, DISSOLVED	1999-Sep	89	46	17									
BARIUM, DISSOLVED	2000-Sep	71	47	38									
BARIUM, DISSOLVED	2001-Sep	80	39	26									
BARIUM, DISSOLVED	2002-Sep	88	41	27									
BARIUM, DISSOLVED	2003-Sep	87	36	26									
BARIUM, DISSOLVED	2004-Sep	82	46	37									
BARIUM, DISSOLVED	2005-Sep	77	47	28									
BARIUM, DISSOLVED	2006-Sep	93.8	50	15.8									
BARIUM, DISSOLVED	2007-Sep	97.1	55	57.3									
BARIUM, DISSOLVED	2008-Sep	113	52.9	31.1									
BARIUM, DISSOLVED	2009-Sep	104	52.2	77									
BARIUM, DISSOLVED	2010-Sep	86.8	66.2	55.1									
BARIUM, DISSOLVED	2011-Sep	97.3	46.1	25.1									
BARIUM, DISSOLVED	2012-Sep	94.5		12.4	27.1	54.7	108						31.4
BARIUM, DISSOLVED	2013-Apr				54.2							13300	21.5
BARIUM, DISSOLVED	2013-Sep	91	41	77.6		139	148						
BARIUM, DISSOLVED	2014-Sep	81.5	80	51.4	55.8	183	163						
BARIUM, DISSOLVED	2015-Sep	103	60.8	91.8	52	178	157						
BARIUM, DISSOLVED	2016-Sep												
BARIUM	2013-Sep				43.1								30.2
BARIUM	2014-Sep								112				29.7
BARIUM	2015-Sep								143				42.4
BARIUM	2016-Sep	104	93.8	94.2		180	198		859				151
BARIUM	2017-Sep	91.3	40.9	57	38.4	116	441		181				951 M1
BARIUM	2018-Sep	89.8	79.6	60	55	174	180		134				952

GW Standard:
MCL = 2000

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

BERYLLIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
BERYLLIUM, DISSOLVED	1999-Sep	<10	<10	<10	<10	<10	<10	<10		<10	<10
BERYLLIUM, DISSOLVED	2000-Sep	<10	<10	<10	<10	<10	<10	<10		<10	<10
BERYLLIUM, DISSOLVED	2001-Sep	<10	<10	<10	<10	<10	<10	<10		<10	<10
BERYLLIUM, DISSOLVED	2002-Sep	<10	<10	<10	<10	<10	<10	<10		<10	<10
BERYLLIUM, DISSOLVED	2003-Sep	<10	<10	<10	<10	<10	<10	<10		<10	<10
BERYLLIUM, DISSOLVED	2004-Sep	<10	<10	<10	<10	<10	<10	<10		<10	<10
BERYLLIUM, DISSOLVED	2005-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2006-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2007-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2008-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2009-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2010-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2011-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
BERYLLIUM, DISSOLVED	2012-Sep	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BERYLLIUM, DISSOLVED	2013-Apr										
BERYLLIUM, DISSOLVED	2013-Sep	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
BERYLLIUM, DISSOLVED	2014-Sep	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
BERYLLIUM, DISSOLVED	2015-Sep	<0.4	<0.4	0.48	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
BERYLLIUM, DISSOLVED	2016-Sep			<0.08		<0.08		<0.08			
BERYLLIUM	2013-Sep										
BERYLLIUM	2014-Sep										
BERYLLIUM	2015-Sep										
BERYLLIUM	2016-Sep	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
BERYLLIUM	2017-Sep	0.018	0.012	<0.012	<0.012	<0.012	0.02	<0.012	<0.012	<0.012	0.15
BERYLLIUM	2018-Sep	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	0.17	<0.12	<0.12	<0.12

GW Standard:
MCL = 4

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

BERYLLIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
BERYLLIUM, DISSOLVED	1999-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2000-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2001-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2002-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2003-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2004-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2005-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2006-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2007-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2008-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2009-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2010-Sep	<10	<10	<10	<10	<10	11.7				
BERYLLIUM, DISSOLVED	2011-Sep	<10	<10	<10	<10	<10	<10				
BERYLLIUM, DISSOLVED	2012-Sep	<1	<1	<1	<1		<1	<1	<1	<1	
BERYLLIUM, DISSOLVED	2013-Apr							<1			
BERYLLIUM, DISSOLVED	2013-Sep	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4		<0.4	<0.4	
BERYLLIUM, DISSOLVED	2014-Sep	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
BERYLLIUM, DISSOLVED	2015-Sep	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
BERYLLIUM, DISSOLVED	2016-Sep			<0.08							
BERYLLIUM	2013-Sep							<0.4			
BERYLLIUM	2014-Sep										
BERYLLIUM	2015-Sep										
BERYLLIUM	2016-Sep	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		<0.08	<0.08	
BERYLLIUM	2017-Sep	<0.012	<0.012	<0.012	0.015	<0.012	<0.012	<0.012	0.021	0.21	
BERYLLIUM	2018-Sep	0.13	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	

GW Standard:
MCL = 4

IPL Marshalltown East and West Closed Landfills
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BERYLLIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
BERYLLIUM, DISSOLVED	1999-Sep					
BERYLLIUM, DISSOLVED	2000-Sep					
BERYLLIUM, DISSOLVED	2001-Sep					
BERYLLIUM, DISSOLVED	2002-Sep					
BERYLLIUM, DISSOLVED	2003-Sep					
BERYLLIUM, DISSOLVED	2004-Sep					
BERYLLIUM, DISSOLVED	2005-Sep					
BERYLLIUM, DISSOLVED	2006-Sep					
BERYLLIUM, DISSOLVED	2007-Sep					
BERYLLIUM, DISSOLVED	2008-Sep					
BERYLLIUM, DISSOLVED	2009-Sep					
BERYLLIUM, DISSOLVED	2010-Sep					
BERYLLIUM, DISSOLVED	2011-Sep					
BERYLLIUM, DISSOLVED	2012-Sep					<1
BERYLLIUM, DISSOLVED	2013-Apr				<5	<1
BERYLLIUM, DISSOLVED	2013-Sep					
BERYLLIUM, DISSOLVED	2014-Sep					
BERYLLIUM, DISSOLVED	2015-Sep					
BERYLLIUM, DISSOLVED	2016-Sep					
BERYLLIUM	2013-Sep					<0.4
BERYLLIUM	2014-Sep	<0.4				<0.4
BERYLLIUM	2015-Sep	<0.4				<0.4
BERYLLIUM	2016-Sep	2.6				0.6
BERYLLIUM	2017-Sep	0.26				6.4 M1
BERYLLIUM	2018-Sep	<0.12				5.6

GW Standard:
MCL = 4

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

BORON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
BORON, DISSOLVED	2009-Sep	535	3980	717	<100	<100	<100	<100	493	<100	400
BORON, DISSOLVED	2010-Sep	584	2940	858	120	<100	<100	<100	1140	113	414
BORON, DISSOLVED	2011-Sep	432	4920	687	<100	<100	<100	<100	801	<100	143
BORON, DISSOLVED	2012-Sep	539	4070	599	<100	<100	<100	<100	605	<100	222
BORON, DISSOLVED	2013-Apr										
BORON, DISSOLVED	2013-Sep	1020	3290	521	<100	<100	<100	<100	388	<100	400
BORON, DISSOLVED	2014-Sep	505	3020	458	125	<100	<100	<100	628	428	535
BORON, DISSOLVED	2015-Sep	687	3890	499	<100	<100	<100	<100	686	<100	232
BORON, DISSOLVED	2016-Sep			460		<50		<50			
BORON	2013-Sep										
BORON	2014-Sep										
BORON	2015-Sep										
BORON	2016-Sep	740	3940	444	126	<50	<50	<50	650	50.2	282
BORON	2017-Sep	700	4810	440	49	37.6	17.2	14.1	755	48.6	169
BORON	2018-Sep	616	3710	490	228	<12.5	<12.5	<12.5	443	41.4	651

GW Standard:
None

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BORON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
BORON, DISSOLVED	2009-Sep	<100	<100	5180	4640	2000	<100				
BORON, DISSOLVED	2010-Sep	118	225	5590	1840	1850	<100				
BORON, DISSOLVED	2011-Sep	121	<100	4960	4060	1940	<100				
BORON, DISSOLVED	2012-Sep	539	<100	3820	1000		<100	<100	<100	<100	
BORON, DISSOLVED	2013-Apr							126			
BORON, DISSOLVED	2013-Sep	<100	<100	4920	2630	1380	<100		<100	<100	
BORON, DISSOLVED	2014-Sep	<100	566	3070	974	1230	<100	128	<100	549	
BORON, DISSOLVED	2015-Sep	<100	111	5020	3430	1720	<100	119	<100	373	
BORON, DISSOLVED	2016-Sep			3900							
BORON	2013-Sep							<100			
BORON	2014-Sep										
BORON	2015-Sep										
BORON	2016-Sep	53.8	226	3870	1870	2450	70.1		<50	289	
BORON	2017-Sep	57	44.7	4860	3580	1600	47	91.2	46.6	67.4	
BORON	2018-Sep	21.6	645	3310	1270	1330	42.9	70.5	<12.5	<12.5	

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
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BORON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
BORON, DISSOLVED	2009-Sep					
BORON, DISSOLVED	2010-Sep					
BORON, DISSOLVED	2011-Sep					
BORON, DISSOLVED	2012-Sep					378
BORON, DISSOLVED	2013-Apr				1360	393
BORON, DISSOLVED	2013-Sep					
BORON, DISSOLVED	2014-Sep					
BORON, DISSOLVED	2015-Sep					
BORON, DISSOLVED	2016-Sep					
BORON	2013-Sep					333
BORON	2014-Sep	1030				305
BORON	2015-Sep	272				272
BORON	2016-Sep	378				216
BORON	2017-Sep	309				266
BORON	2018-Sep	1390				295

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
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COBALT
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
COBALT, DISSOLVED	1999-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COBALT, DISSOLVED	2000-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COBALT, DISSOLVED	2001-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COBALT, DISSOLVED	2002-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COBALT, DISSOLVED	2003-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COBALT, DISSOLVED	2004-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COBALT, DISSOLVED	2005-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COBALT, DISSOLVED	2006-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COBALT, DISSOLVED	2007-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COBALT, DISSOLVED	2008-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COBALT, DISSOLVED	2009-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COBALT, DISSOLVED	2010-Sep	<1.55	6.25 J	7.07 J	<1.55	3.62 J	6.61 J	4.44 J	3.82 J	3.42 J	3.56 J
COBALT, DISSOLVED	2011-Sep	<1.55	<1.55	<1.55	<1.55	<1.55	<1.55	<1.55	1.75 J	<1.55	<1.55
COBALT, DISSOLVED	2012-Sep	<1.55	<1.55	1.93 J	<1.55	3.63 J	<1.55	<1.55	<1.55	<1.55	<1.55
COBALT, DISSOLVED	2013-Apr										
COBALT, DISSOLVED	2013-Sep	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
COBALT, DISSOLVED	2014-Sep	<5	<5	27.3	<5	<5	<5	<5	<5	<5	<5
COBALT, DISSOLVED	2015-Sep	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
COBALT, DISSOLVED	2016-Sep			<0.5		<0.5		<0.5			
COBALT	2013-Sep										
COBALT	2014-Sep										
COBALT	2015-Sep										
COBALT	2016-Sep	<0.5	<0.5	1	<0.5	<0.5	2	<0.5	1.7	1.2	1.3
COBALT	2017-Sep	0.22	0.42	4.1	0.027	0.051	0.43	0.05	<0.014	0.15	3
COBALT	2018-Sep	<0.15	0.56	4.3	<0.15	0.15	1.4	0.76	1	0.52	0.5

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
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COBALT
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
COBALT, DISSOLVED	1999-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2000-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2001-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2002-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2003-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2004-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2005-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2006-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2007-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2008-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2009-Sep	<20	<20	<20	<20	<20	<20				
COBALT, DISSOLVED	2010-Sep	4.67 J	7.21 J	4.6 J	3.95 J	2.41 J	<1.55				
COBALT, DISSOLVED	2011-Sep	3.35 J	<1.55	<1.55	<1.55	<1.55	<1.55				
COBALT, DISSOLVED	2012-Sep	1.97 J	<1.55	<1.55	<1.55		3.24 J	<1.55	<1.55	<1.55	
COBALT, DISSOLVED	2013-Apr							<7			
COBALT, DISSOLVED	2013-Sep	5.3	<5	<5	<5	<5	<5		<5	<5	
COBALT, DISSOLVED	2014-Sep	<5	<5	<5	<5	<5	<5	<5	<5	<5	
COBALT, DISSOLVED	2015-Sep	<5	<5	<5	<5	<5	<5	<5	<5	<5	
COBALT, DISSOLVED	2016-Sep			<0.5							
COBALT	2013-Sep							<5			
COBALT	2014-Sep										
COBALT	2015-Sep										
COBALT	2016-Sep	3.1	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	
COBALT	2017-Sep	1	0.22	0.09	0.16	0.19	0.036	0.1	0.45	3.4	
COBALT	2018-Sep	20.4	0.21	0.16	0.21	<0.15	<0.15	0.16	0.49	0.4	

GW Standard:
None

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COBALT
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
COBALT, DISSOLVED	1999-Sep					
COBALT, DISSOLVED	2000-Sep					
COBALT, DISSOLVED	2001-Sep					
COBALT, DISSOLVED	2002-Sep					
COBALT, DISSOLVED	2003-Sep					
COBALT, DISSOLVED	2004-Sep					
COBALT, DISSOLVED	2005-Sep					
COBALT, DISSOLVED	2006-Sep					
COBALT, DISSOLVED	2007-Sep					
COBALT, DISSOLVED	2008-Sep					
COBALT, DISSOLVED	2009-Sep					
COBALT, DISSOLVED	2010-Sep					
COBALT, DISSOLVED	2011-Sep					
COBALT, DISSOLVED	2012-Sep					<1.55
COBALT, DISSOLVED	2013-Apr				164	<7
COBALT, DISSOLVED	2013-Sep					
COBALT, DISSOLVED	2014-Sep					
COBALT, DISSOLVED	2015-Sep					
COBALT, DISSOLVED	2016-Sep					
COBALT	2013-Sep					<5
COBALT	2014-Sep	<5				<5
COBALT	2015-Sep	12.1				<5
COBALT	2016-Sep	140				5.8
COBALT	2017-Sep	13.3				71.2
COBALT	2018-Sep	6.3				54.5

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

COPPER
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
COPPER, DISSOLVED	1993-Sep						<50	<50		<50	<50
COPPER, DISSOLVED	1994-Feb	<50	<50	<50	<50	<50	<50	<50		<50	<50
COPPER, DISSOLVED	1994-Apr	<50	<50	<50	<50	<50	<50	<50		<50	<50
COPPER, DISSOLVED	1994-Jul	<20	<20	<20	<20	<20	<20	<20		<20	<20
COPPER, DISSOLVED	1994-Oct	<20	<20	<20	<20	<20	<20	<20		<20	<20
COPPER, DISSOLVED	1999-Sep										
COPPER, DISSOLVED	2000-Sep										
COPPER, DISSOLVED	2001-Sep										
COPPER, DISSOLVED	2002-Sep										
COPPER, DISSOLVED	2004-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
COPPER, DISSOLVED	2005-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2006-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2007-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2008-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2009-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2010-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2011-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2012-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
COPPER, DISSOLVED	2013-Apr										
COPPER, DISSOLVED	2013-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
COPPER, DISSOLVED	2014-Sep	<10	<10	14.4	<10	<10	<10	<10	<10	<10	<10
COPPER, DISSOLVED	2015-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
COPPER, DISSOLVED	2016-Sep			0.66		1.1		0.44			
COPPER	2013-Sep										
COPPER	2014-Sep										
COPPER	2015-Sep										
COPPER	2016-Sep	0.69	0.3	2.7	0.94	2	0.42	0.72	2.4	2.7	3.6
COPPER	2017-Sep	2.9	0.98	0.83	0.41	0.8	1.3	0.58	<0.045	0.99	5.5
COPPER	2018-Sep	<0.48	3.3	0.62	0.77	1.1	0.95	2.3	5.9	1.9	2.5

GW Standard:
SMCL = 1000

IPL Marshalltown East and West Closed Landfills
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COPPER
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
COPPER, DISSOLVED	1993-Sep	<50		<50		<50	<50				
COPPER, DISSOLVED	1994-Feb	<50	<50	<50	<50	<50	<50				
COPPER, DISSOLVED	1994-Apr	<50	<50	<50	<50	<50	<50				
COPPER, DISSOLVED	1994-Jul	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	1994-Oct	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	1999-Sep										
COPPER, DISSOLVED	2000-Sep										
COPPER, DISSOLVED	2001-Sep										
COPPER, DISSOLVED	2002-Sep										
COPPER, DISSOLVED	2004-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2005-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2006-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2007-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2008-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2009-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2010-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2011-Sep	<20	<20	<20	<20	<20	<20				
COPPER, DISSOLVED	2012-Sep	<20	<20	<20	<20		<20	<20	<20	<20	
COPPER, DISSOLVED	2013-Apr							<20			
COPPER, DISSOLVED	2013-Sep	<10	<10	<10	<10	<10	<10		<10	<10	
COPPER, DISSOLVED	2014-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	
COPPER, DISSOLVED	2015-Sep	<10	<10	<10	<10	<10	<10	<10	<10	<10	
COPPER, DISSOLVED	2016-Sep			1							
COPPER	2013-Sep							<10			
COPPER	2014-Sep										
COPPER	2015-Sep										
COPPER	2016-Sep	1.3	0.34	2	1.4	1.1	1.9		0.86	1.1	
COPPER	2017-Sep	1	0.46	1.5	0.74	2.6	1	0.78	0.85	5.6	
COPPER	2018-Sep	13.3	0.59	1.1	0.77	0.59	1.2	<0.48	1	0.79	

GW Standard:
SMCL = 1000

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IPL Marshalltown East and West Closed Landfills
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COPPER
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
COPPER, DISSOLVED	1993-Sep					
COPPER, DISSOLVED	1994-Feb					
COPPER, DISSOLVED	1994-Apr					
COPPER, DISSOLVED	1994-Jul					
COPPER, DISSOLVED	1994-Oct					
COPPER, DISSOLVED	1999-Sep					
COPPER, DISSOLVED	2000-Sep					
COPPER, DISSOLVED	2001-Sep					
COPPER, DISSOLVED	2002-Sep					
COPPER, DISSOLVED	2004-Sep					
COPPER, DISSOLVED	2005-Sep					
COPPER, DISSOLVED	2006-Sep					
COPPER, DISSOLVED	2007-Sep					
COPPER, DISSOLVED	2008-Sep					
COPPER, DISSOLVED	2009-Sep					
COPPER, DISSOLVED	2010-Sep					
COPPER, DISSOLVED	2011-Sep					
COPPER, DISSOLVED	2012-Sep					<20
COPPER, DISSOLVED	2013-Apr				884	<20
COPPER, DISSOLVED	2013-Sep					
COPPER, DISSOLVED	2014-Sep					
COPPER, DISSOLVED	2015-Sep					
COPPER, DISSOLVED	2016-Sep					
COPPER	2013-Sep					<10
COPPER	2014-Sep	<10				<10
COPPER	2015-Sep	<10				<10
COPPER	2016-Sep	72.4				22.4
COPPER	2017-Sep	9.6				174
COPPER	2018-Sep	4.3				128

GW Standard:
SMCL = 1000

IPL Marshalltown East and West Closed Landfills
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IRON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20	MW-21
IRON, DISSOLVED	1993-Sep						90	<50		50	50	70		<50	
IRON, DISSOLVED	1994-Feb	60	<50	6600	50	60	380	60		500	110	70	<50	60	60
IRON, DISSOLVED	1994-Apr	80	6300	80	50	50	70	80		290	70	250	90	70	90
IRON, DISSOLVED	1994-Jul	<100	4200	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1994-Oct	<100	4900	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1995-Apr	<100	6400	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1995-Oct	<100	3800	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1996-Apr	<30	4420	<30	<30	<30	<30	438		<30	<30	<30	<30	74	<30
IRON, DISSOLVED	1996-Oct	54	5350	45	<30	<30	<30	<30		<30	<30	<30	<30	<30	<30
IRON, DISSOLVED	1997-Apr	<100	5500	170	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1997-Oct	<100	4900	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1998-Apr	<100	6300	250	<100	<100	<100	<100		<100	130	<100	<100	120	<100
IRON, DISSOLVED	1998-Oct	230	5500	1400	160	<100	<100	160		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	1999-Sep	<100	5600	110	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	2000-Sep	<100	4700	590	<100	<100	<100	<100		<100	<100	100	<100	<100	<100
IRON, DISSOLVED	2001-Sep	<100	5130	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	2002-Sep	370	5000	540	110	<100	<100	<100		<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	2003-Sep	<100	3780	130	<100	<100	120	<100		<100	170	<100	<100	<100	<100
IRON, DISSOLVED	2004-Sep	180	4200	700	<100	<100	<100	520		<100	<100	1700	<100	<100	<100
IRON, DISSOLVED	2005-Sep	<100	4900	130	<100	<100	<100	140	<100	<100	<100	110	2700	<100	<100
IRON, DISSOLVED	2006-Sep	<100	4650	701	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	2007-Sep	<100	2970	3840	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
IRON, DISSOLVED	2008-Sep	<100	5370	7310	<100	<100	365	<100	<100	<100	<100	1470	<100	<100	<100
IRON, DISSOLVED	2009-Sep	<100	5000	5570	<100	165	251	108	<100	314	<100	511	<100	<100	<100
IRON, DISSOLVED	2010-Sep	437	3450	4310	115	<100	<100	115	<100	<100	<100	863	<100	118	<100
IRON, DISSOLVED	2011-Sep	<100	4200	1310	<100	<100	157	<100	101	1160	<100	423	<100	<100	<100
IRON, DISSOLVED	2012-Sep	<100	2580	1620	<100	413	<100	<100	<100	432	<100	<100	<100	<100	<100
IRON, DISSOLVED	2013-Apr														
IRON, DISSOLVED	2013-Sep	<50	2710	<50	<50	<50	<50	<50	<50	<50	<50	127	<50	<50	<50
IRON, DISSOLVED	2014-Sep	<50	3500	9870	<50	<50	179	302	78.8	<50	<50	<50	<50	176	<50
IRON, DISSOLVED	2015-Sep	<50	2460	1520	<50	<50	<50	<50	<50	<50	<50	899	<50	<50	<50
IRON, DISSOLVED	2016-Sep			<13		<13		34						<13	
IRON	2013-Sep														
IRON	2014-Sep														
IRON	2015-Sep														
IRON	2016-Sep	362	4640	3530	51.9	820	55.7	126	1080	1240	1770	1170	<12.8	140	1010
IRON	2017-Sep	475	4500	2850	11.9	18.7	357	93.1	<9.6	162	4440	128	162	135	297
IRON	2018-Sep	42.2	12600	1100	41.7	45.2	624	344	993	289	267	6270	101	82.8	195

GW Standard:
SMCL = 300

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

IRON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
IRON, DISSOLVED	1993-Sep	120	90									
IRON, DISSOLVED	1994-Feb	1570	<50									
IRON, DISSOLVED	1994-Apr	<50	80									
IRON, DISSOLVED	1994-Jul	<100	<100									
IRON, DISSOLVED	1994-Oct	<100	<100									
IRON, DISSOLVED	1995-Apr	<100	<100									
IRON, DISSOLVED	1995-Oct	<100	<100									
IRON, DISSOLVED	1996-Apr	<30	<30									
IRON, DISSOLVED	1996-Oct	32	<30									
IRON, DISSOLVED	1997-Apr	<100	<100									
IRON, DISSOLVED	1997-Oct	<100	<100									
IRON, DISSOLVED	1998-Apr	<100	<100									
IRON, DISSOLVED	1998-Oct	<100	<100									
IRON, DISSOLVED	1999-Sep	<100	<100									
IRON, DISSOLVED	2000-Sep	120	<100									
IRON, DISSOLVED	2001-Sep	<100	<100									
IRON, DISSOLVED	2002-Sep	<100	<100									
IRON, DISSOLVED	2003-Sep	200	<100									
IRON, DISSOLVED	2004-Sep	<100	<100									
IRON, DISSOLVED	2005-Sep	100	<100									
IRON, DISSOLVED	2006-Sep	<100	<100									
IRON, DISSOLVED	2007-Sep	<100	<100									
IRON, DISSOLVED	2008-Sep	<100	<100									
IRON, DISSOLVED	2009-Sep	<100	<100									
IRON, DISSOLVED	2010-Sep	<100	<100									
IRON, DISSOLVED	2011-Sep	<100	178									
IRON, DISSOLVED	2012-Sep		893	<100	<100	<100						<100
IRON, DISSOLVED	2013-Apr			<100							696	402
IRON, DISSOLVED	2013-Sep	<50	<50		<50	<50						
IRON, DISSOLVED	2014-Sep	<50	77.8	<50	<50	<50						
IRON, DISSOLVED	2015-Sep	<50	<50	<50	<50	<50						
IRON, DISSOLVED	2016-Sep											
IRON	2013-Sep			<50								143
IRON	2014-Sep							248				<50
IRON	2015-Sep							1820				<50
IRON	2016-Sep	54.6	518		471	578		46100				25400
IRON	2017-Sep	139	30.3	68.1	516	4500		3960				140000 M1
IRON	2018-Sep	23.9	34.3	23.5	295	213		819				224000

GW Standard:
SMCL = 300

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

LEAD
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
LEAD, DISSOLVED	1993-Sep						<5	<5		<5	<5
LEAD, DISSOLVED	1994-Feb	<5	<5	<5	<5	<5	<5	<5		<5	<5
LEAD, DISSOLVED	1994-Apr	<5	<5	<5	<5	<5	<5	<5		<5	<5
LEAD, DISSOLVED	1994-Jul	<5	<5	<5	<5	<5	<5	<5		<5	<5
LEAD, DISSOLVED	1994-Oct	<5	<5	<5	<5	<5	<5	<5		<5	<5
LEAD, DISSOLVED	2004-Sep	<4	<4	<4	<4	<4	<4	<4		<4	<4
LEAD, DISSOLVED	2005-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2006-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2007-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2008-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2009-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2010-Sep	<4	<4	<4	<4	<4	11.4	<4	<4	<4	<4
LEAD, DISSOLVED	2011-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2012-Sep	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
LEAD, DISSOLVED	2013-Apr										
LEAD, DISSOLVED	2013-Sep	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
LEAD, DISSOLVED	2014-Sep	<1	<1	13.8	<1	<1	<1	<1	<1	<1	<1
LEAD, DISSOLVED	2015-Sep	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
LEAD, DISSOLVED	2016-Sep			<0.19		<0.19		<0.19			
LEAD	2013-Sep										
LEAD	2014-Sep										
LEAD	2015-Sep										
LEAD	2016-Sep	0.24	<0.19	1.9	<0.19	0.42	<0.19	<0.19	1	0.71	0.98
LEAD	2017-Sep	0.36	0.18	0.08	0.056	0.053	0.25	0.12	<0.033	0.13	1.9
LEAD	2018-Sep	0.4	1.9	0.38	<0.12	0.14	<0.12	0.55	0.64	0.39	0.42

GW Standard:
MCL = 15

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

LEAD
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
LEAD, DISSOLVED	1993-Sep	<5		<5		5	<5				
LEAD, DISSOLVED	1994-Feb	<5	<5	<5	<5	<5	<5				
LEAD, DISSOLVED	1994-Apr	<5	<5	<5	<5	<5	<5				
LEAD, DISSOLVED	1994-Jul	<5	<5	<5	<5	<5	<5				
LEAD, DISSOLVED	1994-Oct	<5	<5	<5	<5	<5	<5				
LEAD, DISSOLVED	2004-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2005-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2006-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2007-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2008-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2009-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2010-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2011-Sep	<4	<4	<4	<4	<4	<4				
LEAD, DISSOLVED	2012-Sep	<4	<4	<4	<4		<4	<4	<4	<4	
LEAD, DISSOLVED	2013-Apr							<4			
LEAD, DISSOLVED	2013-Sep	<1	<1	<1	<1	<1	<1		<1	<1	
LEAD, DISSOLVED	2014-Sep	<1	<1	<1	<1	<1	<1	<1	<1	<1	
LEAD, DISSOLVED	2015-Sep	<1	<1	<1	<1	<1	<1	<1	<1	<1	
LEAD, DISSOLVED	2016-Sep			<0.19							
LEAD	2013-Sep							<1			
LEAD	2014-Sep										
LEAD	2015-Sep										
LEAD	2016-Sep	0.31	<0.19	<0.19	0.77	0.64	0.5		0.34	0.42	
LEAD	2017-Sep	0.1	0.22	0.14	0.23	0.7	0.076	0.14	0.38	4.7	
LEAD	2018-Sep	5.7	0.29	0.22	0.34	<0.12	<0.12	<0.12	0.68	0.43	

GW Standard:
MCL = 15

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

LEAD
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
LEAD, DISSOLVED	1993-Sep					
LEAD, DISSOLVED	1994-Feb					
LEAD, DISSOLVED	1994-Apr					
LEAD, DISSOLVED	1994-Jul					
LEAD, DISSOLVED	1994-Oct					
LEAD, DISSOLVED	2004-Sep					
LEAD, DISSOLVED	2005-Sep					
LEAD, DISSOLVED	2006-Sep					
LEAD, DISSOLVED	2007-Sep					
LEAD, DISSOLVED	2008-Sep					
LEAD, DISSOLVED	2009-Sep					
LEAD, DISSOLVED	2010-Sep					
LEAD, DISSOLVED	2011-Sep					
LEAD, DISSOLVED	2012-Sep					<4
LEAD, DISSOLVED	2013-Apr				23.5	<4
LEAD, DISSOLVED	2013-Sep					
LEAD, DISSOLVED	2014-Sep					
LEAD, DISSOLVED	2015-Sep					
LEAD, DISSOLVED	2016-Sep					
LEAD	2013-Sep					<1
LEAD	2014-Sep	<1				<1
LEAD	2015-Sep	1.9				<1
LEAD	2016-Sep	61.9				8.3
LEAD	2017-Sep	6.3				63.8
LEAD	2018-Sep	0.97				74.4

GW Standard:
MCL = 15

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

MAGNESIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20	MW-21
MAGNESIUM, DISSOLVED	1993-Sep						11000	26000		14000	31000	27000		27000	
MAGNESIUM, DISSOLVED	1994-Feb	18000	30000	32000	21000	25000	19000	32000		22000	29000	24000	24000	27000	27000
MAGNESIUM, DISSOLVED	1994-Apr	24000	56000	38000	36000	42000	22000	30000		36000	37000	27000	32000	39000	27000
MAGNESIUM, DISSOLVED	1994-Jul	20000	35000	36000	22000	25000	17000	30000		23000	26000	22000	23000	24000	24000
MAGNESIUM, DISSOLVED	1994-Oct	17000	32000	20000	22000	24000	15000	29000		21000	24000	22000	24000	24000	27000
MAGNESIUM, DISSOLVED	1995-Apr		36000			20000									
MAGNESIUM, DISSOLVED	1995-Oct		29000												
MAGNESIUM, DISSOLVED	1996-Apr		24000												23000
MAGNESIUM, DISSOLVED	1996-Oct		27400			27100									
MAGNESIUM, DISSOLVED	1997-Apr		28000			23000									20000
MAGNESIUM, DISSOLVED	1997-Oct		24000			26000									23000
MAGNESIUM, DISSOLVED	1998-Apr		22000			18000									16000
MAGNESIUM, DISSOLVED	1998-Oct		25000			25000									23000
MAGNESIUM, DISSOLVED	1999-Sep	14000	24000	23000	19000	24000	14000	26000		22000	26000	18000	20000	24000	23000
MAGNESIUM, DISSOLVED	2000-Sep	15000	23000	18000	20000	25000	17000	27000		21000	26000	20000	22000	23000	22000
MAGNESIUM, DISSOLVED	2001-Sep	16400	23900	14600	19900	24700	14900	23600		22700	27600	28100	20500	21700	21700
MAGNESIUM, DISSOLVED	2002-Sep	15000	22000	15000	20000	23000	17000	28000		23000	25000	31000	21000	22000	22000
MAGNESIUM, DISSOLVED	2003-Sep	15600	22000	18300	20800	23500	16700	26500		23700	26900	36200	21800	22400	22100
MAGNESIUM, DISSOLVED	2004-Sep	17000	23000	16000	20000	22000	19000	23000		22000	27000	31000	21000	23000	23000
MAGNESIUM, DISSOLVED	2005-Sep	18000	23000	13000	20000	23000	16000	27000	43000	21000	28000	27000	22000	22000	23000
MAGNESIUM, DISSOLVED	2006-Sep	17000	20500	16600	21700	21800	19900	29700	72900	12800	25800	31400	20200	22500	21800
MAGNESIUM, DISSOLVED	2007-Sep	17300	22000	14700	19800	21300	19100	22900	64200	21500	25900	29800	20500	23900	24500
MAGNESIUM, DISSOLVED	2008-Sep	17700	23700	18600	21000	25900	19900	24500	55200	22700	28300	19700	21500	26600	27400
MAGNESIUM, DISSOLVED	2009-Sep	19000	22400	17400	20300	25000	19100	25900	49200	22100	27000	24200	21700	24600	25800
MAGNESIUM, DISSOLVED	2010-Sep	17500	19300	19100	19400	23900	18500	24700	37700	15200	26600	17100	19600	25200	20300
MAGNESIUM, DISSOLVED	2011-Sep	16900	21700	19000	20100	27700	18000	23500	41000	20700	25600	23400	21100	22400	24600
MAGNESIUM, DISSOLVED	2012-Sep	16600	20800	22100	20700	24900	19700	27200	51000	22900	26300	26900	21600	21900	21700
MAGNESIUM, DISSOLVED	2013-Apr														
MAGNESIUM, DISSOLVED	2013-Sep	19500	18900	16600	19000	21900	18700	20600	43800	19900	24400	27400	20500	21200	21800
MAGNESIUM, DISSOLVED	2014-Sep	13500	17000	23200	16400	16400	18600	21100	31300	8420	21700	<50	17700	18800	16100
MAGNESIUM, DISSOLVED	2015-Sep	15100	20400	14600	19800	19800	19200	18400	36400	20200	25400	14800	19900	22600	22700
MAGNESIUM, DISSOLVED	2016-Sep			27000		20200		23700						21400	
MAGNESIUM	2013-Sep														
MAGNESIUM	2014-Sep														
MAGNESIUM	2015-Sep														
MAGNESIUM	2016-Sep	15900	18900	26500	18400	19600	16000	23400	35200	19000	25000	16600	19900	21100	20100
MAGNESIUM	2017-Sep	14900	18800	13600	19000	22400	14600	23900	42900	17900	29800	20100	20000	22200	21700
MAGNESIUM	2018-Sep	15400	19700	27300	17400	17400	16000	21200	39300	17600	21600	16400	20200	21500	18100

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
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MAGNESIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
MAGNESIUM, DISSOLVED	1993-Sep	33000	41000									
MAGNESIUM, DISSOLVED	1994-Feb	82000	57000									
MAGNESIUM, DISSOLVED	1994-Apr	64000	44000									
MAGNESIUM, DISSOLVED	1994-Jul	26000	85000									
MAGNESIUM, DISSOLVED	1994-Oct	33000	63000									
MAGNESIUM, DISSOLVED	1995-Apr	26000	44000									
MAGNESIUM, DISSOLVED	1995-Oct											
MAGNESIUM, DISSOLVED	1996-Apr	34000	33000									
MAGNESIUM, DISSOLVED	1996-Oct	35600	25900									
MAGNESIUM, DISSOLVED	1997-Apr	23000	19000									
MAGNESIUM, DISSOLVED	1997-Oct	28000	36000									
MAGNESIUM, DISSOLVED	1998-Apr	21000	7300									
MAGNESIUM, DISSOLVED	1998-Oct	33000	36000									
MAGNESIUM, DISSOLVED	1999-Sep	35000	44000									
MAGNESIUM, DISSOLVED	2000-Sep	37000	37000									
MAGNESIUM, DISSOLVED	2001-Sep	33600	42300									
MAGNESIUM, DISSOLVED	2002-Sep	32000	30000									
MAGNESIUM, DISSOLVED	2003-Sep	37900	34600									
MAGNESIUM, DISSOLVED	2004-Sep	31000	38000									
MAGNESIUM, DISSOLVED	2005-Sep	32000	36000									
MAGNESIUM, DISSOLVED	2006-Sep	29100	33400									
MAGNESIUM, DISSOLVED	2007-Sep	31100	26800									
MAGNESIUM, DISSOLVED	2008-Sep	39900	40800									
MAGNESIUM, DISSOLVED	2009-Sep	35000	20300									
MAGNESIUM, DISSOLVED	2010-Sep	25800	29100									
MAGNESIUM, DISSOLVED	2011-Sep	33800	38100									
MAGNESIUM, DISSOLVED	2012-Sep		56100	42500	20200	22900						20600
MAGNESIUM, DISSOLVED	2013-Apr			421							14500	12200
MAGNESIUM, DISSOLVED	2013-Sep	36900	25400		21800	21400						
MAGNESIUM, DISSOLVED	2014-Sep	19900	13500	34200	24100	23500						
MAGNESIUM, DISSOLVED	2015-Sep	23800	12100	39800	24600	24200						
MAGNESIUM, DISSOLVED	2016-Sep											
MAGNESIUM	2013-Sep			34500								12600
MAGNESIUM	2014-Sep							28500				16600
MAGNESIUM	2015-Sep							29400				15700
MAGNESIUM	2016-Sep	24000	13000		24700	27300		37000				15600
MAGNESIUM	2017-Sep	31200	28900	37900	18000	20600		30100				46600
MAGNESIUM	2018-Sep	22500	7320	36600	25700	23500		22500				23000

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
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MANGANESE
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
MANGANESE, DISSOLVED	1999-Sep	<10	850	215	<10	<10	<10	<10		357	54
MANGANESE, DISSOLVED	2000-Sep	<10	799	324	<10	<10	49	29		69	51
MANGANESE, DISSOLVED	2001-Sep	<10	875	<10	<10	<10	<10	<10		380	42
MANGANESE, DISSOLVED	2002-Sep	<10	826	541	<10	<10	58	34		162	43
MANGANESE, DISSOLVED	2003-Sep	<10	1160	29	<10	<10	134	22		200	90
MANGANESE, DISSOLVED	2004-Sep	15	839	1700	<10	<10	275	67		173	24
MANGANESE, DISSOLVED	2005-Sep	<10	832	809	10	14	45	32	85	73	47
MANGANESE, DISSOLVED	2006-Sep	13.2	727	952	13	10.2	113	78	155	35.7	23
MANGANESE, DISSOLVED	2007-Sep	10	696	1050	<10	<10	147	<10	120	194	20.1
MANGANESE, DISSOLVED	2008-Sep	20.9	618	1030	<10	152	417	15.4	103	68.9	25.1
MANGANESE, DISSOLVED	2009-Sep	14.8	745	502	<10	551	199	13.1	99	160	78.3
MANGANESE, DISSOLVED	2010-Sep	15.5	543	419	<10	15.8	34.5	14.5	110	17.9	21.5
MANGANESE, DISSOLVED	2011-Sep	<10	642	209	<10	<10	27.1	<10	128	335	37.5
MANGANESE, DISSOLVED	2012-Sep	<10	1320	171	<10	583	13.1	<10	93.4	279	161
MANGANESE, DISSOLVED	2013-Apr										
MANGANESE, DISSOLVED	2013-Sep	<5	858	52.3	<5	125	<5	60.5	60.9	75.9	<5
MANGANESE, DISSOLVED	2014-Sep	<5	522	946	<5	<5	55.8	10.3	68.3	<5	<5
MANGANESE, DISSOLVED	2015-Sep	<5	701	230	<5	52.5	96.3	<5	60.1	52.4	24.3
MANGANESE, DISSOLVED	2016-Sep			1		0.31		2.7			
MANGANESE	2013-Sep										
MANGANESE	2014-Sep										
MANGANESE	2015-Sep										
MANGANESE	2016-Sep	13.7	454	26.6	2.6	51.6	515	6.1	144	148	118
MANGANESE	2017-Sep	35.8	585	422	0.78 B	4.3	49.8	3.2	<0.07	14.6	407
MANGANESE	2018-Sep	5.2	602	466 M1	2.9	6.6	722	54.9	114	59.8	64.9

GW Standard:
SMCL = 50

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

MANGANESE
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
MANGANESE, DISSOLVED	1999-Sep	12	<10	<10	<10	15	478				
MANGANESE, DISSOLVED	2000-Sep	<10	<10	<10	<10	25	370				
MANGANESE, DISSOLVED	2001-Sep	86	<10	<10	<10	<10	409				
MANGANESE, DISSOLVED	2002-Sep	688	<10	<10	<10	<10	340				
MANGANESE, DISSOLVED	2003-Sep	1150	<10	<10	<10	118	497				
MANGANESE, DISSOLVED	2004-Sep	10000	<10	<10	<10	30	432				
MANGANESE, DISSOLVED	2005-Sep	2500	192	13	<10	89	433				
MANGANESE, DISSOLVED	2006-Sep	1240	10.8	11.4	<10	<10	359				
MANGANESE, DISSOLVED	2007-Sep	820	<10	<10	<10	22.8	234				
MANGANESE, DISSOLVED	2008-Sep	2100	13.7	<10	<10	<10	513				
MANGANESE, DISSOLVED	2009-Sep	2220	18.2	25.7	15.4	21.9	33.8				
MANGANESE, DISSOLVED	2010-Sep	1070	13	11.5	<10	<10	307				
MANGANESE, DISSOLVED	2011-Sep	1070	<10	<10	<10	40.7	475				
MANGANESE, DISSOLVED	2012-Sep	327	<10	<10	<10		1220	<10	118	72.3	
MANGANESE, DISSOLVED	2013-Apr							74			
MANGANESE, DISSOLVED	2013-Sep	1240	<5	<5	<5	<5	84		103	173	
MANGANESE, DISSOLVED	2014-Sep	<5	<5	<5	<5	<5	36.8	91.4	44.5	65.7	
MANGANESE, DISSOLVED	2015-Sep	379	<5	<5	<5	<5	9.9	21.6	98.3	262	
MANGANESE, DISSOLVED	2016-Sep			0.68							
MANGANESE	2013-Sep							21.6			
MANGANESE	2014-Sep										
MANGANESE	2015-Sep										
MANGANESE	2016-Sep	395	0.3	4.2	90.3	2.5	70		49	102	
MANGANESE	2017-Sep	85.3	39.1	6.3	36.1	17.2	2.2	16.1	231	706	
MANGANESE	2018-Sep	1120	40.9	15.7	53.6	2.9	2	166	114	106	

GW Standard:
SMCL = 50

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

MANGANESE
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
MANGANESE, DISSOLVED	1999-Sep					
MANGANESE, DISSOLVED	2000-Sep					
MANGANESE, DISSOLVED	2001-Sep					
MANGANESE, DISSOLVED	2002-Sep					
MANGANESE, DISSOLVED	2003-Sep					
MANGANESE, DISSOLVED	2004-Sep					
MANGANESE, DISSOLVED	2005-Sep					
MANGANESE, DISSOLVED	2006-Sep					
MANGANESE, DISSOLVED	2007-Sep					
MANGANESE, DISSOLVED	2008-Sep					
MANGANESE, DISSOLVED	2009-Sep					
MANGANESE, DISSOLVED	2010-Sep					
MANGANESE, DISSOLVED	2011-Sep					
MANGANESE, DISSOLVED	2012-Sep					<10
MANGANESE, DISSOLVED	2013-Apr				123	18.5
MANGANESE, DISSOLVED	2013-Sep					
MANGANESE, DISSOLVED	2014-Sep					
MANGANESE, DISSOLVED	2015-Sep					
MANGANESE, DISSOLVED	2016-Sep					
MANGANESE	2013-Sep					<5
MANGANESE	2014-Sep	1420				<5
MANGANESE	2015-Sep	1840				<5
MANGANESE	2016-Sep	8480				382
MANGANESE	2017-Sep	1180				17000 M1
MANGANESE	2018-Sep	1050 M1				4330

GW Standard:
SMCL = 50

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

SELENIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20	MW-21
SELENIUM, DISSOLVED	1993-Sep						<5	<5		<5	<5	<5		18	
SELENIUM, DISSOLVED	1994-Feb	<5	<5	<5	7	<5	<5	<5		<5	<5	<5	<5	28	18
SELENIUM, DISSOLVED	1994-Apr	15	<5	15	<5	<5	<5	<5		<5	<5	<5	<5	53	25
SELENIUM, DISSOLVED	1994-Jul	5	<5	5.4	<5	<5	<5	<5		<5	<5	<5	<5	23.4	7.2
SELENIUM, DISSOLVED	1994-Oct	5.4	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	21.7	20.1
SELENIUM, DISSOLVED	1995-Apr	<5		<5										13.9	<5
SELENIUM, DISSOLVED	1995-Oct	<5		10.7	<5									26.7	8.6
SELENIUM, DISSOLVED	1996-Apr	<5		7	<5									11	6
SELENIUM, DISSOLVED	1996-Oct	6		9	<5									21	14
SELENIUM, DISSOLVED	1997-Apr													17.5	<5
SELENIUM, DISSOLVED	1997-Oct			12.3										27	<5
SELENIUM, DISSOLVED	1998-Apr			20.5										11.4	<5
SELENIUM, DISSOLVED	1998-Oct			<5										23	8.6
SELENIUM, DISSOLVED	1999-Sep	<5		9.3										37.6	10
SELENIUM, DISSOLVED	2000-Sep	<5	<5	7.7	<5	<5	<5	<5		<5	<5	<5	<5	14.8	5
SELENIUM, DISSOLVED	2001-Sep	<5	<5	6.9	<5	<5	<5	<5		<5	<5	<5	<5	22.5	<5
SELENIUM, DISSOLVED	2002-Sep	<5	<5	6	<5	<5	<5	<5		<5	<5	<5	<5	13.2	<5
SELENIUM, DISSOLVED	2003-Sep	5.3	<5	5.4	<5	<5	<5	<5		<5	<5	<5	<5	16.3	<5
SELENIUM, DISSOLVED	2004-Sep	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	15.8	<5
SELENIUM, DISSOLVED	2005-Sep	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	15.7	<5
SELENIUM, DISSOLVED	2006-Sep	6.5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	14.1	<5
SELENIUM, DISSOLVED	2007-Sep	5.29	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	15	5.66
SELENIUM, DISSOLVED	2008-Sep	7.24	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	36.4	10.8
SELENIUM, DISSOLVED	2009-Sep	5.37	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	18.4	5.47
SELENIUM, DISSOLVED	2010-Sep	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	23.3	<5
SELENIUM, DISSOLVED	2011-Sep	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	38.1	8.95
SELENIUM, DISSOLVED	2012-Sep	<5	<5	23.8	12.9	<5	<5	<5	<5	<5	<5	<5	<5	27.9	<5
SELENIUM, DISSOLVED	2013-Apr														
SELENIUM, DISSOLVED	2013-Sep	7.5	<1	30.9	1.8	1.1	<1	<1	2.2	<1	2.3	<1	2.5	40	7
SELENIUM, DISSOLVED	2014-Sep	4.8	<1	28.6	<1	<1	<1	<1	2.2	<1	4.2	<1	3.2	14	3.4
SELENIUM, DISSOLVED	2015-Sep	4.8	<1	<1	<1	<1	<1	<1	1.7	<1	<1	<1	1.5	36.4	6.6
SELENIUM, DISSOLVED	2016-Sep			3		0.21		0.54						19	
SELENIUM	2013-Sep														
SELENIUM	2014-Sep														
SELENIUM	2015-Sep														
SELENIUM	2016-Sep	5.8	0.27	6.8	0.8	0.41	<0.18	0.68	1.5	1.1	1.7	0.52	1.9	19.9	7.1
SELENIUM	2017-Sep	5.6	0.17	0.69	1.4	1	<0.086	0.66	<0.086	1	0.63	0.094	1.6	33.7	6.6
SELENIUM	2018-Sep	5.6	1.4	2.3	1.2	0.34	<0.16	0.71	0.22	1.3	4	0.87	3.8	13.5	3.4

GW Standard:
MCL = 50

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

SELENIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
SELENIUM, DISSOLVED	1993-Sep	<5	<5									
SELENIUM, DISSOLVED	1994-Feb	<5	10									
SELENIUM, DISSOLVED	1994-Apr	26	53									
SELENIUM, DISSOLVED	1994-Jul	9.5	<5									
SELENIUM, DISSOLVED	1994-Oct	16.1	<5									
SELENIUM, DISSOLVED	1995-Apr	<5	<5									
SELENIUM, DISSOLVED	1995-Oct	13.4	<5									
SELENIUM, DISSOLVED	1996-Apr	21	<5									
SELENIUM, DISSOLVED	1996-Oct	8	<5									
SELENIUM, DISSOLVED	1997-Apr	6.7										
SELENIUM, DISSOLVED	1997-Oct	17.5										
SELENIUM, DISSOLVED	1998-Apr	<5										
SELENIUM, DISSOLVED	1998-Oct											
SELENIUM, DISSOLVED	1999-Sep	17.3	<5									
SELENIUM, DISSOLVED	2000-Sep	15.3	<5									
SELENIUM, DISSOLVED	2001-Sep	13.4	<5									
SELENIUM, DISSOLVED	2002-Sep	16.9	<5									
SELENIUM, DISSOLVED	2003-Sep	12.1	<5									
SELENIUM, DISSOLVED	2004-Sep	7.2	<5									
SELENIUM, DISSOLVED	2005-Sep	5.8	<5									
SELENIUM, DISSOLVED	2006-Sep	14.9	<5									
SELENIUM, DISSOLVED	2007-Sep	5.98	<5									
SELENIUM, DISSOLVED	2008-Sep	10.6	<5									
SELENIUM, DISSOLVED	2009-Sep	6.65	<5									
SELENIUM, DISSOLVED	2010-Sep	<5	<5									
SELENIUM, DISSOLVED	2011-Sep	11.8	<5									
SELENIUM, DISSOLVED	2012-Sep		<5	<5	<5	<5						11.4
SELENIUM, DISSOLVED	2013-Apr			<5							<5	<5
SELENIUM, DISSOLVED	2013-Sep	12.4	2.1		1.5	1.4						
SELENIUM, DISSOLVED	2014-Sep	4.2	1.4	<1	1.3	2						
SELENIUM, DISSOLVED	2015-Sep	7.5	<1	<1	1.7	1.4						
SELENIUM, DISSOLVED	2016-Sep											
SELENIUM	2013-Sep			1								8.3
SELENIUM	2014-Sep							<1				12.8
SELENIUM	2015-Sep							<1				6.3
SELENIUM	2016-Sep	8.2	0.36		0.83	1.2		4.8				7.6
SELENIUM	2017-Sep	9.2	6.1	0.21	1.4	1.4		0.54				13.2
SELENIUM	2018-Sep	3.6	0.47	1.3	1	1.3		1.3				28

GW Standard:
MCL = 50

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

ZINC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
ZINC, DISSOLVED	1993-Sep						<50	<50		<50	<50
ZINC, DISSOLVED	1994-Feb	<50	<50	<50	<50	<50	<50	<50		<50	<50
ZINC, DISSOLVED	1994-Apr	<50	<50	<50	<50	<50	<50	<50		<50	<50
ZINC, DISSOLVED	1994-Jul	<20	<20	<20	<20	<20	<20	<20		<20	<72
ZINC, DISSOLVED	1994-Oct	<20	<20	<20	<20	<20	<20	<20		<20	<20
ZINC, DISSOLVED	2004-Sep	<20	<20	<20	<20	<20	<20	<20		<20	<20
ZINC, DISSOLVED	2005-Sep	<20	23	<20	<20	20	<20	<20	<20	<20	<20
ZINC, DISSOLVED	2006-Sep	25.9	35.6	20.4	28.6	31.5	24.4	20.4	21	43.8	49.7
ZINC, DISSOLVED	2007-Sep	38.4	48.3	<20	29.1	29.2	42.9	25.2	46.9	38.3	32.8
ZINC, DISSOLVED	2008-Sep	22.6	25.8	<20	21.2	21.2	23.6	<20	27.2	27.7	22.8
ZINC, DISSOLVED	2009-Sep	44.2	53.4	23.8	35.4	42.1	37	28.9	36.8	45.4	37.1
ZINC, DISSOLVED	2010-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
ZINC, DISSOLVED	2011-Sep	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
ZINC, DISSOLVED	2012-Sep	<20	<20	<20	<20	20.7	<20	<20	<20	<20	<20
ZINC, DISSOLVED	2013-Apr										
ZINC, DISSOLVED	2013-Sep	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
ZINC, DISSOLVED	2014-Sep	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
ZINC, DISSOLVED	2015-Sep	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
ZINC, DISSOLVED	2016-Sep			1.5		1.6		1.5			
ZINC	2013-Sep										
ZINC	2014-Sep										
ZINC	2015-Sep										
ZINC	2016-Sep	2.7 B	1.5 B	10.3	3.5 B	3 B	1.6 B	1.8 B	8.8 B	8.4 B	6.9 B
ZINC	2017-Sep	8.1	2.4 B	2.4 B	2.6 B	4.9 B	3.7 B	2.1 B	<0.53	2.7 B	14.5
ZINC	2018-Sep	<3.7	5.9	<3.7	<3.7	4.4	4.7	5.4	9.6	4.8	7.2

GW Standard:
SMCL = 5000

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

ZINC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
ZINC, DISSOLVED	1993-Sep	<50		<50		<50	<50				
ZINC, DISSOLVED	1994-Feb	<50	<50	<50	<50	<50	<50				
ZINC, DISSOLVED	1994-Apr	<50	<50	<50	<50	<50	<50				
ZINC, DISSOLVED	1994-Jul	<20	<20	<20	<20	<20	<20				
ZINC, DISSOLVED	1994-Oct	<20	<20	<20	<20	<20	<20				
ZINC, DISSOLVED	2004-Sep	<20	<20	<20	<20	<20	<20				
ZINC, DISSOLVED	2005-Sep	22	22	<20	<20	<20	27				
ZINC, DISSOLVED	2006-Sep	36.5	26.4	31	24.1	24.4	37.9				
ZINC, DISSOLVED	2007-Sep	59.6	25.9	32	34.5	43.7	63				
ZINC, DISSOLVED	2008-Sep	32.5	20.8	<20	24.5	31.6	52.7				
ZINC, DISSOLVED	2009-Sep	65.1	34.2	48.6	44.1	43.7	46.3				
ZINC, DISSOLVED	2010-Sep	<20	<20	<20	<20	<20	<20				
ZINC, DISSOLVED	2011-Sep	<20	<20	<20	<20	<20	<20				
ZINC, DISSOLVED	2012-Sep	<20	<20	<20	<20		<20	<20	<20	<20	
ZINC, DISSOLVED	2013-Apr							79.1			
ZINC, DISSOLVED	2013-Sep	<50	<50	<50	<50	<50	<50		<50	<50	
ZINC, DISSOLVED	2014-Sep	<50	<50	<50	<50	<50	<50	<50	<50	<50	
ZINC, DISSOLVED	2015-Sep	<50	<50	<50	<50	<50	<50	<50	<50	<50	
ZINC, DISSOLVED	2016-Sep			4.7							
ZINC	2013-Sep							<50			
ZINC	2014-Sep										
ZINC	2015-Sep										
ZINC	2016-Sep	22.3	1.3 B	39.2	5.6 B	23.5	4.9 B		3.2	4.1	
ZINC	2017-Sep	1.4 B	2.6 B	4.9 B	3.7 B	11.4	4.5 B	2.1 B,M1,R1	2.7 B	22.4	
ZINC	2018-Sep	16.5	3.7	4.3	4.2	<3.7	6.1	<3.7	7.6	4.7	

GW Standard:
SMCL = 5000

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

ZINC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
ZINC, DISSOLVED	1993-Sep					
ZINC, DISSOLVED	1994-Feb					
ZINC, DISSOLVED	1994-Apr					
ZINC, DISSOLVED	1994-Jul					
ZINC, DISSOLVED	1994-Oct					
ZINC, DISSOLVED	2004-Sep					
ZINC, DISSOLVED	2005-Sep					
ZINC, DISSOLVED	2006-Sep					
ZINC, DISSOLVED	2007-Sep					
ZINC, DISSOLVED	2008-Sep					
ZINC, DISSOLVED	2009-Sep					
ZINC, DISSOLVED	2010-Sep					
ZINC, DISSOLVED	2011-Sep					
ZINC, DISSOLVED	2012-Sep					<20
ZINC, DISSOLVED	2013-Apr				123	<20
ZINC, DISSOLVED	2013-Sep					
ZINC, DISSOLVED	2014-Sep					
ZINC, DISSOLVED	2015-Sep					
ZINC, DISSOLVED	2016-Sep					
ZINC	2013-Sep					<50
ZINC	2014-Sep	<50				<50
ZINC	2015-Sep	<50				<50
ZINC	2016-Sep	291				55.1
ZINC	2017-Sep	35.2				517
ZINC	2018-Sep	10.9				398

GW Standard:
SMCL = 5000

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

CHLORIDE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19	MW-20
CHLORIDE	1993-Sep						54	92		14	87	37		53
CHLORIDE	1994-Feb	15	2	25	17	54	7	11		2	2	3	11	33
CHLORIDE	1994-Apr	15	21	4	25	52	3	13		36	3	3	13	40
CHLORIDE	1994-Jul	13	18	5.4	23	47	<5	12		<5	<5	<5	16	33
CHLORIDE	1994-Oct	13	17	<5	19	46	<5	12		<5	<5	5	12	29
CHLORIDE	1995-Apr	14	12	<5	26	46	<5	11		<5	<5	5.6	28	36
CHLORIDE	1995-Oct	14	20	<5	15	54	<5	10		<5	<5	<5	11	31
CHLORIDE	1996-Apr	15	11	3.6	19	56	3	10		4.9	4.8	7.1	10	32
CHLORIDE	1996-Oct	28	26	10	33	54	10	18		13	10	15	20	36
CHLORIDE	1997-Apr	15	9.4	<5	<5	47	<5	7.8		<5	<5	<5	18	37
CHLORIDE	1997-Oct	15	16	<5	25	48	<5	9.4		<5	<5	6.4	13	31
CHLORIDE	1998-Apr	12	22	5.1	33	46	<5	9.4		<5	5	6	31	38
CHLORIDE	1998-Oct	13	20	<5	26	52	<5	11		<5	<5	5.1	14	37
CHLORIDE	1999-Sep	14	21	<5	25	46	<5	12		<5	<5	5.5	14	31
CHLORIDE	2000-Sep	13.8	14.9	<5	19.6	19.5	<5	12		<5	<5	9	13.2	24.4
CHLORIDE	2001-Sep	13.3	16.3	<5	18.4	18.3	<5	13.8		5.9	5.9	15.3	14.5	20.5
CHLORIDE	2002-Sep	14.8	15.9	<5	21.9	11.9	<5	12.8		<5	<5	13.6	13.7	20.1
CHLORIDE	2003-Sep	16	14	<5	23.5	14.5	<5	14.8		<5	<5	14.5	15.2	19.8
CHLORIDE	2004-Sep	20.1	17.4	<5	19.4	27.1	<5	18.9		<5	<5	22	14.8	26.1
CHLORIDE	2005-Sep	22.9	15.3	<5	19.1	18.5	<5	18.7	35.6	<5	<5	13.6	15.3	22
CHLORIDE	2006-Sep	26.1	10.8	<5	22.1	14.6	<5	20.5	26.7	<5	<5	16.5	16.7	21.8
CHLORIDE	2007-Sep	26.3	15	<5	20.3	40.6	<5	16.4	21.1	<5	<5	16.4	17.1	33.6
CHLORIDE	2008-Sep	23	16.5	<5	21.5	51.9	<5	7.31	16.9	<5	<5	9.03	15.7	33.8
CHLORIDE	2009-Sep	21.9	15.6	<5	20	43.4	<5	8.21	18.8	<5	<5	11.1	15.2	33.4
CHLORIDE	2010-Sep	12.8	15.2	1.2	23.6	44.5	1.25	2.76	19.8	<1	<2	4.09	16.9	31
CHLORIDE	2011-Sep	11	15.5	<2	17.8	30	<2	3.81	20.7	<2	<2	7.37	13.1	26.1
CHLORIDE	2012-Sep	11.9	15.3	<5	15.9	33	<5	<5	19.4	<5	<5	7.91	13.1	17.2
CHLORIDE	2013-Apr													
CHLORIDE	2013-Sep	14.3	11.7	2	17.3	19.7	29.9	3.1	22.2	1.4	1.6	7.2	14.2	19.3
CHLORIDE	2014-Sep	8.1	12.4	5.7	28.5	41.3	46	2.5	23.3	<1	<1	1.8	26.1	33.3
CHLORIDE	2015-Sep	11.6	13.4	1.3	15.9	26.1	18.9	1.3	14.7	1.1	<1	4.3	15.3	25.3
CHLORIDE	2016-Sep	11.8	10	8.8	21.5	30.1	2.6	1.9	18.6	2.8	1.3	3.2	17.9	24.3
CHLORIDE	2017-Sep	11.8	14.6	3	14.8	19.8	4	2.4	14.2	4	1.7	4.2	13.8	19.8
CHLORIDE	2018-Sep	9.5	10.3	11.8	18.6	27.4	3	1.5	21.5	3.2	2.2	1.8	19.9	24

GW Standard:
SMCL = 250

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

CHLORIDE
UNITS: MG/L

CHEMICAL PARAMETER	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
CHLORIDE		62	23									
CHLORIDE	32	3	38									
CHLORIDE	39	43	38									
CHLORIDE	33	38	<5									
CHLORIDE	32	36	<5									
CHLORIDE	37	40	<5									
CHLORIDE	26	37	<5									
CHLORIDE	32	37	4.2									
CHLORIDE	38	51	13									
CHLORIDE	41	43	<5									
CHLORIDE	22	41	5.3									
CHLORIDE	31	40	<5									
CHLORIDE	30	39	<5									
CHLORIDE	27	35	<5									
CHLORIDE	22.2	34.1	<5									
CHLORIDE	18.8	30.6	5.5									
CHLORIDE	13.8	31.9	<5									
CHLORIDE	16.8	30.9	<5									
CHLORIDE	23	35.5	<5									
CHLORIDE	19.6	33.9	<5									
CHLORIDE	17.3	28.6	<5									
CHLORIDE	29	35.8	<5									
CHLORIDE	26.4	30.8	<5									
CHLORIDE	27.9	34.8	<5									
CHLORIDE	18.6	32.7	<2									
CHLORIDE	20.9	30.5	<5									
CHLORIDE	14.1		<5	<5	12.8	13.8						<5
CHLORIDE				<5							<100	<5
CHLORIDE	16.7	29.1	1.1	1.3	13.1	15.2						<1
CHLORIDE	18.3	34.9	<1	<1	19.7	20.1		1.6				<1
CHLORIDE	19.7	28.8	1.1	3.9	17.8	18		2.3			6.6	1.2
CHLORIDE	17.7	26	6		16.5	16.7		2.4				1.2
CHLORIDE	16.5	26.4	3.1	3.4	18.2	17		3.3				11.7
CHLORIDE	13	25.6	4.5	3.1	16.6	16		1.9				9.9

GW Standard:
SMCL = 250

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

SULFATE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14
SULFATE	1999-Sep	68	160	65	31	25	30	43		56	64
SULFATE	2000-Sep	78	120	43	36	33	35	28		110	48
SULFATE	2001-Sep	70	100	37	29	23	38	14		76	56
SULFATE	2002-Sep	78	47	62	30	21	36	19		110	60
SULFATE	2003-Sep	77	90	70	32	27	35	17		100	32
SULFATE	2004-Sep	84	110	57	34	29	39	31		100	64
SULFATE	2005-Sep	90	100	36	32	28	44	17	130	120	80
SULFATE	2006-Sep	79	52	63.6	29.9	22.4	42.7	14.7	372	60.5	81.2
SULFATE	2007-Sep	107	118	47.4	35	23.5	28.7	13.8	370	106	86.9
SULFATE	2008-Sep	81.8	109	41.7	25.4	10.9	35.2	8.48	219	86.5	60
SULFATE	2009-Sep	91.5	108	32.7	27.1	10.5	35.6	10.1	197	80.2	56.5
SULFATE	2010-Sep	84.5	80.3	32.2	17.1	5.7	25.6	7.17	121	69.2	54.5
SULFATE	2011-Sep	83.2	100	30.9	25.2	14.3	26	9.16	163	70.5	51.8
SULFATE	2012-Sep	88.3	90.1	78.2	30.8	22.5	27.5	11.6	220	72.6	54.2
SULFATE	2013-Apr										
SULFATE	2013-Sep	94.5	73.1	50	27.7	26.5	19.7	11.1	158	69.3	50
SULFATE	2014-Sep	63.4	82.1	27.6	18.8	14	24.1	10.5	110	33.6	38.7
SULFATE	2015-Sep	74.5	96.7	18.8	21.1	11.1	27.2	6.2	116	68.9	49
SULFATE	2016-Sep	80.5 M1	69.8	31.3	14.1	9.9	6.3	7.8	99	59.7	40
SULFATE	2017-Sep	80	88.7	20.9	23.7	21.3	12	8.4	116	67.6	45.1
SULFATE	2018-Sep	74.5	63.6	29.2	18.6	13.6	9.1	7.8	127	51.6	30.7

GW Standard:
SMCL = 250

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

SULFATE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
SULFATE	1999-Sep	40	33	240	110	180	360				
SULFATE	2000-Sep	28	25	140	76	170	400				
SULFATE	2001-Sep	55	30	150	59	130	410				
SULFATE	2002-Sep	92	33	100	81	120	100				
SULFATE	2003-Sep	180	34	110	44	140	390				
SULFATE	2004-Sep	100	16	160	85	130	410				
SULFATE	2005-Sep	90	34	160	79	140	360				
SULFATE	2006-Sep	107	32.8	101	45.8	113	318				
SULFATE	2007-Sep	67.1	36	149	153	120	324				
SULFATE	2008-Sep	30.6	26.5	333	199	196	446				
SULFATE	2009-Sep	42.4	25.5	241	169	175	95.7				
SULFATE	2010-Sep	16.4	22.7	285	89.8	125	153				
SULFATE	2011-Sep	29.8	23.2	241	127	160	462				
SULFATE	2012-Sep	104	30	169	43.8		774	275	21.5	29.4	
SULFATE	2013-Apr							357			
SULFATE	2013-Sep	91	26.9	223	77.5	159	189	183	24.5	26	
SULFATE	2014-Sep	22.6	32	118	53.4	80	73.4	188	15.2	24.7	
SULFATE	2015-Sep	19.6	21.6	209	118	107	29.8	254	16.6	20.8	
SULFATE	2016-Sep	19.8	21.1	132	86.9	123	31.8		11.2	16.1	
SULFATE	2017-Sep	48.4	20.4	209	92.2	117	157	222	34.4	29	
SULFATE	2018-Sep	24.3	32.2	123	55.2	77.4	13.5	218	10.9	12	

GW Standard:
SMCL = 250

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

SULFATE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
SULFATE	1999-Sep					
SULFATE	2000-Sep					
SULFATE	2001-Sep					
SULFATE	2002-Sep					
SULFATE	2003-Sep					
SULFATE	2004-Sep					
SULFATE	2005-Sep					
SULFATE	2006-Sep					
SULFATE	2007-Sep					
SULFATE	2008-Sep					
SULFATE	2009-Sep					
SULFATE	2010-Sep					
SULFATE	2011-Sep					
SULFATE	2012-Sep					277
SULFATE	2013-Apr				153	105
SULFATE	2013-Sep					131
SULFATE	2014-Sep	72.9				210
SULFATE	2015-Sep	58			74.9	196
SULFATE	2016-Sep	73.3				168
SULFATE	2017-Sep	80.5				178
SULFATE	2018-Sep	50.3				202

GW Standard:
SMCL = 250

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

PH, FIELD
UNITS: SU

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19
PH, FIELD	1993-Sep						7.25	7.49		6.72	7.2	7.16	
PH, FIELD	1994-Feb	7.74	7.14	6.95	6.51	7.47	7.23	7.58		7.49	7.69	7.3	7.15
PH, FIELD	1994-Apr	7.19	6.9	6.46	7.28	7.02	7.05	7.15		6.94	7.34	7.3	7.32
PH, FIELD	1994-Jul	7.2	6.93	6.88	7.11	6.98	6.86	7.24		6.82	7.29	7.06	7.07
PH, FIELD	1994-Oct	7.31	6.9	6.96	7.36	7.27	6.9	7.12		7.11	7.34	7.3	7.12
PH, FIELD	1995-Apr	7.23	6.88	6.44	7.08	7.34	7.11	7.23		6.77	7.12	7.51	7.13
PH, FIELD	1995-Oct	7.49	7.41	7.95	7.19	7.98	6.84	7.07		7.36	6.99	6.68	7.16
PH, FIELD	1996-Apr	7.9	7.7	7.2	7.7	8.4	8.2	7.9		7.7	8.5	7.9	7.9
PH, FIELD	1996-Oct	7.3	7.1	6.9	7.6	7.4	7.1	7.4		7.2	7.5	7.4	7.6
PH, FIELD	1997-Apr	7.5	7.1	6.4	7.4	7.4	7.2	7.3		7.5	7.3	7.4	7.4
PH, FIELD	1997-Oct	7.8	7.5	7	7.7	7.8	7.7	7.7		7.2	7.6	7.7	7.8
PH, FIELD	1998-Apr	7.22	7.06	6.14	6.85	7.17	7.12	7.07		6.27	6.97	7.04	7.11
PH, FIELD	1998-Oct	6.9	6.7	6.34	7	7	7.2	6.8		6.3	7	6.1	7.1
PH, FIELD	1999-Sep	6.7	6.6	5.6	6.5	6.5	6.6	6.6		6.9	6.9	5.8	6.8
PH, FIELD	2000-Sep	6.8	6.6	6.32	7.21	7.02	6.98	7.25		7.12	7.28	6.9	6.96
PH, FIELD	2001-Sep	6.9	6.86	6.7	7.4	7.13	7.2	7.3		6.45	7.33	6.82	9.4
PH, FIELD	2002-Sep	6.86	6.98	6.54	7.06	6.98	7.18	7.06		6.75	6.96	6.64	6.84
PH, FIELD	2003-Sep	7.45	7.13	6.33	6.88	7.06	7.13	7.16		7.04	7.15	7.27	6.42
PH, FIELD	2004-Sep	7.36	6.88	6.71	7.31	7.17	7.21	7.2		7.05	7.22	6.79	7.08
PH, FIELD	2005-Sep	7.3	6.46	5.71	6.47	6.59	6.67	6.83	6.68	6.73	6.91	6.77	6.58
PH, FIELD	2006-Sep	7.2	6.69	6.11	7.05	7.1	7.25	7.04	7.34	6.64	7.01	6.76	6.42
PH, FIELD	2007-Sep	7.13	6.88	5.76	6.82	6.9	7.22	7.21	7.32	6.96	6.95	6.83	6.53
PH, FIELD	2008-Sep	7.1	6.86	6.43	6.85	6.94	7.1	7.01	7.19	7.01	7.12	7.19	6.67
PH, FIELD	2009-Sep	7.41	6.18	6.89	7.35	7.16	7.45	7.16	7.2	7.18	7.35	6.94	7.18
PH, FIELD	2010-Sep	7.29	7.11	6.92	7.34	7.16	7.3	7.34	7.15	7.09	7.25	6.94	7.38
PH, FIELD	2011-Sep	7.82	7.5	7.68	7.58	7.03	7.5	7.24	6.89	7.58	7.7	6.7	7.55
PH, FIELD	2012-Sep	7.4	7.07	7.14	7.23	5.67	7.27	7.19	8.65	7.02	7.24	6.74	7.62
PH, FIELD	2013-Sep	7.36	7	6.57	7.3	7.15	7.08	7.25	7.29	7.13	7.23	6.87	7.1
PH, FIELD	2014-Sep	6.96	7.12	7.27	7.47	7.26	7.19	7.27	7.29	6.72	7.31	7.36	7.68
PH, FIELD	2015-Sep	6.81	6.67	7.24	6.79	6.76	6.71	6.57	7.51	7.26	7.27	7.23	7.23
PH, FIELD	2016-Sep	7.51	7.48	7.39	8.33	8.32	7.09	7.57	7.96	7.5	7.66	7.54	7.8
PH, FIELD	2017-Sep	7.5	6.86	6.35	7.12	7.29	8.12	7.05	6.64	7.08	7.39	5.55	7.34
PH, FIELD	2018-Sep	7.12	7.06	7.03	7.25	7.17	6.87	7.33	7.29	7.03	7.25	7.19	7.24

GW Standard:
SMCL = 8.5

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

PH, FIELD
UNITS: SU

CHEMICAL PARAMETER	EVENT	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
PH, FIELD	1993-Sep	7.15		8.29	7.47				
PH, FIELD	1994-Feb	7.46	6.7	6.97	5.44				
PH, FIELD	1994-Apr	7.39	7.29	7.44	7.54				
PH, FIELD	1994-Jul	7.28	7.1	7.23	7.04				
PH, FIELD	1994-Oct	7.33	7.42	7.75	7.04				
PH, FIELD	1995-Apr	7.45	7.27	7.18	6.73				
PH, FIELD	1995-Oct	7.07	7.13	6.54	8.15				
PH, FIELD	1996-Apr	7.9	7.9	7.8	7.7				
PH, FIELD	1996-Oct	7.8	7.3	7.6	7.4				
PH, FIELD	1997-Apr	7.4	7.3	7.4	7.2				
PH, FIELD	1997-Oct	7.8	7.7	8	7.4				
PH, FIELD	1998-Apr	7.06	6.98	7.02	6.62				
PH, FIELD	1998-Oct	6.5	6.7	6.6	6.6				
PH, FIELD	1999-Sep	7	6.7	7	6.6				
PH, FIELD	2000-Sep	7.15	6.7	7.38	6.99				
PH, FIELD	2001-Sep	6.72	7.25	7.19	6.92				
PH, FIELD	2002-Sep	6.83	7.2	7.33	7.19				
PH, FIELD	2003-Sep	7.4	7.28	7.3	7.26				
PH, FIELD	2004-Sep	7.26	7.22	7.24	6.98				
PH, FIELD	2005-Sep	7.03	7.27	7.05	6.84				
PH, FIELD	2006-Sep	7.1	6.89	7.39	7.07				
PH, FIELD	2007-Sep	7.36	7.12	7.35	7.33				
PH, FIELD	2008-Sep	7.18	7.07	7.28	7.07				
PH, FIELD	2009-Sep	7.24	6.12	7.09	7.3				
PH, FIELD	2010-Sep	7.23	7.15	7.15	7.3				
PH, FIELD	2011-Sep	7.45	7.48	7.26	7.17				
PH, FIELD	2012-Sep	7.18	7.29		7.15	7.62	7.66	7.97	
PH, FIELD	2013-Sep	7.35	7.21	7.33	7.12	7.1	7.62	7.86	
PH, FIELD	2014-Sep	7.17	7.45	6.95	6.26	7.27	7.96	7.95	
PH, FIELD	2015-Sep	7.23	6.93	7.17	7.29	6.7	7.85	7.14	
PH, FIELD	2016-Sep	8.2	7.52	7.66	8.02		8.67	8.53	
PH, FIELD	2017-Sep	7.07	7.46		6.88	9.01	8.12	8.13	
PH, FIELD	2018-Sep	7.26	7.05	7.75	6.7	7.01	7.69	7.9	

GW Standard:
SMCL = 8.5

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

PH, FIELD
UNITS: SU

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
PH, FIELD	1993-Sep					
PH, FIELD	1994-Feb					
PH, FIELD	1994-Apr					
PH, FIELD	1994-Jul					
PH, FIELD	1994-Oct					
PH, FIELD	1995-Apr					
PH, FIELD	1995-Oct					
PH, FIELD	1996-Apr					
PH, FIELD	1996-Oct					
PH, FIELD	1997-Apr					
PH, FIELD	1997-Oct					
PH, FIELD	1998-Apr					
PH, FIELD	1998-Oct					
PH, FIELD	1999-Sep					
PH, FIELD	2000-Sep					
PH, FIELD	2001-Sep					
PH, FIELD	2002-Sep					
PH, FIELD	2003-Sep					
PH, FIELD	2004-Sep					
PH, FIELD	2005-Sep					
PH, FIELD	2006-Sep					
PH, FIELD	2007-Sep					
PH, FIELD	2008-Sep					
PH, FIELD	2009-Sep					
PH, FIELD	2010-Sep					
PH, FIELD	2011-Sep					
PH, FIELD	2012-Sep					7.78
PH, FIELD	2013-Sep					7.83
PH, FIELD	2014-Sep	7.23				8.29
PH, FIELD	2015-Sep	7.16				7.02
PH, FIELD	2016-Sep	8.19				8.66
PH, FIELD	2017-Sep	9.06				7.98
PH, FIELD	2018-Sep	7.39			8.32	8

GW Standard:
SMCL = 8.5

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

TEMPERATURE
UNITS: DEG C

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19
TEMPERATURE	1993-Sep						16.3	14.1		16.1	15.6	12.8	
TEMPERATURE	1994-Feb	10.1	10.1	10.1	11.6	9	8.6	9.8		11.1	10.2	9.5	10.6
TEMPERATURE	1994-Apr	9.8	9	9.4	13.2	13	11.7	13.3		11.3	13.7	14.3	10
TEMPERATURE	1994-Jul	14	13.6	13.9	14.8	17.3	13.8	16		17.9	15.2	15.8	14.8
TEMPERATURE	1994-Oct	16.3	16.8	15.5	14.2	15.5	16.5	15.1		15.2	15.6	16.5	13.8
TEMPERATURE	1995-Apr	24.4	23.9	23.5	24.1	20	20.8	22.7		23.9	22.3	22	22.9
TEMPERATURE	1995-Oct	12.5	11.4	12.1	9.8	12.2	9.6	9.4		11.7	10.5	10.6	11.3
TEMPERATURE	1996-Apr	8.6	7	8	9.5	11.5	6.5	11		7.5	8	10.5	9.8
TEMPERATURE	1996-Oct	10.6	11.7	11.1	8.9	11.7	12.2	11.7		11.1	10.6	12.2	9.4
TEMPERATURE	1997-Apr	7	6	6	6	5	5	6		11	7	9	7
TEMPERATURE	1997-Oct	11	12	11	10	16	13	11		13	12	12	10
TEMPERATURE	1998-Apr	10	12.5	9	12.5	10	10	10.5		10.5	11	13.5	10
TEMPERATURE	1998-Oct	14	14.5	14	12	16	15.5	13		13.9	13	11.4	13.5
TEMPERATURE	1999-Sep	15	14.2	15.6	13	13.3	15.3	14		15	18.6	10.6	12.7
TEMPERATURE	2000-Sep	19.2	20.7	12.4	11.8	13.7	17.6	12.1		15.5	14.4	13.1	11
TEMPERATURE	2001-Sep	15.9	18.5	15.1	14.1	15.6	14.2	14.9		16.1	13.5	13	14.1
TEMPERATURE	2002-Sep	14.2	14.4	15.3	13.1	14.5	13.6	14.9		15.9	14.5	13.6	13.7
TEMPERATURE	2003-Sep	13.9	16	14.5	11.8	15.9	14.3	13.1		15.8	13.2	12.7	11.7
TEMPERATURE	2004-Sep	13.6	11.9	11.9	11.2	13.3	13.8	12.6		13.5	12.3	12.3	11.1
TEMPERATURE	2005-Sep	15.6	14.6	13	10.8	12.4	14	12.6	12.7	14	13.3	12.3	11.7
TEMPERATURE	2006-Sep	17.2	13.5	12.2	12.3	14.7	15.7	13.7	15.2	16	14.7	12.8	11.6
TEMPERATURE	2007-Sep	14.4	13.6	12.6	10.9	14.3	15.8	13.8	15.3	15	12.7	14	11.4
TEMPERATURE	2008-Sep	12.4	14.2	11.7	10.6	13.7	13.7	12.1	11.1	17.7	16.1	12.1	11.3
TEMPERATURE	2009-Sep	13.4	12.6	12.2	10.9	14.9	16.1	12.6	11.5	15.6	13.5	11.5	12.2
TEMPERATURE	2010-Sep	13.1	14.5	14.6	11.1	18	15.8	12.8	16.7	15.4	15	14.9	12
TEMPERATURE	2011-Sep	12.9	13.1	12.4	11.1	10.8	14.1	12.5	9.5	12.9	12.5	9.3	12.3
TEMPERATURE	2012-Sep	14.17	15.05	13.88	12.19	11.03	15.3	13.47	10.45	11.99	13.91	10.66	13.9
TEMPERATURE	2013-Sep	14.2	14.3	13.5	11.6	11.4		12.7	10.7	17.7	12.8	11.1	11.5
TEMPERATURE	2014-Sep	18.52	16.85	18.69	18.44	20.7	18.71	17.8	20.22	20.22	17.38	22.37	13.48
TEMPERATURE	2015-Sep	13.01	14.83	14.29	11.36	17.96	14.33	17.05	13.45	14.99	15.46	13.45	13.21
TEMPERATURE	2016-Sep	12.5	14.6	12.5	11	13	14.2	13.7	11.6	16.6	17.6	14	11.7
TEMPERATURE	2017-Sep	13	12.9	15.2	10.7	15.1	13.4	13.1	13.6	16.1	11.9	13	13.5
TEMPERATURE	2018-Sep	12.2	13.7	11.7	10.9	16.8	16.3	14	13.8	15.9	14.3	12.7	12.9

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

TEMPERATURE
UNITS: DEG C

CHEMICAL PARAMETER	EVENT	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03
TEMPERATURE	1993-Sep	14.4		12.2	16.6				
TEMPERATURE	1994-Feb	11.1	11.4	8.4	8.7				
TEMPERATURE	1994-Apr	14.6	10.5	14.6	15.9				
TEMPERATURE	1994-Jul	14.9	13.4	15.8	17.5				
TEMPERATURE	1994-Oct	13.6	16.9	13.6	14.5				
TEMPERATURE	1995-Apr	24.6	24.6	24.2	22.1				
TEMPERATURE	1995-Oct	9.8	10.6	9.1	14				
TEMPERATURE	1996-Apr	10	9.8	15	8.9				
TEMPERATURE	1996-Oct	10.6	9.4	9.4	12.8				
TEMPERATURE	1997-Apr	10	9	11	9				
TEMPERATURE	1997-Oct	11	10	10	12				
TEMPERATURE	1998-Apr	12	11	12	10.5				
TEMPERATURE	1998-Oct	13.7	13.1	11	13				
TEMPERATURE	1999-Sep	14	14.1	10	10.5				
TEMPERATURE	2000-Sep	14.5	15.8	14.8	15.3				
TEMPERATURE	2001-Sep	16	14.8	13.9	15.2				
TEMPERATURE	2002-Sep	14.9	13.3	15.2	15.8				
TEMPERATURE	2003-Sep	14.7	15.5	20.1	15.6				
TEMPERATURE	2004-Sep	15.5	10.6	14.2	13.8				
TEMPERATURE	2005-Sep	13.2	13.3	12.9	14.5				
TEMPERATURE	2006-Sep	13	12.4	17.9	14.7				
TEMPERATURE	2007-Sep	13.7	12.5	14	14.6				
TEMPERATURE	2008-Sep	13.1	13.1	14.1	15.3				
TEMPERATURE	2009-Sep	12.7	10.1	11.3	14				
TEMPERATURE	2010-Sep	14.7	14.2	13	15.1				
TEMPERATURE	2011-Sep	12.2	11.6	8.8	11				
TEMPERATURE	2012-Sep	11.06	14.29		16.7	17.94	20.36	21.62	
TEMPERATURE	2013-Sep	12.8	13.3	13.6	14.1	17.1	19.8	18.7	
TEMPERATURE	2014-Sep	17.37	18.37	12.4	15.62	21.21	24.02	28.69	
TEMPERATURE	2015-Sep	14.1	13.38	14.69	16.83	14.22	21.01	18.43	
TEMPERATURE	2016-Sep	12.2	11.6	13.4	13.8		15.5	15.6	
TEMPERATURE	2017-Sep	15.1	13.5		17.4	15.6	18.6	21.5	
TEMPERATURE	2018-Sep	12.6	14.1	14.2	16.8	16.4	19.2	16.4	

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

TEMPERATURE
UNITS: DEG C

CHEMICAL PARAMETER	EVENT	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
TEMPERATURE	1993-Sep					
TEMPERATURE	1994-Feb					
TEMPERATURE	1994-Apr					
TEMPERATURE	1994-Jul					
TEMPERATURE	1994-Oct					
TEMPERATURE	1995-Apr					
TEMPERATURE	1995-Oct					
TEMPERATURE	1996-Apr					
TEMPERATURE	1996-Oct					
TEMPERATURE	1997-Apr					
TEMPERATURE	1997-Oct					
TEMPERATURE	1998-Apr					
TEMPERATURE	1998-Oct					
TEMPERATURE	1999-Sep					
TEMPERATURE	2000-Sep					
TEMPERATURE	2001-Sep					
TEMPERATURE	2002-Sep					
TEMPERATURE	2003-Sep					
TEMPERATURE	2004-Sep					
TEMPERATURE	2005-Sep					
TEMPERATURE	2006-Sep					
TEMPERATURE	2007-Sep					
TEMPERATURE	2008-Sep					
TEMPERATURE	2009-Sep					
TEMPERATURE	2010-Sep					
TEMPERATURE	2011-Sep					
TEMPERATURE	2012-Sep					16.9
TEMPERATURE	2013-Sep					14.4
TEMPERATURE	2014-Sep	17.93				21.95
TEMPERATURE	2015-Sep	14.7				14.79
TEMPERATURE	2016-Sep	13.4				14.6
TEMPERATURE	2017-Sep	13.9				15.8
TEMPERATURE	2018-Sep	17.6			17.2	17.2

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

CONDUCTANCE, SPECIFIC
UNITS: UMHOS/CM

CHEMICAL PARAMETER	EVENT	MW-03	MW-04	MW-05	MW-07	MW-08	MW-09	MW-10	MW-11AR	MW-13	MW-14	MW-18	MW-19
CONDUCTANCE, SPECIFIC	1993-Sep						394	634		490	691	677	
CONDUCTANCE, SPECIFIC	1994-Feb	746	1100	679	701	762	651	742		716	785	713	658
CONDUCTANCE, SPECIFIC	1994-Apr	740	1150	682	658	731	455	687		680	673	690	662
CONDUCTANCE, SPECIFIC	1994-Jul	696	1190	904	670	627	476	610		720	675	580	636
CONDUCTANCE, SPECIFIC	1994-Oct	785	1280	544	712	736	494	699		751	741	707	674
CONDUCTANCE, SPECIFIC	1995-Apr	666	1203	491	641	561	444	608		497	659	567	585
CONDUCTANCE, SPECIFIC	1995-Oct	1000	1545	864	967	1010	812	1080		1113	1123	886	954
CONDUCTANCE, SPECIFIC	1996-Apr	720	1000	570	860	680	410	790		810	740	550	660
CONDUCTANCE, SPECIFIC	1996-Oct	760	1370	640	760	860	470	560		900	880	600	760
CONDUCTANCE, SPECIFIC	1997-Apr	760	1280	360	680	640	430	520		720	810	630	700
CONDUCTANCE, SPECIFIC	1997-Oct	810	1310	770	720	930	540	630		620	560	680	690
CONDUCTANCE, SPECIFIC	1998-Apr	540	850	640	490	490	430	540		370	610	510	530
CONDUCTANCE, SPECIFIC	1998-Oct	520	940	550	540	660	510	510		630	550	490	510
CONDUCTANCE, SPECIFIC	1999-Sep	610	940	520	620	640	580	620		740	630	550	590
CONDUCTANCE, SPECIFIC	2000-Sep	643	952	419	629	697	392	643		831	686	616	628
CONDUCTANCE, SPECIFIC	2001-Sep	640	930	370	610	698	510	562		793	675	901	600
CONDUCTANCE, SPECIFIC	2002-Sep	667	871	377	621	645	467	627		819	695	989	595
CONDUCTANCE, SPECIFIC	2003-Sep	677	861	463	656	671	606	627		804	692	1207	624
CONDUCTANCE, SPECIFIC	2004-Sep	689	931	440	593	635	577	554		721	638	1018	575
CONDUCTANCE, SPECIFIC	2005-Sep	704	889	370	630	678	502	647	732	758	677	959	611
CONDUCTANCE, SPECIFIC	2006-Sep	719	823	375	689	668	633	695	1120	481	690	1070	632
CONDUCTANCE, SPECIFIC	2007-Sep	723	907	403	644	677	625	593	1134	674	671	1031	624
CONDUCTANCE, SPECIFIC	2008-Sep	719	879	449	623	699	599	560	970	744	678	767	604
CONDUCTANCE, SPECIFIC	2009-Sep	723	892	421	620	681	602	587	903	720	678	934	602
CONDUCTANCE, SPECIFIC	2010-Sep	661	741	449	581	620	586	555	857	687	665	644	579
CONDUCTANCE, SPECIFIC	2011-Sep	663	861	430	610	735	597	567	918	737	682	808	555
CONDUCTANCE, SPECIFIC	2012-Sep	690	803	536	605	774	339	611	955	712	688	937	739
CONDUCTANCE, SPECIFIC	2013-Sep	727	740	450	596	653	693	516	872	732	666	935	585
CONDUCTANCE, SPECIFIC	2014-Sep	611	782	583	571	572	754	528	784	383	606	504	600
CONDUCTANCE, SPECIFIC	2015-Sep	675	780	353	692	549	655	513	723	625	596	579	554
CONDUCTANCE, SPECIFIC	2016-Sep	1105	1352	1192	523.1	493.8	822	922	1329	1162	1099	1002	1011
CONDUCTANCE, SPECIFIC	2017-Sep	585	802	339.7	562.3	695	493.8	527.7	763	660	715	721	554.2
CONDUCTANCE, SPECIFIC	2018-Sep	631	809	685	589	534	526	484	828	667	588	571	611

GW Standard:
None

IPL Marshalltown East and West Closed Landfills
Historic Monitoring Results

CONDUCTANCE, SPECIFIC
UNITS: UMHOS/CM

CHEMICAL PARAMETER	MW-20	MW-21	MW-22	MW-23	GWGCS	SW-01	SW-02	SW-03	LW-01	LW-02	LW-03	LW-04	LEACHATE TANK
CONDUCTANCE, SPECIFIC	964		814	1164									
CONDUCTANCE, SPECIFIC	1130	810	2050	200									
CONDUCTANCE, SPECIFIC	990	927	860	1124									
CONDUCTANCE, SPECIFIC	987	812	827	1520									
CONDUCTANCE, SPECIFIC	860	890	924	1520									
CONDUCTANCE, SPECIFIC	835	679	784	1190									
CONDUCTANCE, SPECIFIC	1488	1196	1190	2160									
CONDUCTANCE, SPECIFIC	1120	840	990	1800									
CONDUCTANCE, SPECIFIC	1070	1100	1150	960									
CONDUCTANCE, SPECIFIC	960	860	940	1650									
CONDUCTANCE, SPECIFIC	1160	1050	1060	1800									
CONDUCTANCE, SPECIFIC	800	590	730	2630									
CONDUCTANCE, SPECIFIC	890	780	820	1100									
CONDUCTANCE, SPECIFIC	1650	760	770	1310									
CONDUCTANCE, SPECIFIC	825	755	895	1167									
CONDUCTANCE, SPECIFIC	850	700	850	1328									
CONDUCTANCE, SPECIFIC	764	657	817	970									
CONDUCTANCE, SPECIFIC	844	672	938	1152									
CONDUCTANCE, SPECIFIC	873	759	755	1211									
CONDUCTANCE, SPECIFIC	794	724	817	1127									
CONDUCTANCE, SPECIFIC	776	689	804	1066									
CONDUCTANCE, SPECIFIC	869	849	830	828									
CONDUCTANCE, SPECIFIC	1157	922	913	1252									
CONDUCTANCE, SPECIFIC	1038	919	903	671									
CONDUCTANCE, SPECIFIC	1058	695	768	952									
CONDUCTANCE, SPECIFIC	1015	812	849	1242									
CONDUCTANCE, SPECIFIC	832	664		1668	842	437	547						736
CONDUCTANCE, SPECIFIC	928	712	848	824	991	530	531						514
CONDUCTANCE, SPECIFIC	789	627	717	455	991	581	592		876				624
CONDUCTANCE, SPECIFIC	856	706	687	431	991	525	539		788				538
CONDUCTANCE, SPECIFIC	1334	1184	1344	1193		998	1015		1425				884
CONDUCTANCE, SPECIFIC	887	707		1449	95.3	446.1	283.1		789				528.7
CONDUCTANCE, SPECIFIC	811	644	719	271.2	1044	576	576		771			1193	632

GW Standard:
None

Appendix E

2023 Statistical Summary Report

November 30, 2023
File No. 25223063.00

TECHNICAL MEMORANDUM

SUBJECT: Statistical Evaluation of Groundwater Monitoring Results
Big Bend Closed CCR Landfill, September 2023 Sampling Event

PREPARED BY: Ryan Matzuk

CHECKED BY: Charles Hostetler

STATISTICAL METHOD

The statistical analysis uses a prediction interval approach as recommended for detection monitoring in the March 2009 U.S. Environmental Protection Agency (U.S. EPA) Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act (RCRA) facilities. For the prediction interval evaluation, interwell testing was selected based on the considerations outlined in Chapter 6 of the Unified Guidance. The statistical program used to calculate the interwell prediction interval is Sanitas™ (Version 9.6.37).

The Big Bend monitoring data are evaluated in two well groups, representing the shallow and deep groundwater systems. For the shallow groundwater system, monitoring well MW-21 is used as the background well. For the deep groundwater system, MW-12 is used as the background well.

TIME SERIES PLOTS

Time series plots are prepared for the required monitoring parameters to show the concentration variations over time. Time series graphs are included in **Attachments E1** (shallow) and **E2** (deep). For metals, the time series plots only show monitoring results since 2016, when the monitoring program transitioned from dissolved metals to total metals analysis. For chloride and sulfate, which are not typically affected by filtering, older historical results for background wells MW-12, for the deep groundwater flow system, and MW-21, for the shallow groundwater flow system, are included in the time series plots and are used in the determination of background for the statistical evaluation.

For the two background wells (MW-12 and MW-21), data points that were previously removed from the dataset as outliers or as otherwise not representative of background are flagged with an "X" in the time series data tables and shown on the time series plots by a lighter color data point that is not included in the times series plot line. Evaluation of these data points and the 2023 data for use in the current event statistical analysis is discussed in the following section.

OUTLIER ANALYSIS

An outlier analysis is performed for background monitoring results at upgradient wells MW-12 and MW-21. A statistical outlier is a value that is extremely different from the other values in the data set.

The Sanitas outlier tests identify data points that do not appear to fit the distribution of the rest of the data set and determine if they differ significantly from the rest of the data. The outlier analysis performed in Sanitas includes the following steps:

1) Run normality test (Shapiro Wilk/Francia).

2) If normally distributed, run U.S. EPA's 1989 Outlier Test to identify suspected outliers.
   a) If number of background samples is less than or equal to 25, run Dixon's test for suspected outliers.
   b) If number of background samples is more than 25, run Rosner's test for suspected outliers.

3) If not normally distributed, run Tukey's test for outliers.

4) Review data flagged as possible outliers to evaluate whether they should be removed from the background data set. Also review time series plots for possible outliers that were not picked up in the statistical evaluation (e.g., outlier test may not identify outliers when two values are similar to each other, but very different from all other data).

Results identified as statistical outliers are checked for possible lab instrument failure, field collection problems, or data entry errors; however, outliers may exist naturally in the data if there is an extremely wide inherent or temporal variability in the data. The Unified Guidance states that unless a likely error can be identified, the outlier should not be removed.

Prior to the statistical outlier analysis, some chloride results for both the shallow and deep background wells were removed from the background dataset based on visual review of the time series plots. These results were also removed from the background data set for the previous data evaluation:

- **Chloride, Shallow (MW-21).** Recent results for upgradient well MW-21 have shown a fairly sharp increasing trend, with levels since 2017 being higher than previous results. To be conservative, the chloride results for 2017 and later were excluded from the upper prediction limit (UPL) calculations. With those results removed, the distribution of data was found to be lognormal and no outliers were identified.

- **Sulfate, Shallow (MW-21).** One high result from the September 2006 event was previously flagged by Sanitas as a statistical outlier and removed from the dataset based on visual inspection of the data. The high result was inconsistent with subsequent results (approximately 5X typical), and may reflect a lab dilution or calculation error. With the September 2021 sulfate result added, the 2006 result still appears to be a clear outlier (see time series plot); therefore, it was not added back into the dataset for statistical outlier screening. With the outlier removed, the remaining 20 values fit a normal distribution.

- **Chloride, Deep (MW-12).** Most of the results for upgradient well MW-12 before 2013 were reported as non-detects with a detection limit of 5 milligrams per liter (mg/L). More recently, a lower detection limit has been used and chloride has been detected at concentrations ranging from 2.2 to 3.5 mg/l. Based on these results, the non-detect results before 2013 were excluded from further analysis. With the current population starting in 2013 included, the sample results were found to be normally distributed and no outliers were identified.

For the September 2023 sampling event, the following background values from MW-12 and MW-21 were identified as potential outliers and handled as described:

- **Copper, Shallow (MW-21).** One high results from the September 2018 event was flagged by Sanitas as a statistical outlier. This result was kept in the dataset because there was no known explanation for the higher result, and it appeared to be within the range of potential natural variation relative to the other observed copper concentrations.

- **Zinc, Shallow (MW-21).** One high result from the September 2022 event was flagged by Sanitas as a statistical outlier. This value is much higher than previous results for MW-21, but other wells at the site showed a similar increase in zinc for the 2022 event. There is no known explanation for the higher results at multiple wells. To be conservative, the September 2022 result for zinc was removed from the dataset as an outlier for this analysis. If future results confirm the increase in zinc, then the September 2022 value may be used in future analysis. The September 2023 zinc concentration was below the limit of detection.

- **Sulfate, Deep (MW-12).** One high result from the September 2011 event was flagged by Sanitas as a statistical outlier. Consistent with the previous statistical analysis, this result was kept in the dataset because there was no known explanation for the higher result, and it appeared to be within the range of potential natural variation relative to the other observed sulfate concentrations (approximately 2X typical values).

Outlier analysis results are included in **Attachments E3** (shallow) and **E4** (deep).

INTERWELL PREDICTION LIMITS

Interwell UPLs are calculated for the shallow and deep groundwater systems using data from the background wells for each monitored constituent, with outliers removed as noted above. The prediction limit analysis performed in Sanitas includes the following steps:

1) If 50 percent or more of results are non-detect, apply a non-parametric UPL. For small background sample sizes, the non-parametric UPL is the highest background value. For a parameter with 100 percent non-detects in the background values, the Double Quantification Rule applies, which says that a statistically significant increase (SSI) occurs when two results exceeding the quantification limit are reported for a compliance well.

2) If fewer than 50 percent of the results are non-detect, run normality test (Shapiro Wilk/Francia) to assess whether the data fit a normal distribution or can be transformed to fit a normal distribution (e.g., lognormal).

3) If normal or transformed normal, calculate parametric UPL.

4) If not normal or transformed normal, calculate non-parametric UPL.

For evaluation of parameters with less than 100 percent non-detects in the background sampling, the non-detects were replaced with the detection limit, unless the non-detects represented less than 15 percent of the total samples, in which case one-half of the detection limit was used.

Consistent with the Unified Guidance, parametric prediction limits are calculated based on a 1-of-2 retesting protocol and a target 10 percent annual site-wide false positive rate. Sanitas establishes the per-test significance level based on user inputs of the number of events per year, number of constituents being evaluated, and number of compliance wells. For the 2023 event, the following values were used:

Parameter	Value	Comments
Evaluations per year	1	September event
Constituents analyzed	14	Shallow: 20 constituents sampled. Deep: 20 constituents sampled. Beryllium and selenium not counted because all background results are non-detect. For Shallow and Deep units calcium, fluoride, lithium, molybdenum, TDS, and TSS are not counted because they were added to the program in 2023 and have an insufficient amount of data required to produce prediction limits.
Compliance wells	13	7 shallow and 6 deep

Non-parametric prediction limits are also based on a 1-of-2 retesting protocol. The non-parametric limit is the highest value in the background dataset. Due to the small sample size, the false positive rate for the non-parametric tests is higher than for the parametric tests, but will go down as more background data are obtained.

For results with 100 percent non-detects in the background data, evaluation under the Double Quantification Rule means that a SSI has not occurred for a compliance well unless two sample results from the well exceed the laboratory's reporting limit or quantification limit. For evaluation of parameters with less than 100 percent non-detects in the background sampling, the non-detects were replaced with the detection limit, unless the non-detects represent less than 15 percent of the total samples, in which case one-half of the detection limit was used.

Although the limits are based on a 1-of-2 retesting approach, retesting is not required. Because the site is closed and has been monitored for many years, retesting will typically not be performed unless a new potential SSI is identified. If retesting is not performed, a result above the UPL is presumed to represent an SSI above the interwell background level. Only results that exceed the laboratory's limit of quantification or reporting limit are compared to the UPL; therefore, a J-flagged value above the UPL is not an SSI.

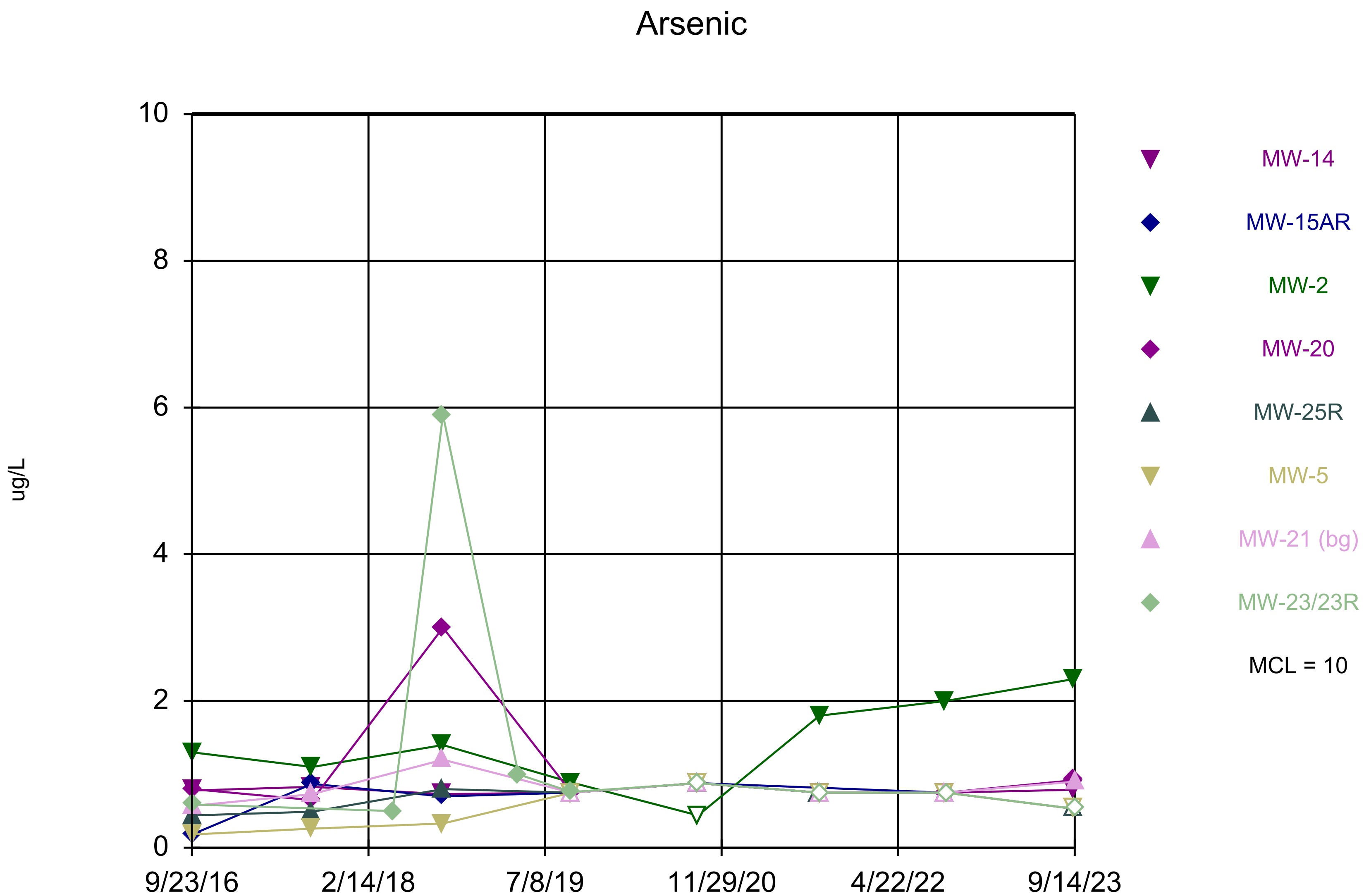
Interwell prediction limit analysis results for 2023 are included in **Attachments E5** (shallow) and **E6** (deep).

RM/AJR/CJH

Attachment E1

Times Series Graphs – Shallow

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

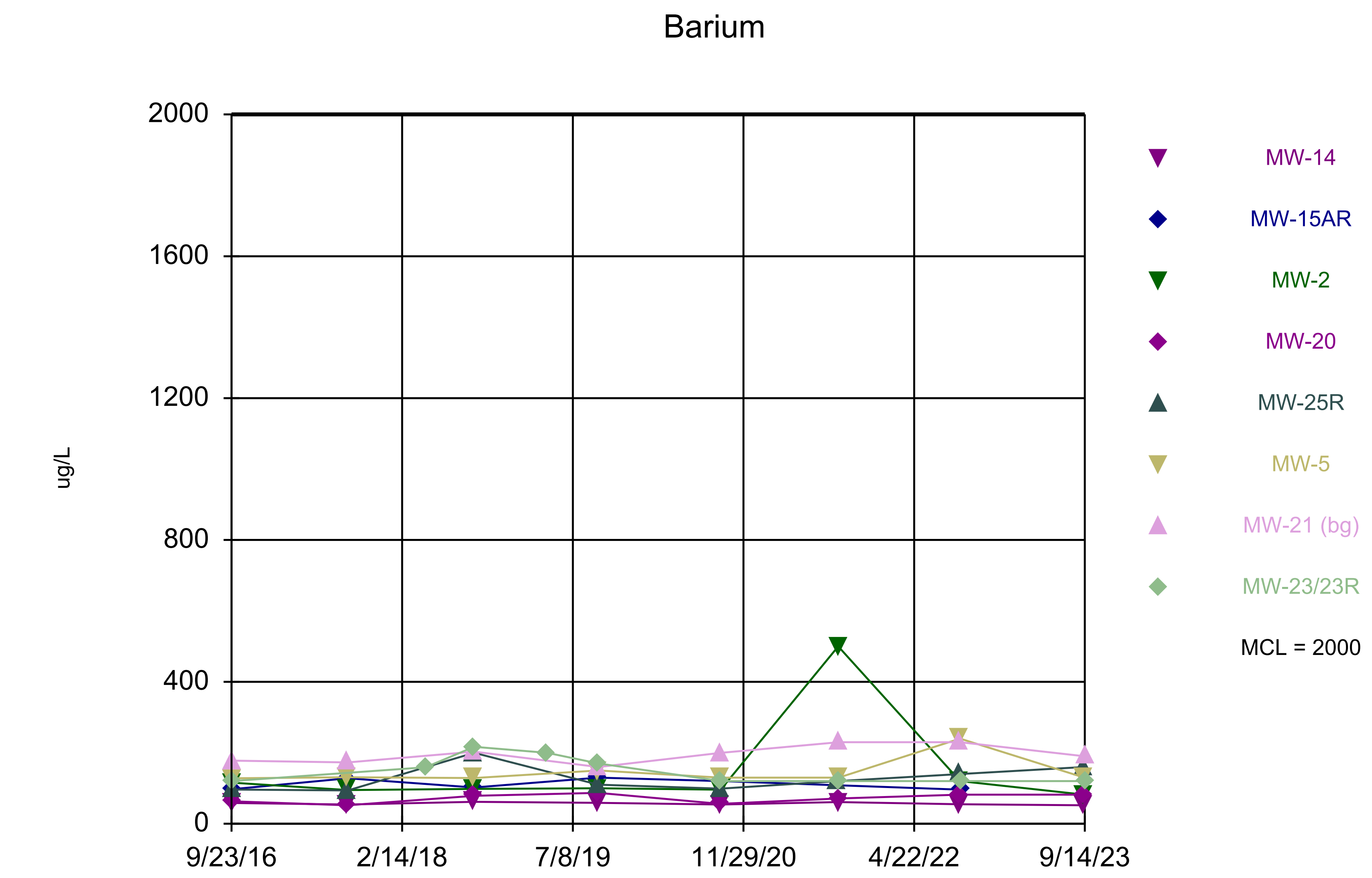
Constituent: Arsenic (ug/L)   Analysis Run 10/23/2023 11:19 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	0.78 (J)	0.18 (J)	1.3	0.8 (J)	0.44 (J)	0.18 (J)	0.57 (J)	0.59 (J)
9/5/2017	0.83 (J)	0.87 (J)	1.1	0.65 (J)	0.49 (J)	0.26 (J)	0.73 (J)	
4/25/2018								0.5 (J)
9/17/2018	0.73 (J)	0.7 (J)	1.4	3	0.8 (J)	0.33 (J)	1.2	5.9
4/23/2019								1 (J)
9/23/2019	<0.75	<0.75	0.89 (J)	<0.75	<0.75	<0.75	<0.75	0.76 (J)
9/21/2020				<0.88	<0.88			
9/22/2020	<0.88		<0.88			<0.88		
9/23/2020							<0.88	
9/24/2020		<0.88						<0.88
9/7/2021					<0.75			
9/8/2021	<0.75		1.8 (J)	0.75 (J)				
9/9/2021						<0.75		<0.75
9/10/2021							<0.75	
9/6/2022	0.75 (J)			<0.75	<0.75			
9/7/2022			2			<0.75	<0.75	
9/8/2022								<0.75
9/9/2022		<0.75						
9/11/2023	0.79 (J)							
9/12/2023			2.3	0.92 (J)	<0.53 (U)			
9/13/2023						<0.53 (U)		
9/14/2023							0.9 (J)	<0.53 (U)

ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series   Analysis Run 10/23/2023 11:17 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Barium (ug/L) Analysis Run 10/23/2023 11:19 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	58.5	97.2	116	63.1	96.5	128	178	120
9/5/2017	54	128	94.8	52.1	93.8	131	173	
4/25/2018								159
9/17/2018	61.7	102	98.3	78.8	200	129	203	217
4/23/2019								200
9/23/2019	59	130	100	87	110	150	160	170
9/21/2020				56	99			
9/22/2020	54		96			130		
9/23/2020							200	
9/24/2020		120						120
9/7/2021					120 (B)			
9/8/2021	61 (B)		500 (B)	71 (B)				
9/9/2021						130 (B)		120 (B)
9/10/2021							230 (B)	
9/6/2022	55			82	140			
9/7/2022			120			240	230	
9/8/2022								120
9/9/2022		96						
9/11/2023	52							
9/12/2023			82	82	160			
9/13/2023						130		
9/14/2023							190	120

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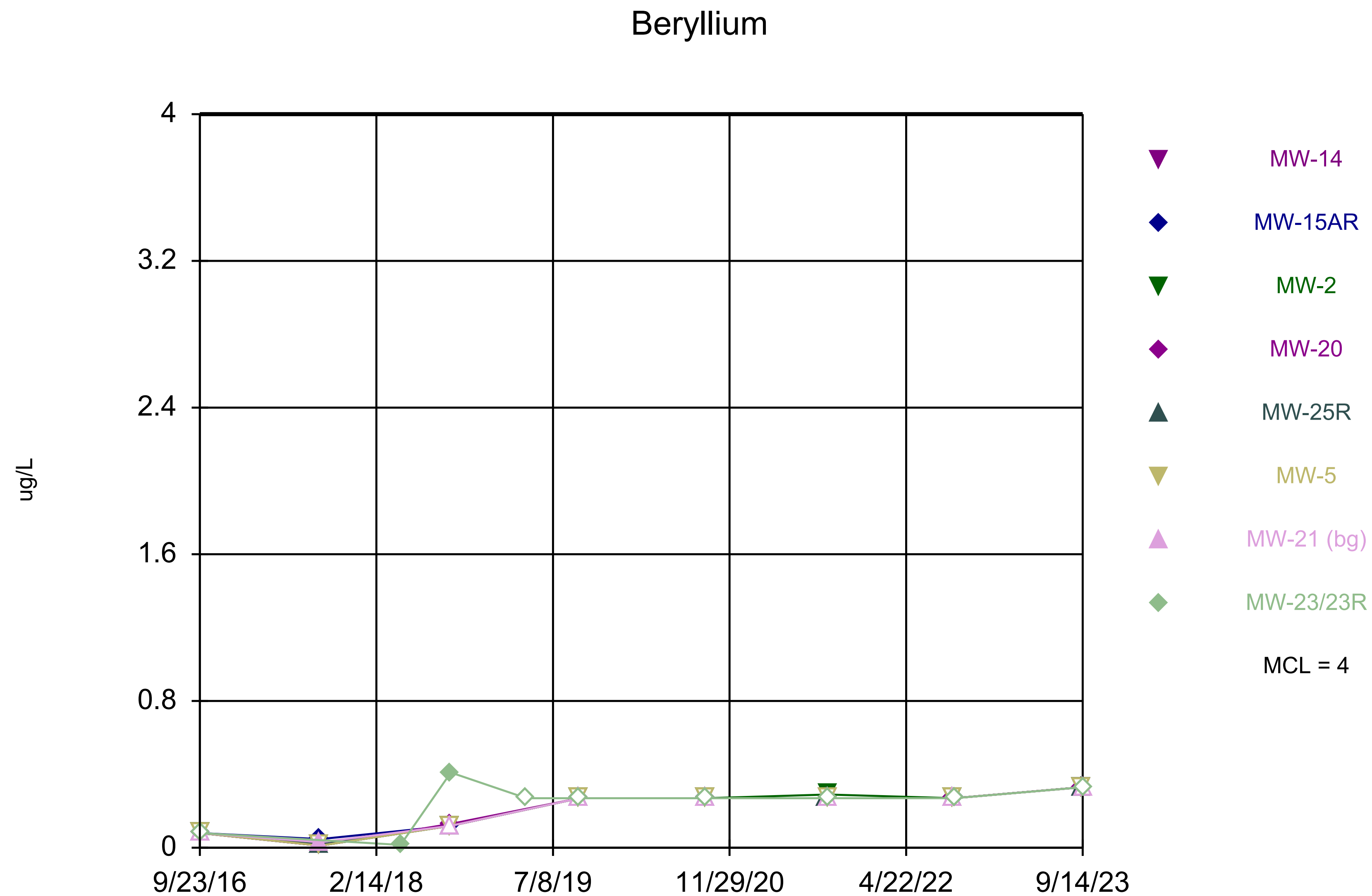
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Beryllium (ug/L)   Analysis Run 10/23/2023 11:19 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
9/5/2017	<0.012	0.047 (J)	<0.012	<0.012	0.018 (J)	<0.012	0.03 (J)	
4/25/2018								0.015 (J)
9/17/2018	<0.12	<0.12	<0.12	0.13 (J)	<0.12	<0.12	<0.12	0.41 (J)
4/23/2019								<0.27
9/23/2019	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
9/21/2020				<0.27	<0.27			
9/22/2020	<0.27		<0.27			<0.27		
9/23/2020							<0.27	
9/24/2020		<0.27						<0.27
9/7/2021					<0.27			
9/8/2021	<0.27		0.29 (J)	<0.27				
9/9/2021						<0.27		<0.27
9/10/2021							<0.27	
9/6/2022	<0.27			<0.27	<0.27			
9/7/2022			<0.27			<0.27	<0.27	
9/8/2022								<0.27
9/9/2022		<0.27						
9/11/2023	<0.33 (U)							
9/12/2023			<0.33 (U)	<0.33 (U)	<0.33 (U)			
9/13/2023						<0.33 (U)		
9/14/2023							<0.33 (U)	<0.33 (U)

ND substitution: RL or RL/2 if <15% NDs.

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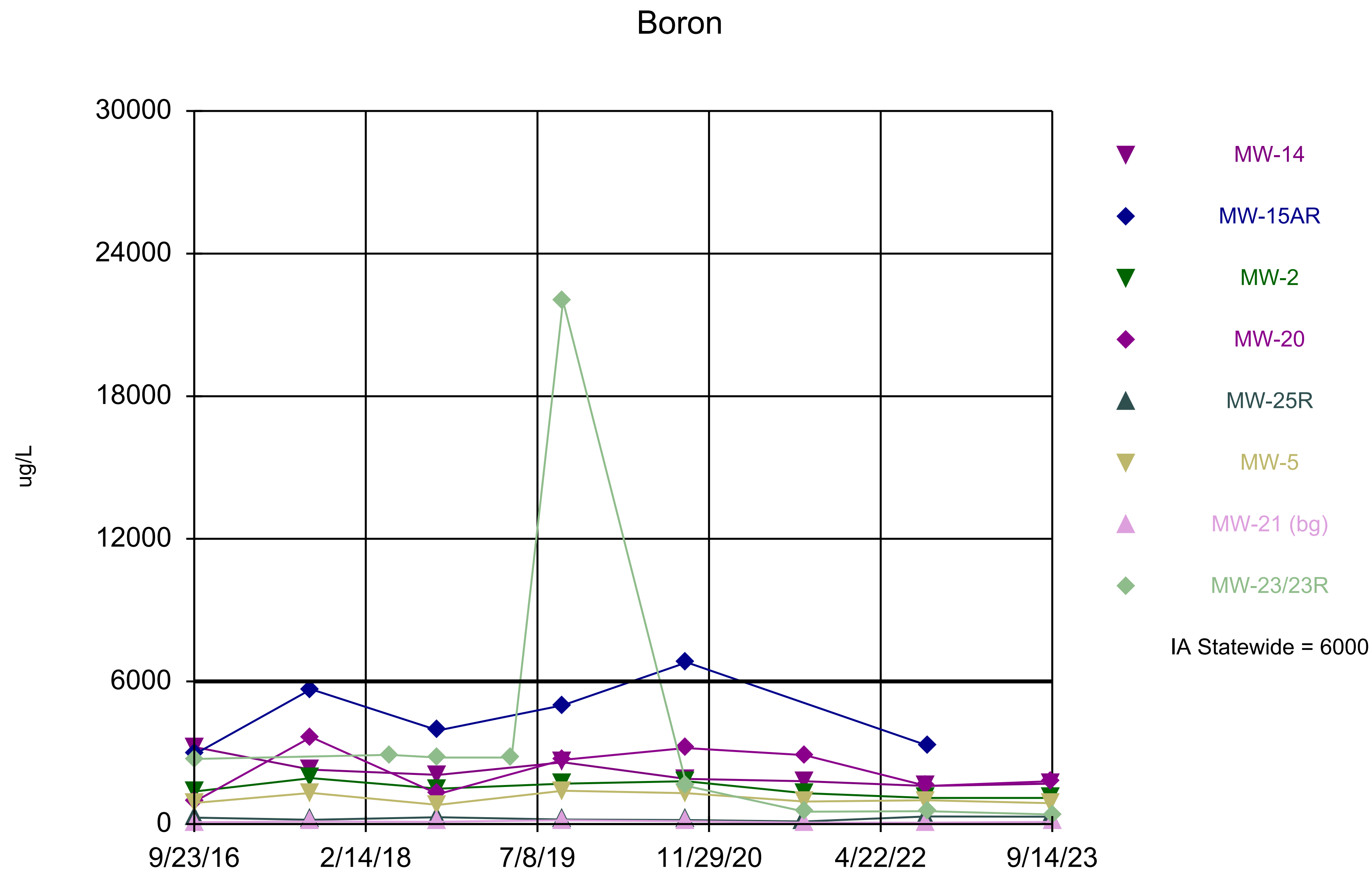

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Boron (ug/L)   Analysis Run 10/23/2023 11:19 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	3240	2930	1370	939	269	890	81 (J)	2740
9/5/2017	2290	5670	1930	3660	178	1310	110	
4/25/2018								2910
9/17/2018	2070	3940	1490	1260	290	809	97.6 (J)	2800
4/23/2019								2800
9/23/2019	2600	5000	1700	2700	190 (J)	1400	160 (J,B)	22000 (B)
9/21/2020				3200	170			
9/22/2020	1900		1800			1300		
9/23/2020							120	
9/24/2020		6800						1600
9/7/2021					110			
9/8/2021	1800		1300	2900				
9/9/2021						950		520
9/10/2021							63 (J)	
9/6/2022	1600			1600	320			
9/7/2022			1100			1000	63 (J)	
9/8/2022								540
9/9/2022		3300						
9/11/2023	1700							
9/12/2023			1100	1800	310			
9/13/2023						880		
9/14/2023							94 (J)	400

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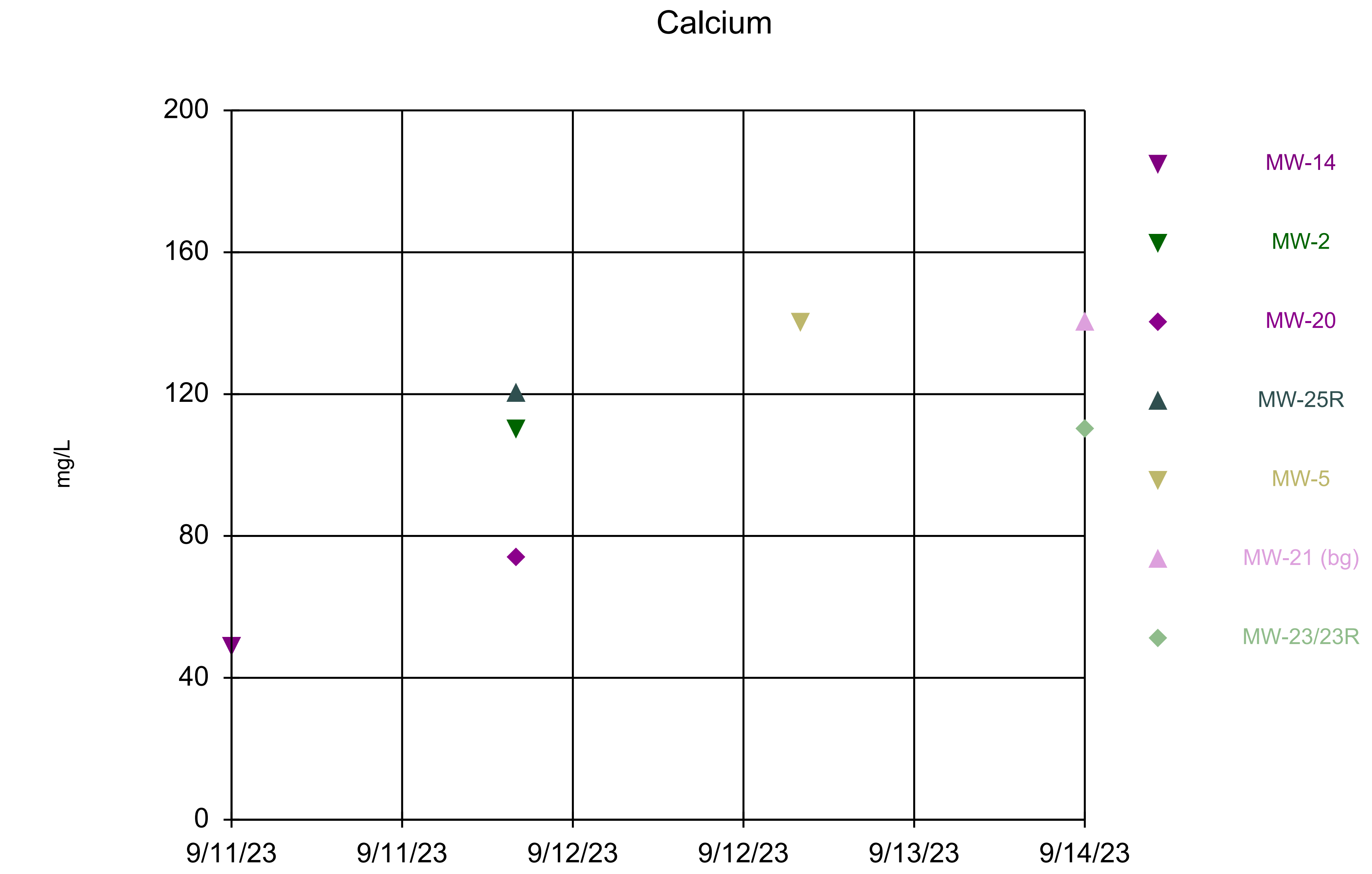

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Calcium (mg/L)   Analysis Run 10/23/2023 11:19 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/11/2023	49						
9/12/2023		110	74	120			
9/13/2023					140		
9/14/2023						140	110

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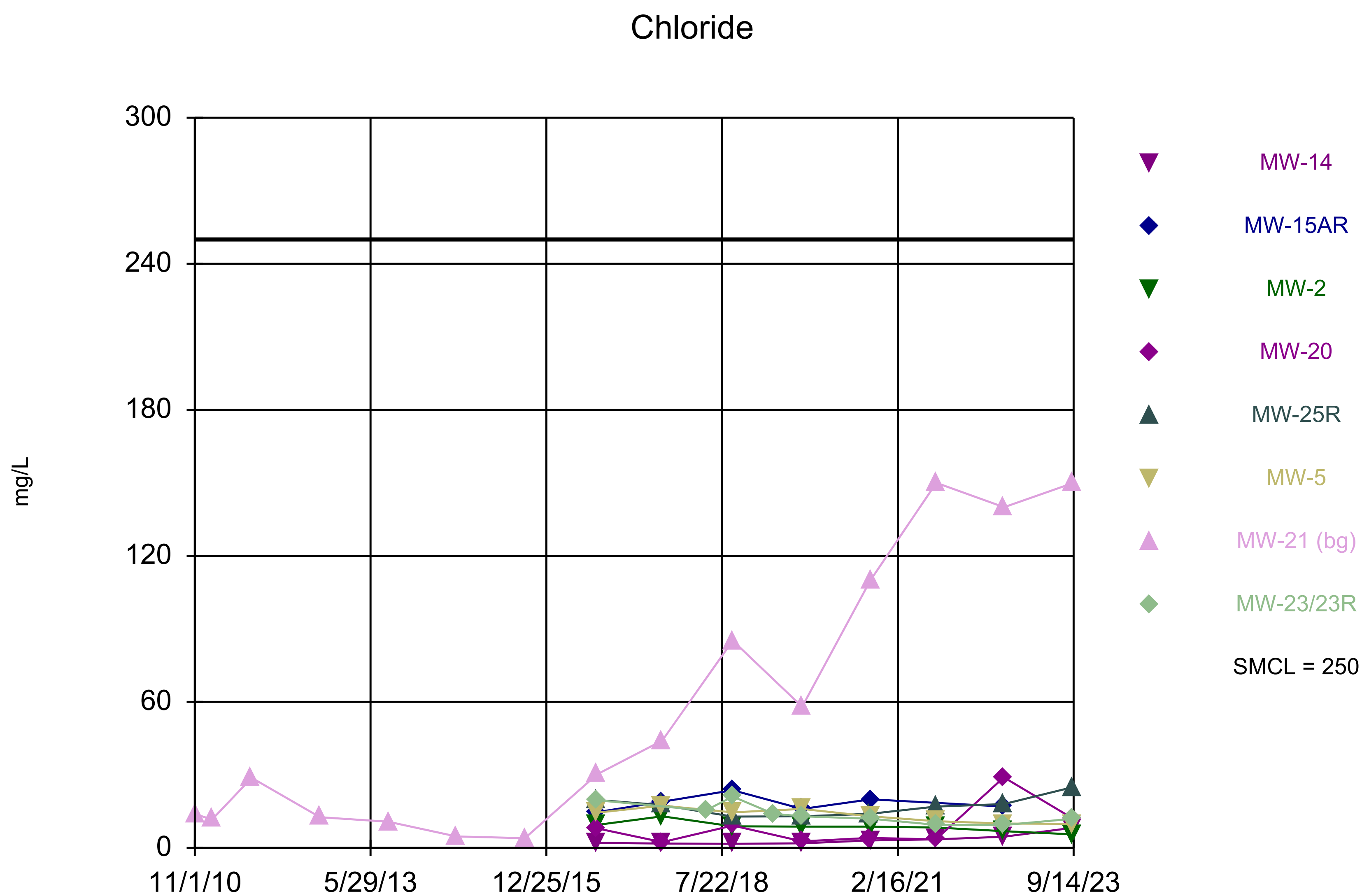

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/23/2023 11:19 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
11/1/2010							13.9	
2/1/2011							11.7	
9/1/2011							28.8	
9/1/2012							12.6	
9/1/2013							10.8	
9/1/2014							4.7	
9/1/2015							4	
9/23/2016	2.1	14.7	9.5	8	19.7	14.5	30.3	19.6
9/5/2017	1.8	19	13	2.4	17.6	17.4	44.1 (X)	
4/25/2018								15.4
9/17/2018	1.7	23.7	8.9	9.2	12.9	14.6	85.2 (X)	21.1
4/23/2019								14
9/23/2019	1.9 (J)	16	8.8	2.7 (J)	13	16	58 (X)	13
9/21/2020				4.1 (J)	14			
9/22/2020	3.1 (J)		8.8			13		
9/23/2020							110 (X)	
9/24/2020		20						12
9/7/2021					17			
9/8/2021	3.5 (J)		8.4	3.5 (J)				
9/9/2021						11		9.5
9/10/2021							150 (X)	
9/6/2022	4.6 (J)			29	18			
9/7/2022			6.9			10	140 (X)	
9/8/2022								9.4
9/9/2022		17						
9/11/2023	8.3							
9/12/2023			5.6	12	25			
9/13/2023						9.9		
9/14/2023							150 (X)	12

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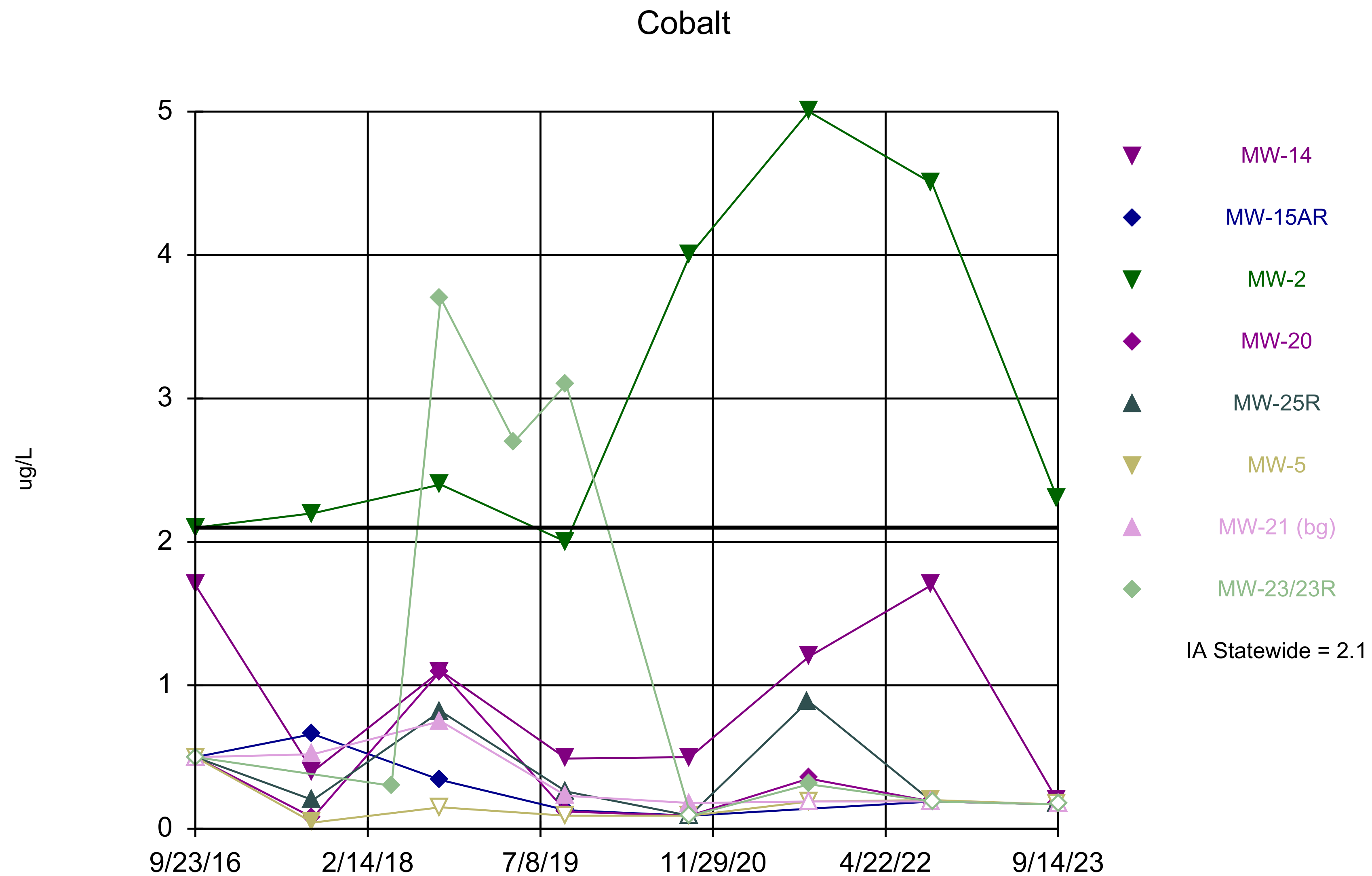

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow
Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Cobalt (ug/L) Analysis Run 10/23/2023 11:19 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	1.7	<0.5	2.1	<0.5	<0.5	<0.5	<0.5	<0.5
9/5/2017	0.4 (J)	0.66 (J)	2.2	0.078 (J)	0.2 (J)	0.043 (J)	0.52 (J)	
4/25/2018								0.3 (J)
9/17/2018	1.1	0.34 (J)	2.4	1.1	0.82 (J)	<0.15	0.75 (J)	3.7
4/23/2019								2.7
9/23/2019	0.49 (J)	0.13 (J)	2	0.12 (J)	0.26 (J)	<0.091	0.23 (J)	3.1
9/21/2020				<0.091	<0.091			
9/22/2020	0.5		4			<0.091		
9/23/2020							0.18 (J)	
9/24/2020		<0.091						<0.091
9/7/2021					0.89			
9/8/2021	1.2		5	0.35 (J)				
9/9/2021						<0.19		0.31 (J)
9/10/2021							<0.19	
9/6/2022	1.7			<0.19	<0.19			
9/7/2022			4.5 (D)			0.2 (J)	<0.19	
9/8/2022								<0.19
9/9/2022		<0.19						
9/11/2023	0.2 (J)							
9/12/2023			2.3	<0.17 (U)	<0.17 (U)			
9/13/2023						<0.17 (U)		
9/14/2023							<0.17 (U)	<0.17 (U)

ND substitution: RL or RL/2 if <15% NDs.

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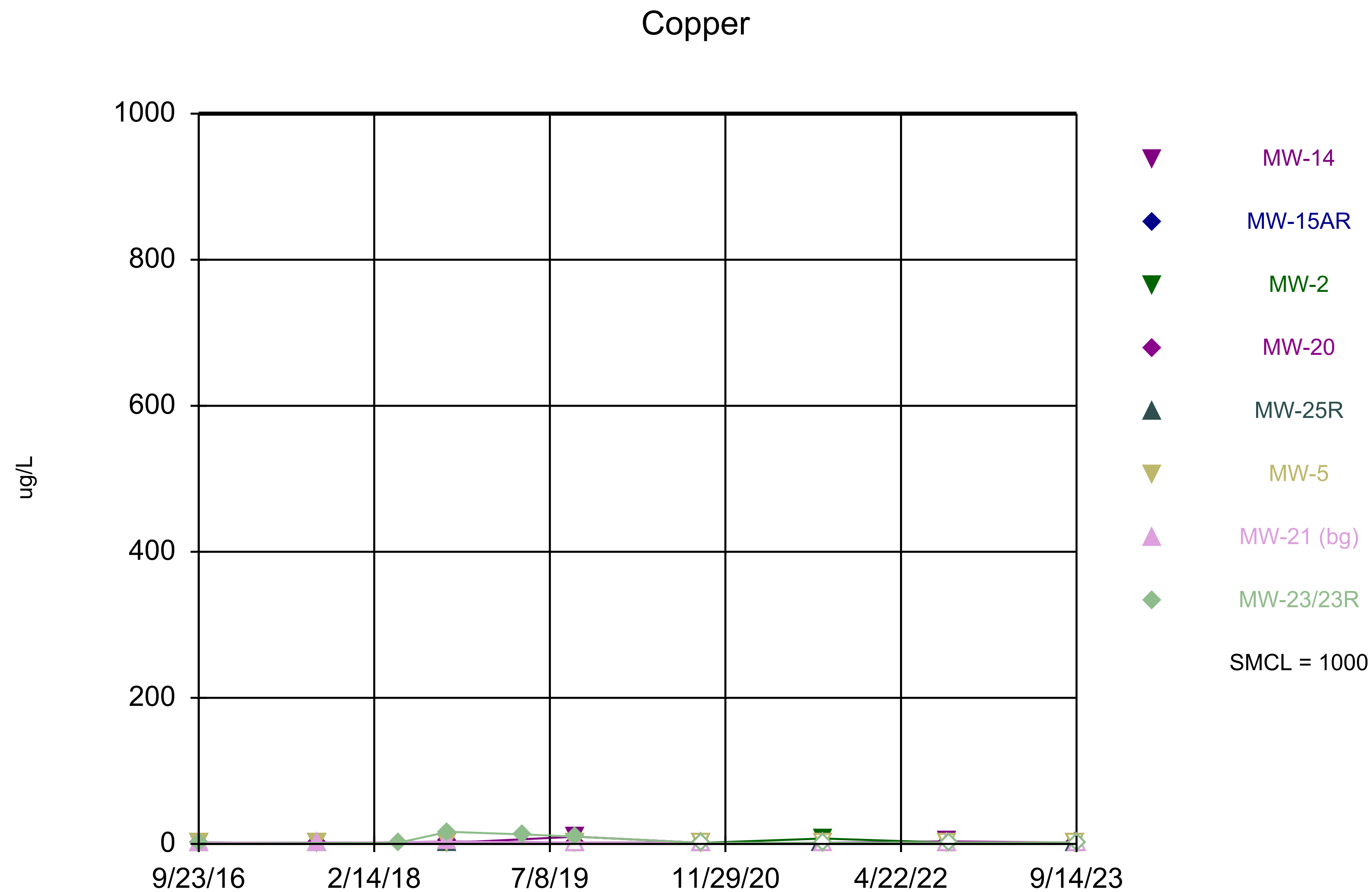
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Copper (ug/L) Analysis Run 10/23/2023 11:19 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	1.9	0.18 (J)	2.1	1.6	1.6	0.6 (J)	1.7	0.26 (J)
9/5/2017	1	1.6	0.8 (J)	0.67 (J)	1.8	0.43 (J)	1.9	
4/25/2018								1.6
9/17/2018	1.4	1.1	1.6	3.2	2.6	1.8	2.8	16.7
4/23/2019								13
9/23/2019	9.9	<2	<2	<2	<2	<2	<2	10
9/21/2020				<1.5	<1.5			
9/22/2020	<1.5		<1.5			<1.5		
9/23/2020							<1.5	
9/24/2020		<1.5						<1.5
9/7/2021					1.5 (J)			
9/8/2021	1.5 (J)		7.5	1.5 (J)				
9/9/2021						<1.4		<1.4
9/10/2021							<1.4	
9/6/2022	3.5 (J)			<1.8	<1.8			
9/7/2022			<1.8			<1.8	<1.8	
9/8/2022								<1.8
9/9/2022		<1.8						
9/11/2023	<1.8 (U)							
9/12/2023			<1.8 (U)	<1.8 (U)	<1.8 (U)			
9/13/2023						<1.8 (U)		
9/14/2023							<1.8 (U)	<1.8 (U)

ND substitution: RL or RL/2 if <15% NDs.

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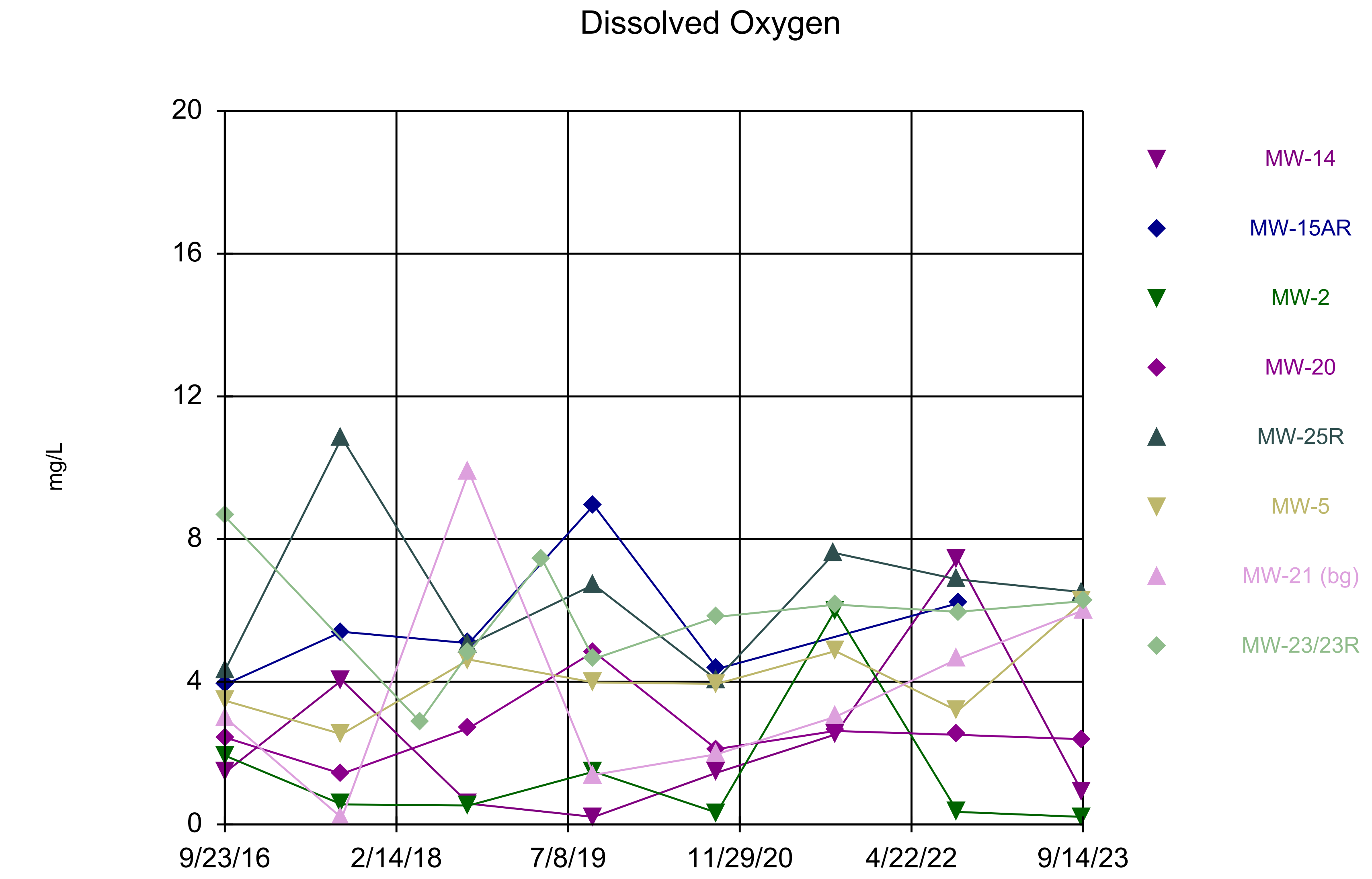

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Dissolved Oxygen (mg/L) Analysis Run 10/23/2023 11:19 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	1.45	3.92	1.93	2.44	4.31	3.47	3	8.64
9/5/2017	4.04	5.4	0.56	1.42	10.84	2.53	0.18	
4/25/2018								2.88
9/17/2018	0.58	5.08	0.53	2.7	5.04	4.62	9.89	4.81
4/23/2019								7.42
9/23/2019	0.21	8.95	1.48	4.84	6.72	3.98	1.39	4.64
9/21/2020				2.11	4.06			
9/22/2020	1.45		0.33			3.94		
9/23/2020							1.97	
9/24/2020		4.36						5.82
9/7/2021					7.61			
9/8/2021	2.52		6	2.62				
9/9/2021						4.86		6.16
9/10/2021							3.02	
9/6/2022	7.44			2.51	6.87			
9/7/2022			0.35			3.18	4.64	
9/8/2022								5.96
9/9/2022		6.2						
9/11/2023	0.91							
9/12/2023			0.21	2.39	6.51			
9/13/2023						6.24		
9/14/2023							6	6.26

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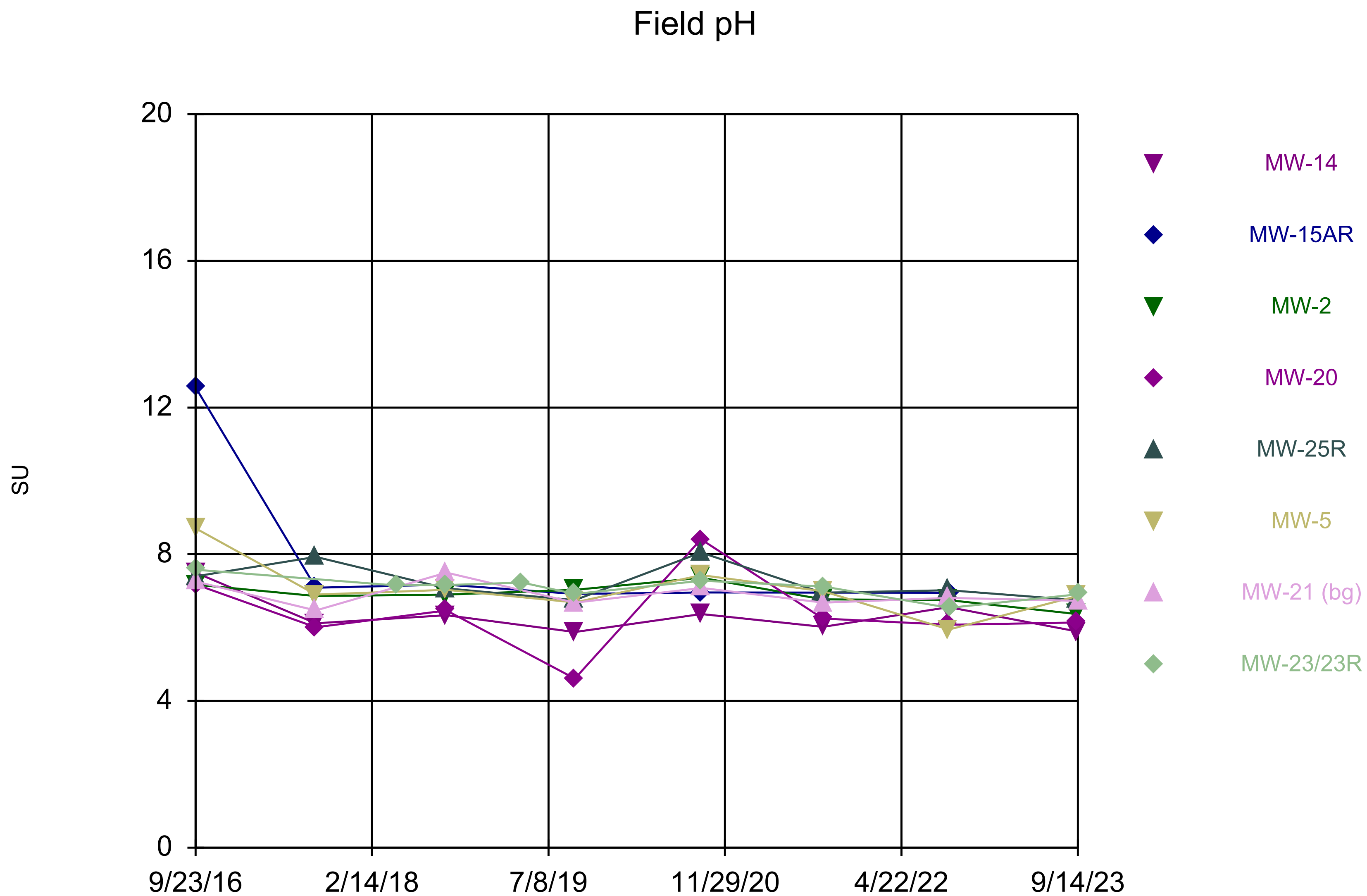

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Field pH (SU)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	7.5	12.55	7.17	7.18	7.4	8.71	7.26	7.58
9/5/2017	6.12	7.09	6.86	6.01	7.93	6.9	6.47	
4/25/2018								7.15
9/17/2018	6.34	7.17	6.9	6.47	7.07	7.03	7.5	7.16
4/23/2019								7.23
9/23/2019	5.88	6.92	7.03	4.61	6.75	6.69	6.68	6.92
9/21/2020				8.41	8.05			
9/22/2020	6.37		7.36			7.43		
9/23/2020							7.08	
9/24/2020		6.96						7.28
9/7/2021					6.95			
9/8/2021	6.02		6.77	6.25				
9/9/2021						6.99		7.12
9/10/2021							6.68	
9/6/2022	6.56			6.08	7.02			
9/7/2022			6.75			5.95	6.81	
9/8/2022								6.54
9/9/2022		6.95						
9/11/2023	5.9							
9/12/2023			6.37	6.14	6.75			
9/13/2023						6.86		
9/14/2023							6.73	6.91

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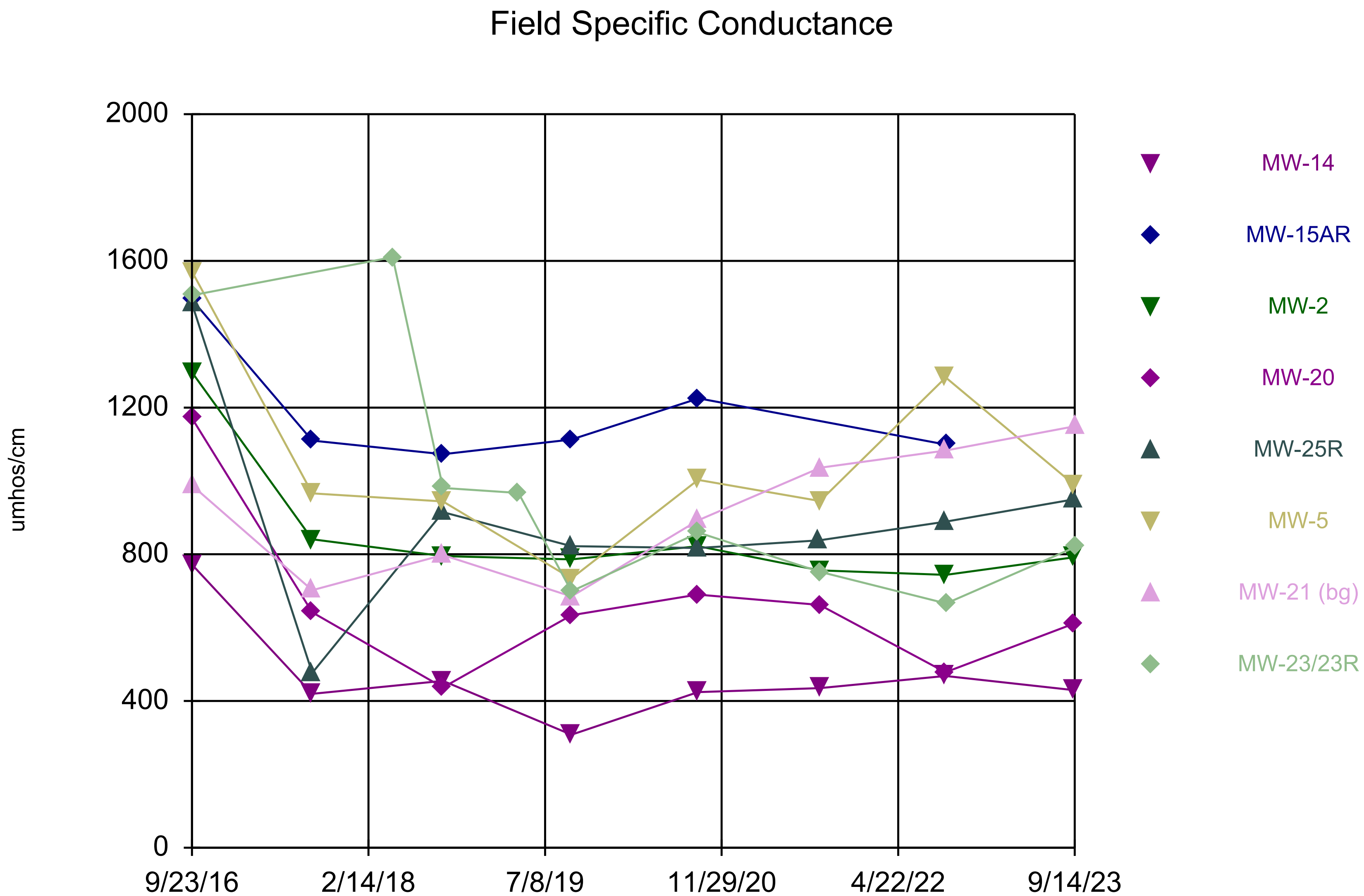

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Field Specific Conductance (umhos/cm)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	772	1494	1296	1171	1483	1571	988	1506
9/5/2017	419.5	1110	841	641.8	476.5	966	702	
4/25/2018								1610
9/17/2018	455	1073	795	437	915	944	798	981
4/23/2019								967
9/23/2019	308	1113	786	634	822	734	685	699
9/21/2020				690	817			
9/22/2020	424.1		822			1003		
9/23/2020							893	
9/24/2020		1225						859
9/7/2021					838			
9/8/2021	435		756	662				
9/9/2021						945		752
9/10/2021							1036	
9/6/2022	468.1			478.4	889			
9/7/2022			744			1282	1083	
9/8/2022								666
9/9/2022		1099						
9/11/2023	429.5							
9/12/2023			792	611	950			
9/13/2023						989		
9/14/2023							1149	819

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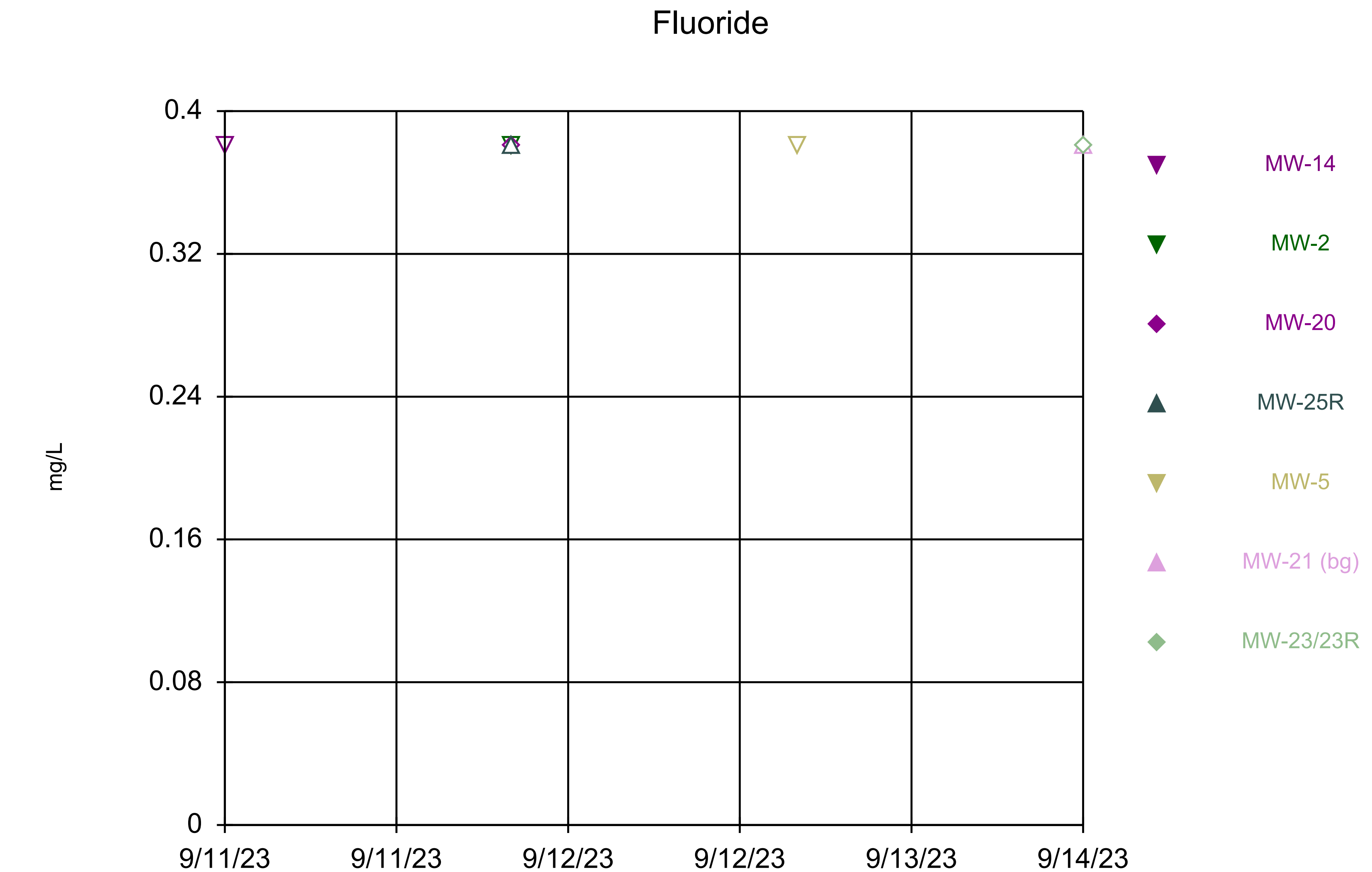


Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

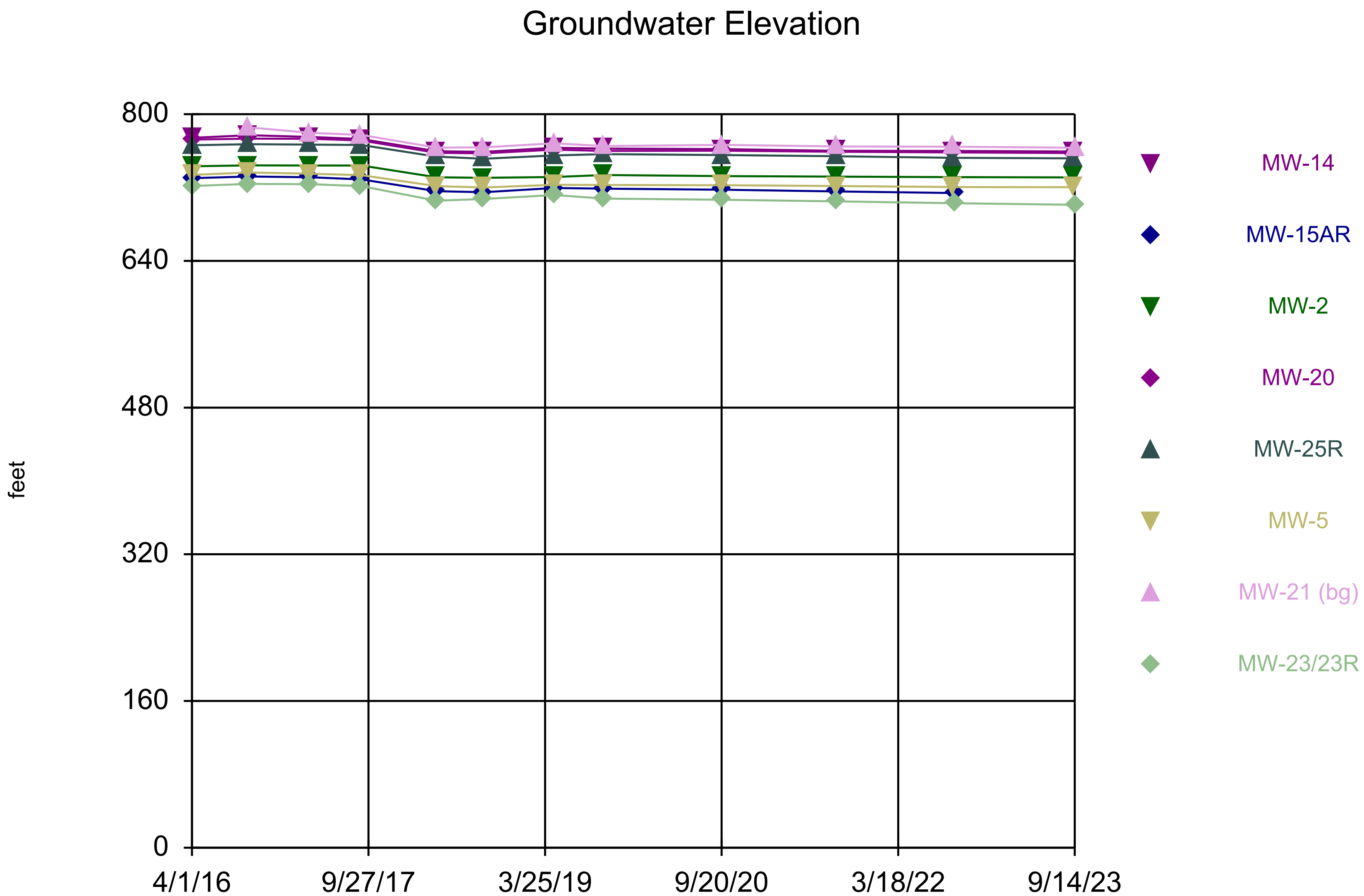
Constituent: Fluoride (mg/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/11/2023	<0.38 (U)						
9/12/2023		<0.38 (U)	<0.38 (U)	<0.38 (U)			
9/13/2023					<0.38 (U)		
9/14/2023						<0.38 (U)	<0.38 (U)

ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Groundwater Elevation (feet)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
4/1/2016	774.17	730.09	743.15	772.22	766.02	733.75		721.62
9/23/2016	776.97	731.95	744.19	773.31	767.17	736.37	785.54	723.89
4/1/2017	775.17	731.2	743.99	773.16	766.82	735.09	779.67	723.7
9/5/2017	772.82	728.88	743.99	771.19	766.34	733.47	777.34	721.48
4/25/2018	759.5356	716.03	731.1388	757.8623	753.6187	721.5403	763.5023	705.67
9/17/2018	758.8656	714.89	730.5288	757.2523	751.2687	720.0603	763.8023	707.41
4/23/2019	763.3256	719.44	731.3988	761.3123	754.9487	722.9203	768.1923	711.8
9/23/2019	762.4456	718.74	733.6188	759.8223	756.3787	722.8403	765.2623	707.94
9/21/2020				760.11	755.38			
9/22/2020	761.94		732.42			722.52		
9/23/2020							766.48	
9/24/2020		717.59						706.64
9/7/2021					754.01			
9/8/2021	759.94		731.84	759.01				
9/9/2021		715.69				721.63		704.82
9/10/2021							764.83	
9/6/2022	759.86			758.2	752.35			
9/7/2022			731.25			720.5	764.45	
9/8/2022								702.85
9/9/2022		713.99						
9/11/2023	759.33							
9/12/2023			731.05	757.61	751.77			
9/13/2023						720.36		
9/14/2023							763.37	701.13

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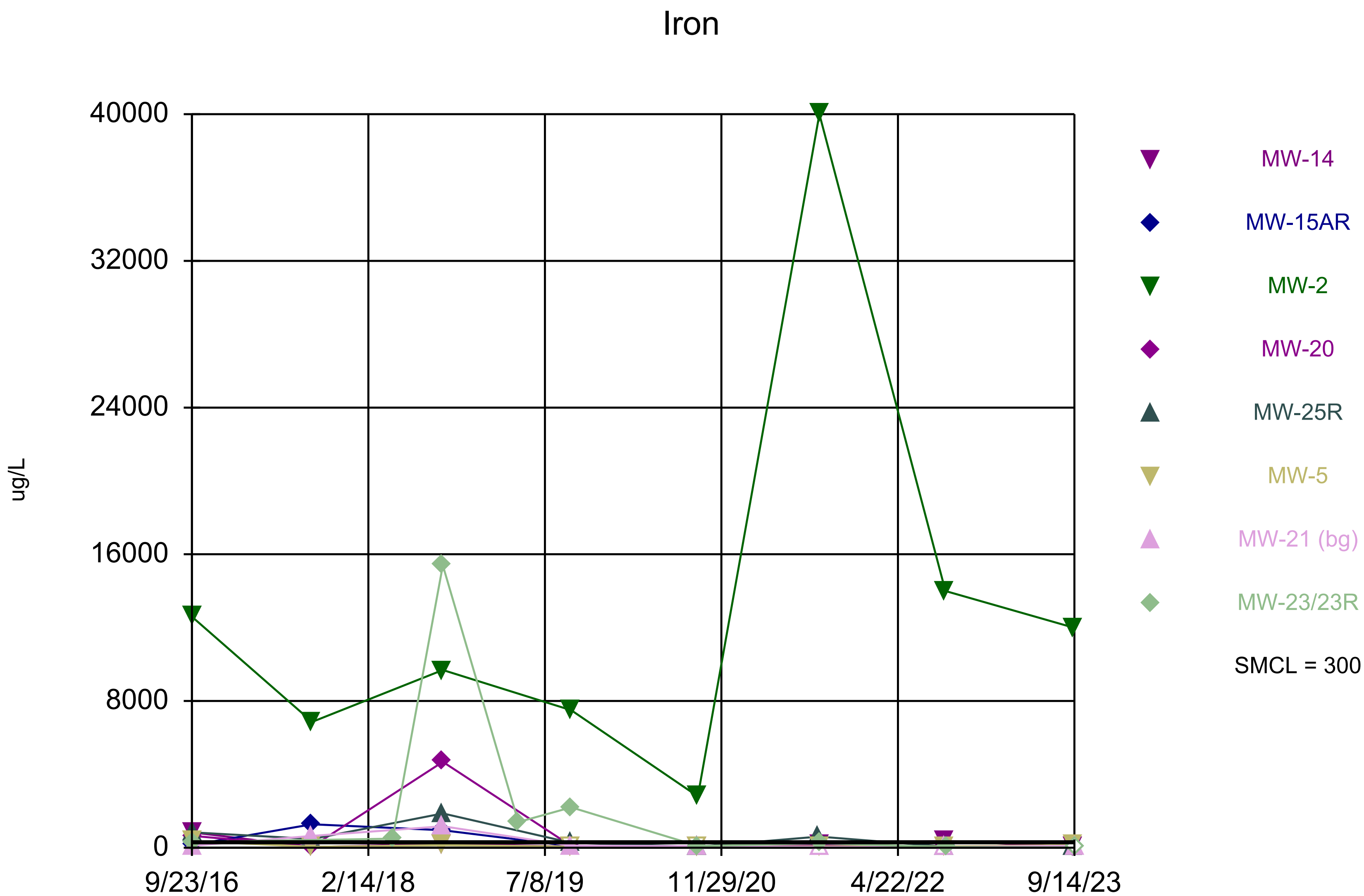
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Iron (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	838	145	12600	648	835	363	110	317
9/5/2017	34.3 (J)	1280	6860	60.7	479	48.8 (J)	644	
4/25/2018								493
9/17/2018	213	951	9690	4680	1870	139	1170	15400
4/23/2019								1400
9/23/2019	67 (J)	88 (J)	7500	93 (J)	270	<66	110	2200
9/21/2020				<50	<50			
9/22/2020	<50		2800			<50		
9/23/2020							78 (J)	
9/24/2020		<50						90 (J)
9/7/2021					610			
9/8/2021	200		40000	180				
9/9/2021						71 (J)		240
9/10/2021							<36	
9/6/2022	370			40 (J)	56 (J)			
9/7/2022			14000			70 (J)	<36	
9/8/2022								40 (J)
9/9/2022		<36						
9/11/2023	54 (J)							
9/12/2023			12000	60 (J)	<36 (U)			
9/13/2023						140		
9/14/2023							100	<36 (U)

ND substitution: RL or RL/2 if <15% NDs.

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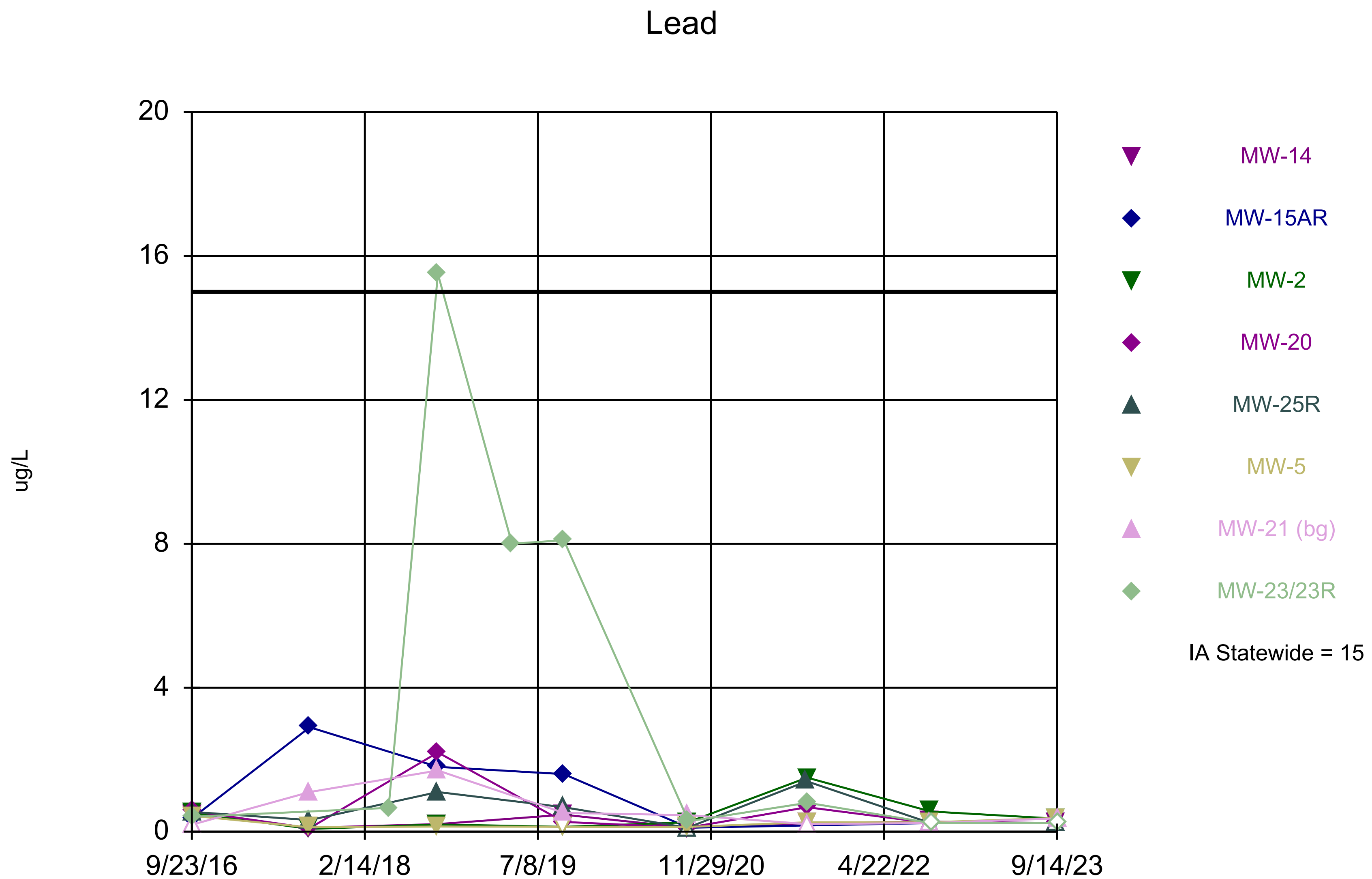
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Lead (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	0.48 (J)	0.37 (J)	0.52 (J)	0.57 (J)	0.55 (J)	0.44 (J)	<0.19	0.41 (J)
9/5/2017	0.11 (J)	2.9	0.075 (J)	0.099 (J)	0.32 (J)	0.12 (J)	1.1	
4/25/2018								0.66 (J)
9/17/2018	0.21 (J)	1.8	0.2 (J)	2.2	1.1	0.14 (J)	1.7	15.5
4/23/2019								8
9/23/2019	0.47 (J)	1.6	<0.27	<0.27	0.68	<0.27	0.52	8.1
9/21/2020				<0.11	<0.11			
9/22/2020	<0.11		0.26 (J)			0.13 (J)		
9/23/2020							0.46 (J)	
9/24/2020		<0.11						0.29 (J)
9/7/2021					1.4			
9/8/2021	0.24 (J)		1.5	0.68				
9/9/2021						0.26 (J)		0.8
9/10/2021							<0.21	
9/6/2022	0.28 (J)			<0.24	<0.24			
9/7/2022			0.56			0.26 (J)	<0.24	
9/8/2022								<0.24
9/9/2022		<0.24						
9/11/2023	<0.24 (U)							
9/12/2023			0.36 (J)	<0.24 (U)	<0.24 (U)			
9/13/2023						0.38 (J)		
9/14/2023							0.37 (J)	<0.24 (U)

ND substitution: RL or RL/2 if <15% NDs.

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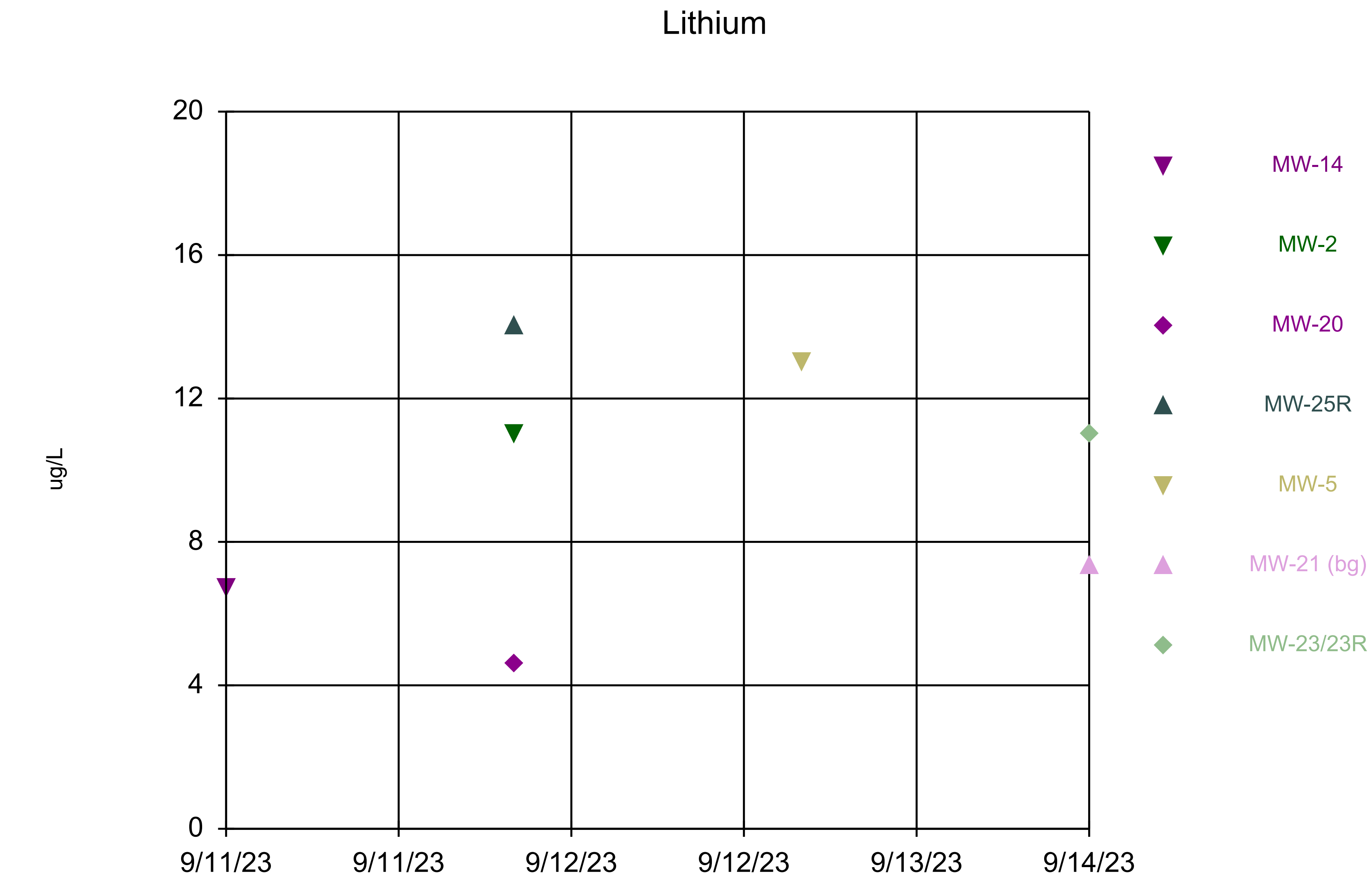


Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

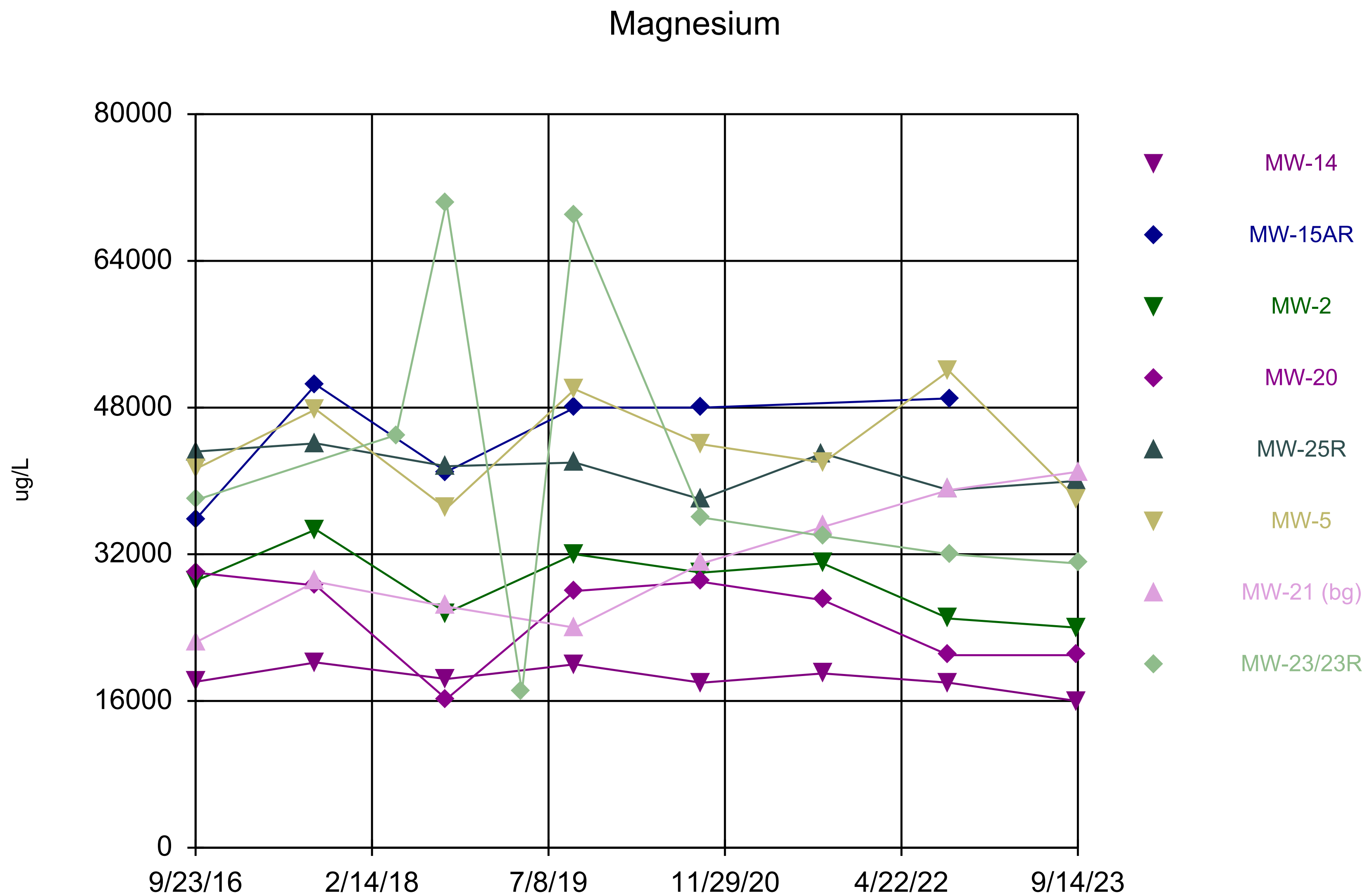
Time Series

Constituent: Lithium (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/11/2023	6.7 (J)						
9/12/2023		11	4.6 (J)	14			
9/13/2023					13		
9/14/2023						7.3 (J)	11

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Magnesium (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	18100	35800	29100	30000	43200	41300	22400	37900
9/5/2017	20200	50500	34700	28600	44100	47800	29000	
4/25/2018								45000
9/17/2018	18400	41000	25600	16200	41600	37000	26300	70400
4/23/2019								17000
9/23/2019	20000	48000	32000	28000	42000	50000	24000	69000
9/21/2020				29000	38000			
9/22/2020	18000		30000			44000		
9/23/2020							31000	
9/24/2020		48000						36000
9/7/2021					43000			
9/8/2021	19000		31000	27000				
9/9/2021						42000		34000
9/10/2021							35000	
9/6/2022	18000			21000	39000			
9/7/2022			25000			52000	39000	
9/8/2022								32000
9/9/2022		49000						
9/11/2023	16000							
9/12/2023			24000	21000	40000			
9/13/2023						38000		
9/14/2023							41000	31000

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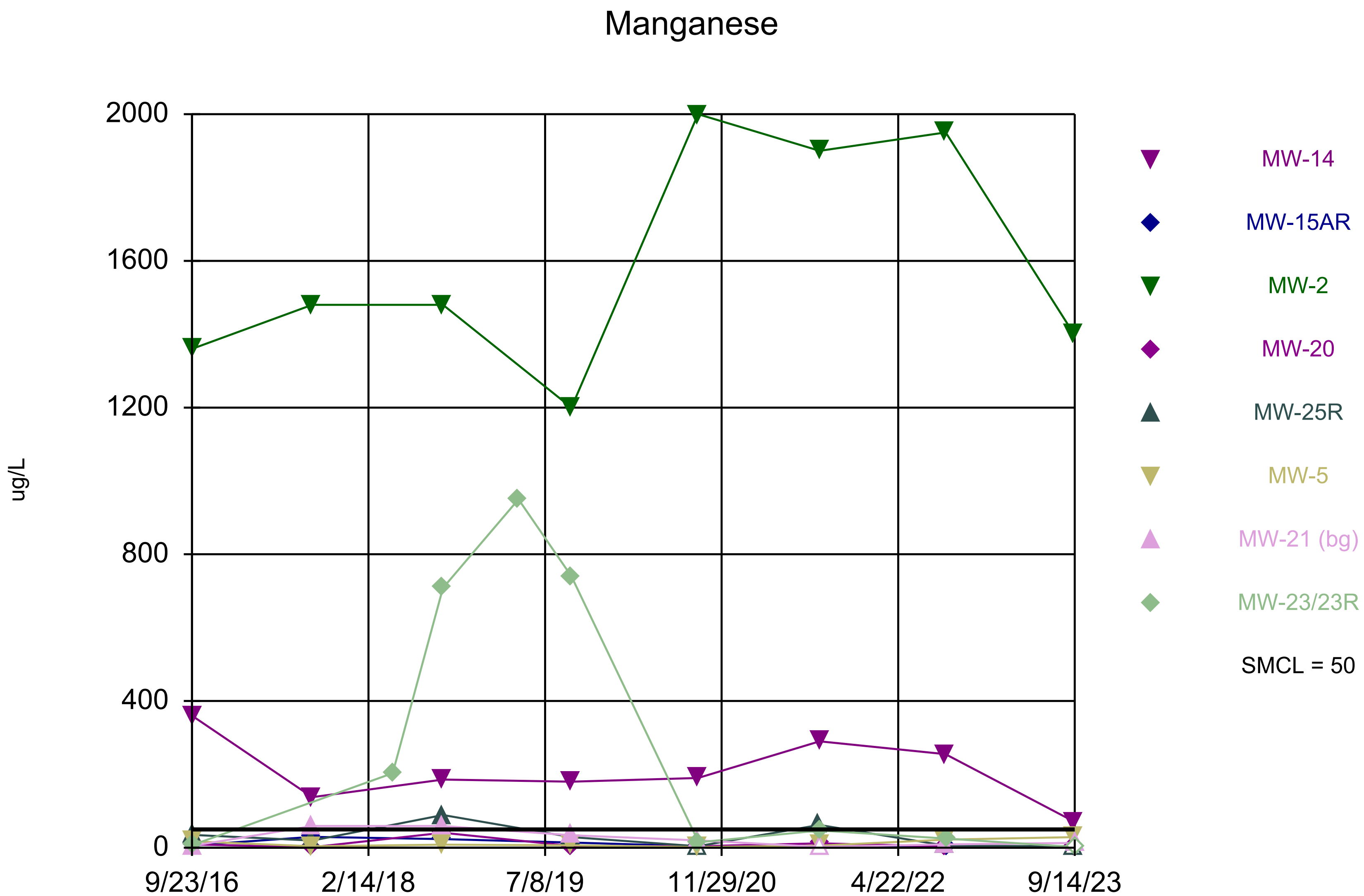
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Manganese (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	360	6.7	1360	9.2	35.2	17.4	5.2	7
9/5/2017	138	29.8	1480	1.6	19.7	4	59.3	
4/25/2018								203
9/17/2018	186	23.5	1480	40.8	89.1	8.2	59.2	708
4/23/2019								950
9/23/2019	180	14	1200	4.6 (J)	29	6.6 (J)	34	740
9/21/2020				<4	<4			
9/22/2020	190		2000			<4		
9/23/2020							20	
9/24/2020		<4						15
9/7/2021					62			
9/8/2021	290		1900	12				
9/9/2021						6 (J)		47
9/10/2021							<4.4	
9/6/2022	255 (D)			<3.6	5.7 (J)			
9/7/2022			1950 (D)			22	9.1 (J)	
9/8/2022								25
9/9/2022		<3.6						
9/11/2023	72							
9/12/2023			1400	<3.6 (U)	<3.6 (U)			
9/13/2023						29		
9/14/2023							13	<3.6 (U)

ND substitution: RL or RL/2 if <15% NDs.

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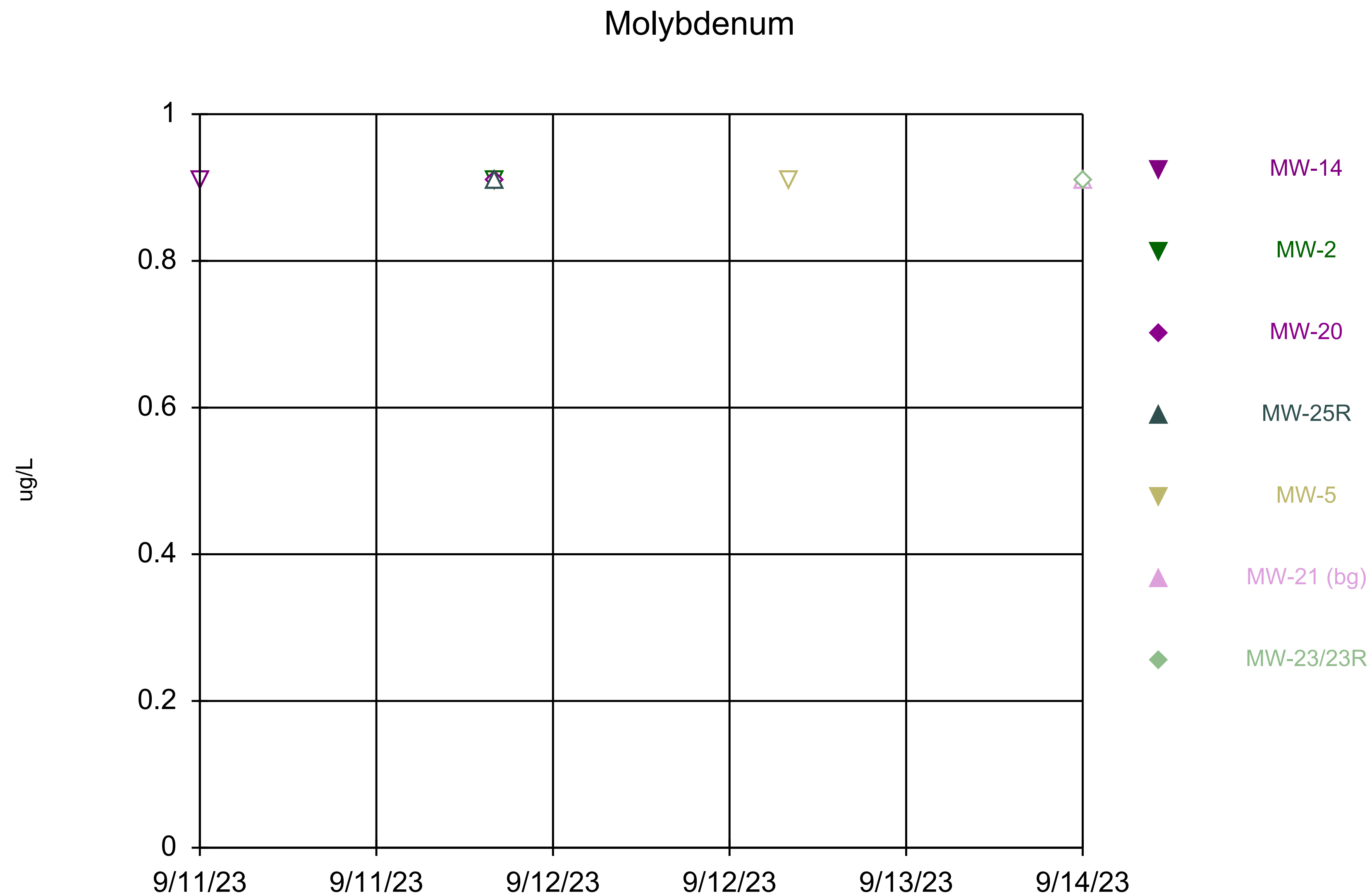
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Molybdenum (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/11/2023	<0.91 (U)						
9/12/2023		<0.91 (U)	<0.91 (U)	<0.91 (U)			
9/13/2023					<0.91 (U)		
9/14/2023						<0.91 (U)	<0.91 (U)

ND substitution: RL or RL/2 if <15% NDs.

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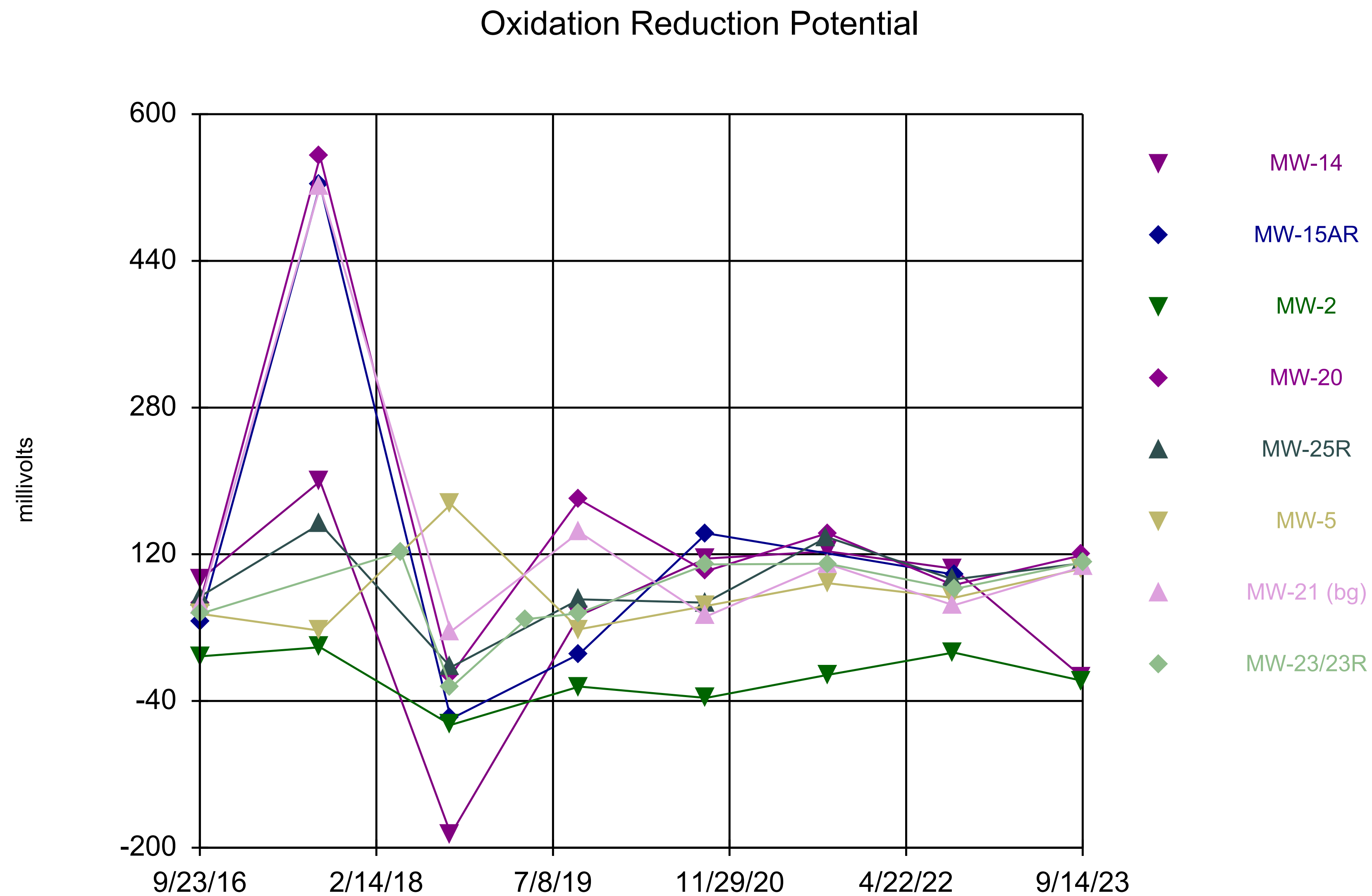

Time Series   Analysis Run 10/23/2023 11:17 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Oxidation Reduction Potential (millivolts)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	92.1	46.5	8.6	66.5	73.8	55.1	63.8	55
9/5/2017	199.6	522.6	18.6	553.8	153.1	36.7	521	
4/25/2018								122.5
9/17/2018	-185.3	-59.5	-66.1	-11.7	-3.1	174.6	35.8	-25.4
4/23/2019								49.2
9/23/2019	53.2	11.3	-24.3	179.7	70.9	38.2	144.2	55.9
9/21/2020				101.5	67.3			
9/22/2020	115.3		-36.7			63.7		
9/23/2020							52.2	
9/24/2020		142.8						108.9
9/7/2021					138.7			
9/8/2021	123.2		-11.5	143				
9/9/2021						88.5		109.7
9/10/2021							109.2	
9/6/2022	104.4			86.4	92.5			
9/7/2022			12.9			72.4	64.4	
9/8/2022								82.1
9/9/2022		97.9						
9/11/2023	-13.3							
9/12/2023			-17.9	118.9	110.2			
9/13/2023						104.5		
9/14/2023							106.2	111.1

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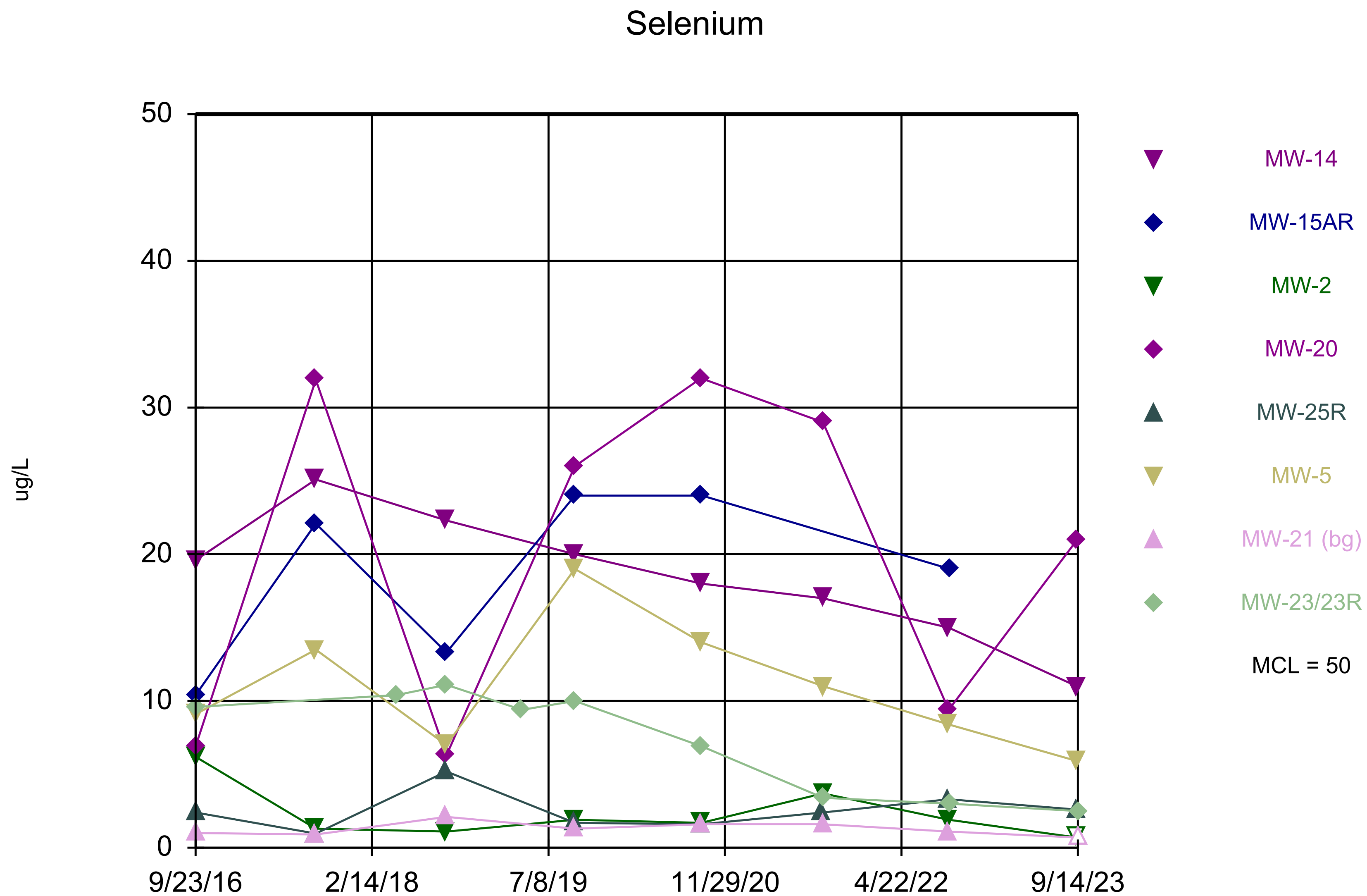
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Selenium (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	19.6	10.4	6.2	6.9	2.4	9.1	1	9.6
9/5/2017	25.1	22.1	1.3	31.9	0.97 (J)	13.5	0.9 (J)	
4/25/2018								10.4
9/17/2018	22.3	13.3	1.1	6.3	5.2	7	2.1	11.1
4/23/2019								9.4
9/23/2019	20	24	1.9 (J)	26	1.7 (J)	19	1.3 (J)	10
9/21/2020				32	1.6 (J)			
9/22/2020	18		1.7 (J)			14		
9/23/2020							1.6 (J)	
9/24/2020		24						6.9
9/7/2021					2.4 (J)			
9/8/2021	17		3.7 (J)	29				
9/9/2021						11		3.4 (J)
9/10/2021							1.6 (J)	
9/6/2022	15			9.4	3.3 (J)			
9/7/2022			1.9 (J)			8.4	1.1 (J)	
9/8/2022								3 (J)
9/9/2022		19						
9/11/2023	11							
9/12/2023			<1.4 (U)	21	2.6 (J)			
9/13/2023						5.9		
9/14/2023							<1.4 (U)	2.5 (J)

ND substitution: RL or RL/2 if <15% NDs.

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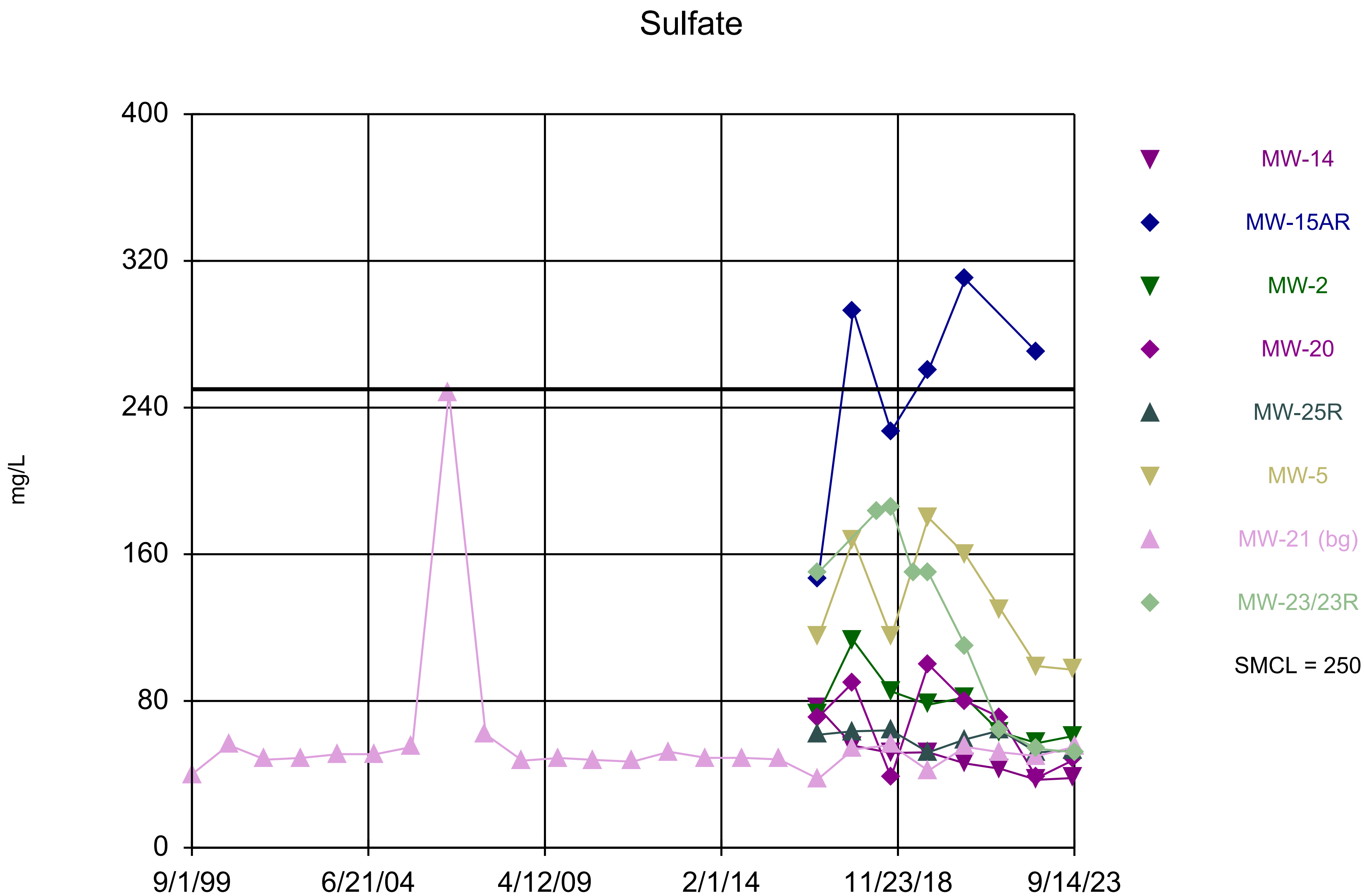

Time Series   Analysis Run 10/23/2023 11:17 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Sulfate (mg/L) Analysis Run 10/23/2023 11:20 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/1/1999							40	
9/1/2000							56	
9/1/2001							48	
9/1/2002							49	
9/1/2003							51	
9/1/2004							51	
9/1/2005							55	
9/1/2006							248 (X)	
9/1/2007							61.8	
9/1/2008							47.5	
9/1/2009							48.9	
8/1/2010							47.9	
9/1/2011							46.9	
9/1/2012							52.3	
9/1/2013							49	
9/1/2014							49	
9/1/2015							48.1	
9/23/2016	76.3	147	73.2	71.2	61.6	115	37.5	150
9/5/2017	55.6	293	113	90.2	63.5	168	53.6	
4/25/2018								183
9/17/2018	51.7	227	85.3	38.4	64	115	56	186
4/23/2019								150
9/23/2019	52	260	78	100	52	180	42	150
9/21/2020				80	59			
9/22/2020	46		82			160		
9/23/2020							55	
9/24/2020		310						110
9/7/2021					64			
9/8/2021	43		63	71				
9/9/2021						130		64
9/10/2021							52	
9/6/2022	37			38	52			
9/7/2022			57			99	50	
9/8/2022								54
9/9/2022		270						
9/11/2023	38							
9/12/2023			61	48	53			
9/13/2023						97		
9/14/2023							55	52

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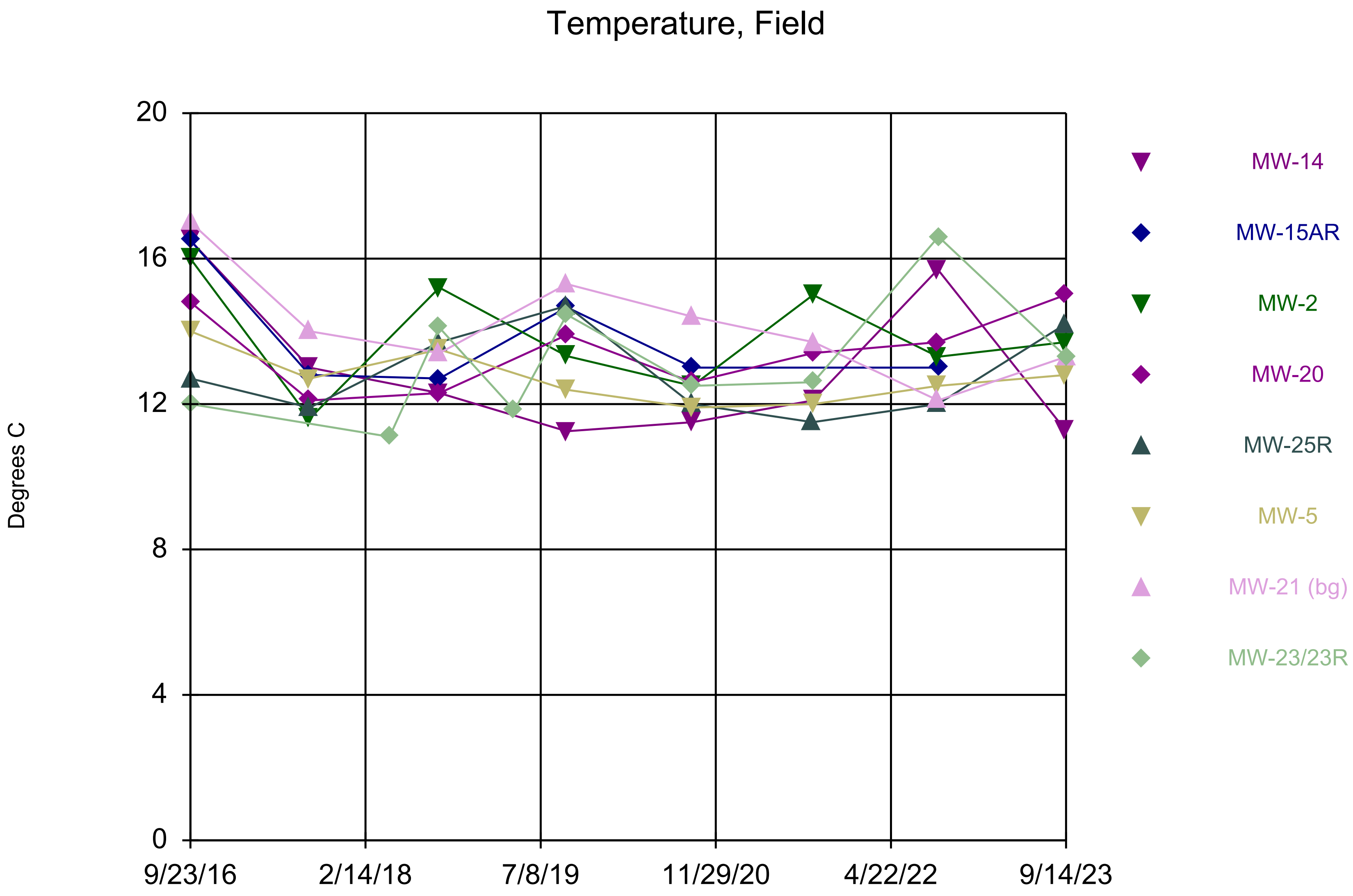

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Temperature, Field (Degrees C) Analysis Run 10/23/2023 11:20 AM View: shallow
Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	16.5	16.5	16	14.8	12.7	14	17	12
9/5/2017	13	12.8	11.6	12.1	11.9	12.7	14	
4/25/2018								11.1
9/17/2018	12.3	12.7	15.2	12.3	13.7	13.5	13.4	14.1
4/23/2019								11.83
9/23/2019	11.25	14.66	13.32	13.9	14.7	12.39	15.3	14.46
9/21/2020				12.6	12			
9/22/2020	11.5		12.5			11.9		
9/23/2020							14.4	
9/24/2020		13						12.5
9/7/2021					11.5			
9/8/2021	12.1		15	13.4				
9/9/2021						12		12.6
9/10/2021							13.7	
9/6/2022	15.7			13.7	12			
9/7/2022			13.3			12.5	12.1	
9/8/2022								16.6
9/9/2022		13						
9/11/2023	11.3							
9/12/2023			13.7	15	14.2			
9/13/2023						12.8		
9/14/2023							13.3	13.3

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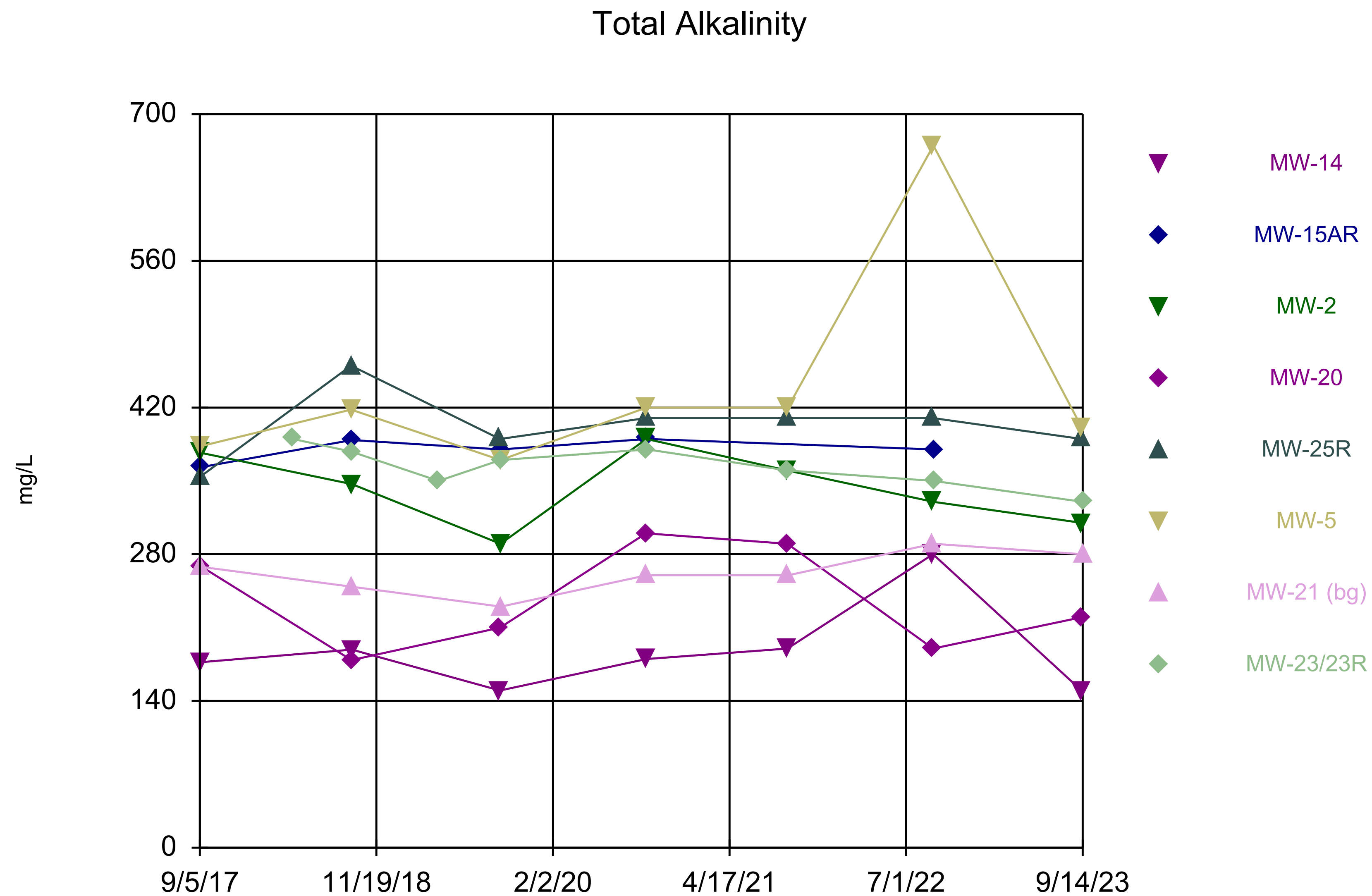

Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Total Alkalinity (mg/L) Analysis Run 10/23/2023 11:20 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/5/2017			377			383		
9/6/2017		363		269	354			
9/7/2017	177						268	
4/25/2018								390
9/17/2018					460	418		378
9/18/2018				179				
9/19/2018	189	389	347					
9/20/2018							249	
4/23/2019								350
9/23/2019	150			210	390			
9/24/2019		380	290			370		370
9/25/2019							230	
9/21/2020				300	410			
9/22/2020	180		390			420		
9/23/2020							260	
9/24/2020		390						380
9/7/2021					410			
9/8/2021	190		360	290				
9/9/2021						420		360
9/10/2021							260	
9/6/2022	280			190	410			
9/7/2022			330			670	290	
9/8/2022								350
9/9/2022		380						
9/11/2023	150							
9/12/2023			310	220	390			
9/13/2023						400		
9/14/2023							280	330

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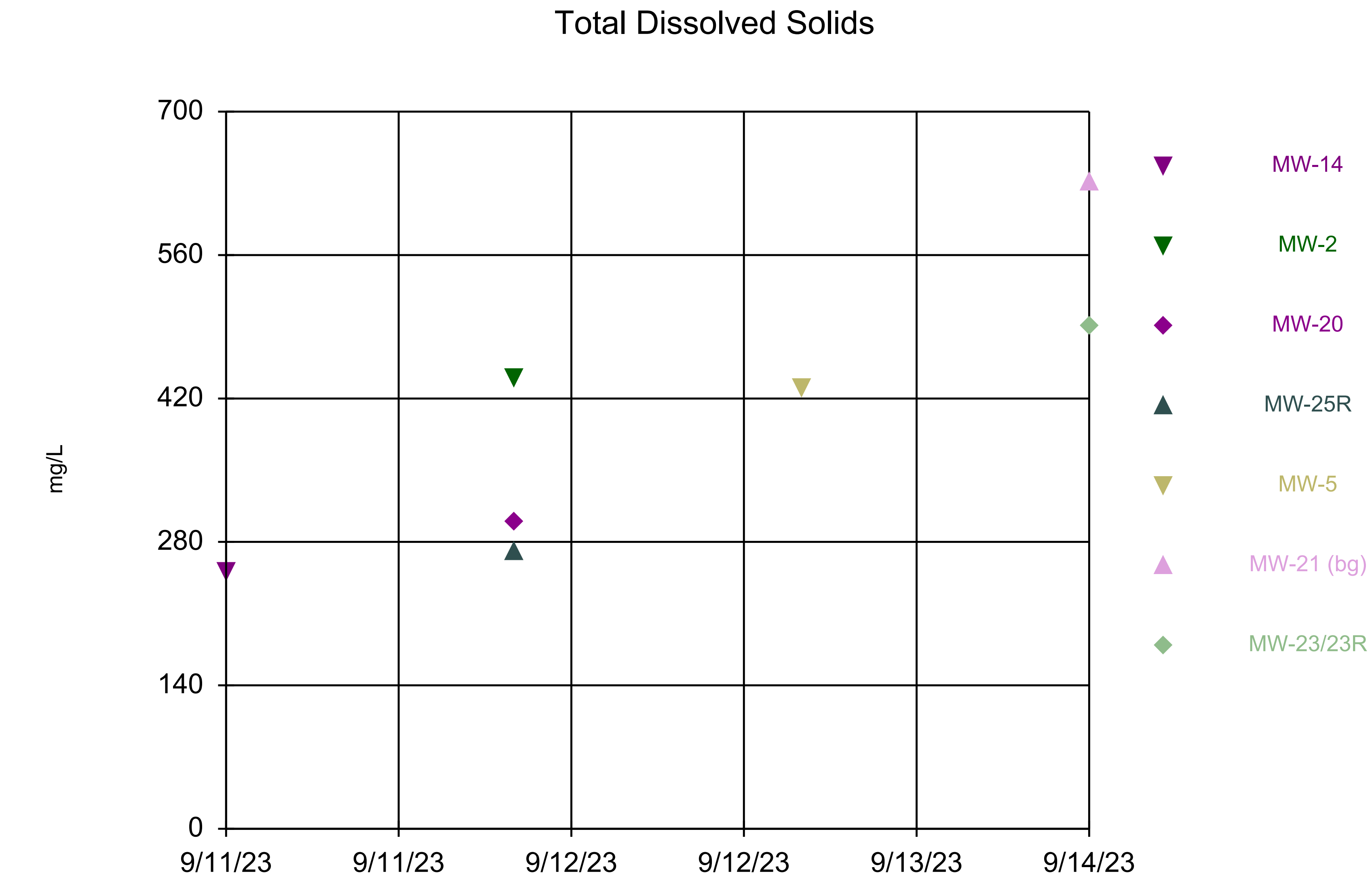


Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

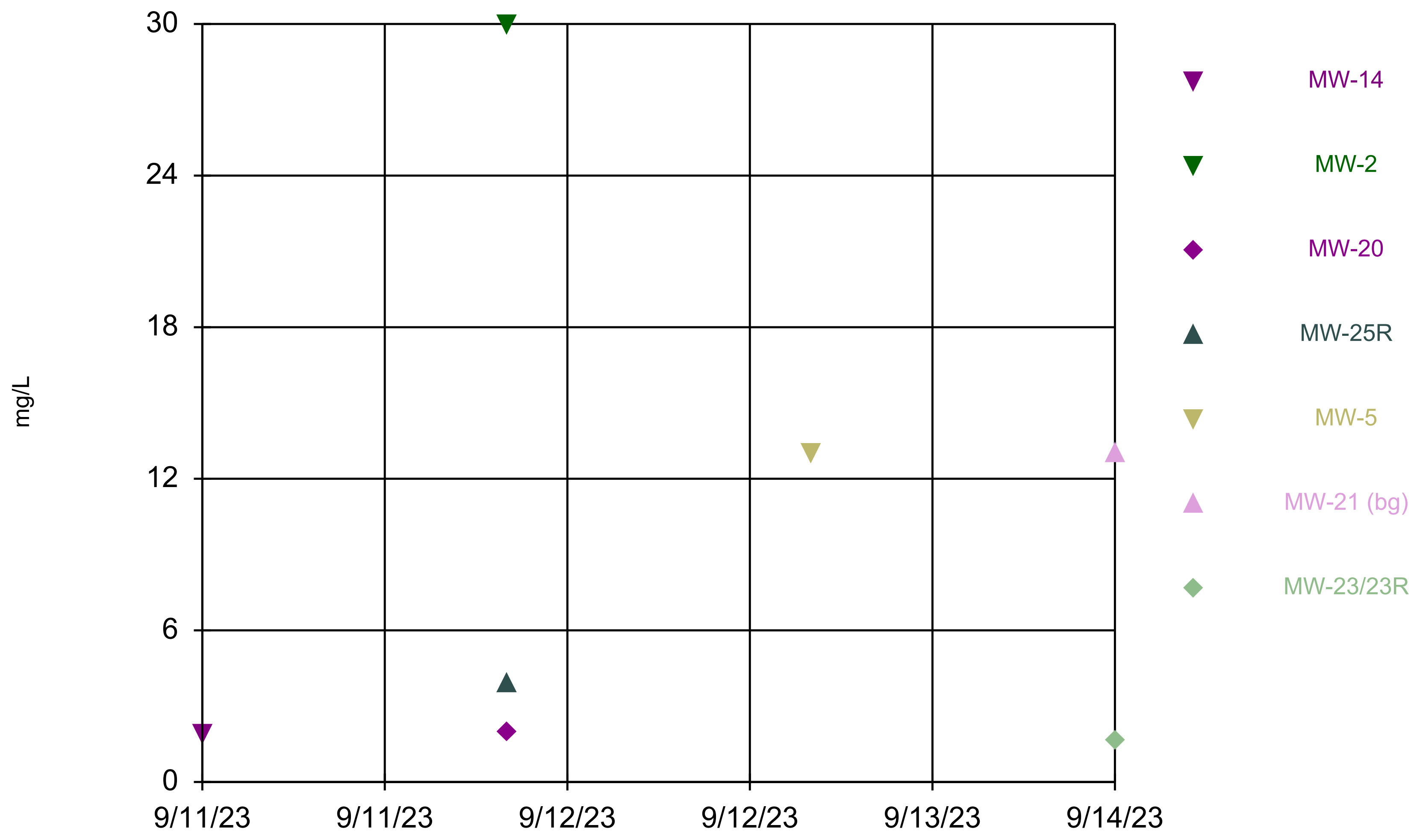
Time Series

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/11/2023	250						
9/12/2023		440	300	270			
9/13/2023					430		
9/14/2023						630	490

Total Suspended Solids



Time Series Analysis Run 10/23/2023 11:17 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Total Suspended Solids (mg/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/11/2023	1.9						
9/12/2023		30	2	3.9			
9/13/2023					13		
9/14/2023						13	1.6 (J)

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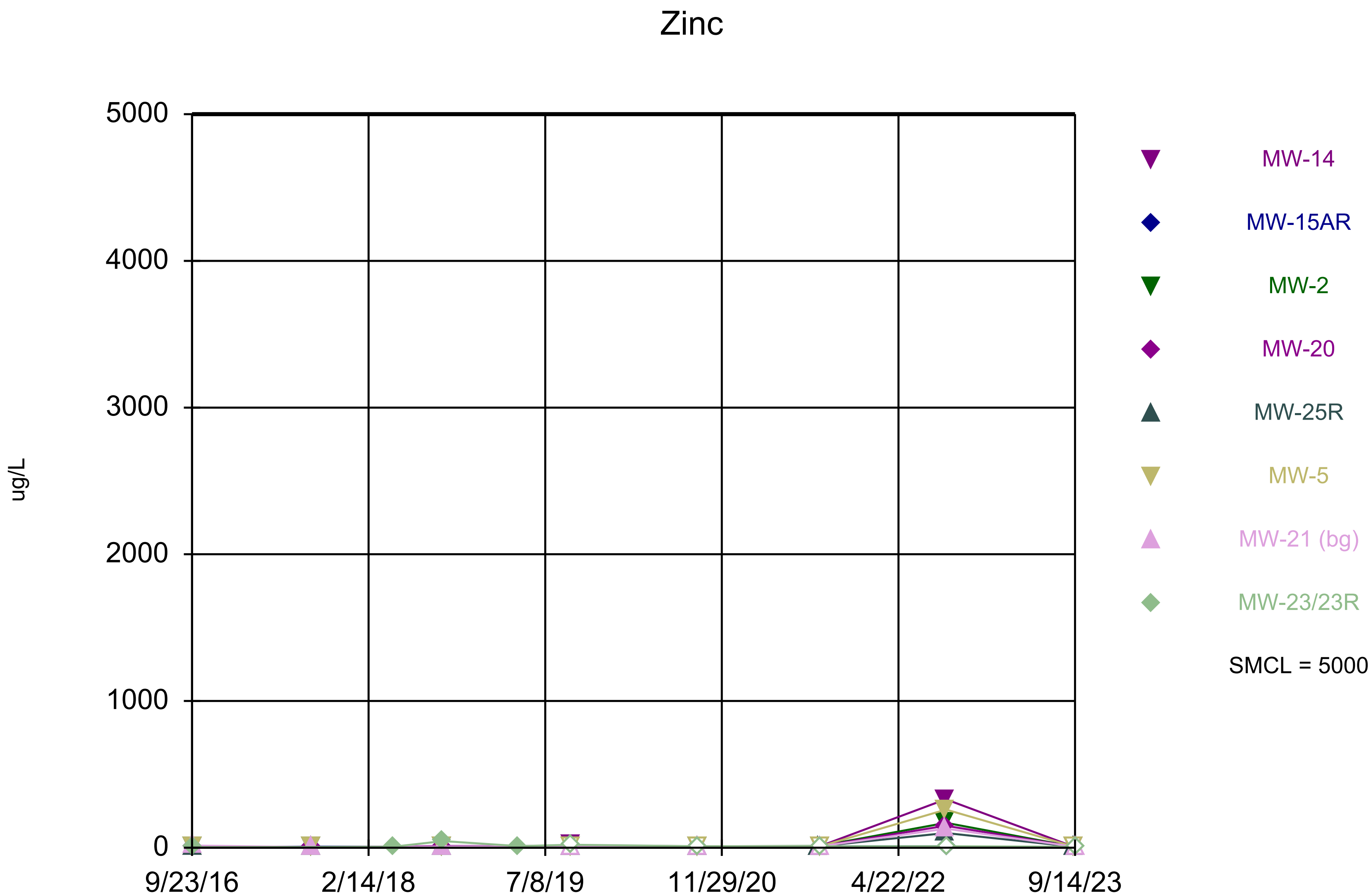
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:18 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Zinc (ug/L)   Analysis Run 10/23/2023 11:20 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

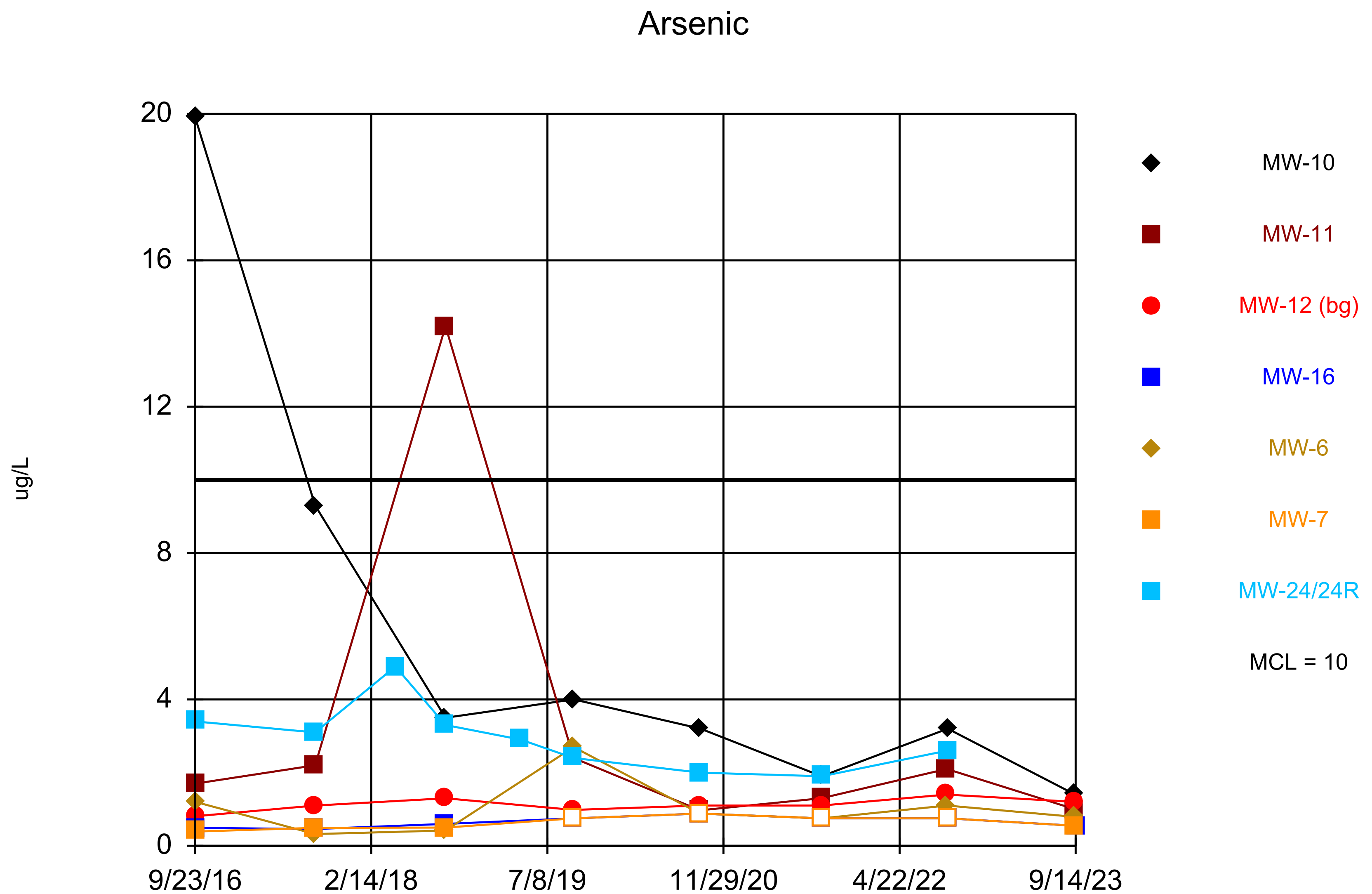
	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	7.3 (J)	2.4 (J)	8.3 (J)	3.8 (J)	7.2 (J)	4 (J)	14.2	3.7 (J)
9/5/2017	3.4 (J)	7 (J)	2 (J)	1.8 (J)	4.7 (J)	2 (J)	4.7 (J)	
4/25/2018								6.3 (J)
9/17/2018	6 (J)	7.8 (J)	6.6 (J)	11.5	8.2 (J)	4.9 (J)	8 (J)	44.8
4/23/2019								11 (J)
9/23/2019	15 (J)	<10	<10	<10	<10	<10	<10	<20
9/21/2020				<10	<10			
9/22/2020	<10		<10			<10		
9/23/2020							<10	
9/24/2020		<10						<10
9/7/2021					<10			
9/8/2021	<10		12 (J)	<10				
9/9/2021						<10		<10
9/10/2021							<10	
9/6/2022	330			150	100			
9/7/2022			170			260	130 (X)	
9/8/2022								<10
9/9/2022		<10						
9/11/2023	<6.4 (U)							
9/12/2023			6.6 (J)	<6.4 (U)	<6.4 (U)			
9/13/2023						<6.4 (U)		
9/14/2023							<6.4 (U)	<6.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

Attachment E2

Times Series Graphs – Deep

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

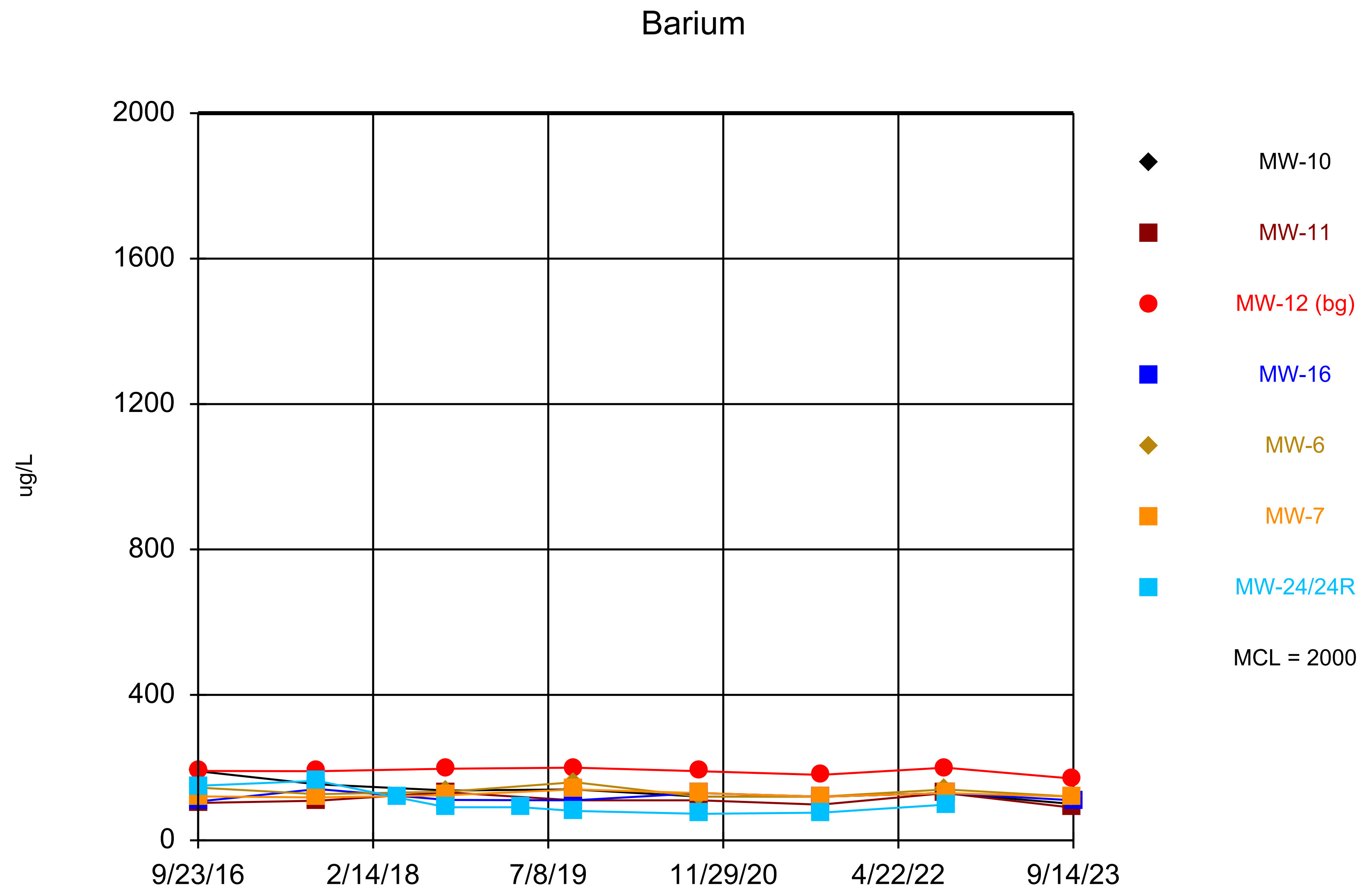
Constituent: Arsenic (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	19.9	1.7	0.81 (J)	0.49 (J)	1.2	0.39 (J)	3.4
9/5/2017	9.3	2.2	1.1	0.46 (J)	0.32 (J)	0.49 (J)	3.1
4/25/2018							4.9
9/17/2018	3.5	14.2	1.3	0.6 (J)	0.42 (J)	0.5 (J)	3.3
4/23/2019							2.9
9/23/2019	4	2.4	0.98 (J)	<0.75	2.7	<0.75	2.4
9/21/2020			1.1 (J)				
9/22/2020		0.97 (J)			<0.88		
9/23/2020				<0.88		<0.88	
9/24/2020	3.2						2
9/8/2021		1.3 (J)	1.1 (J)				
9/9/2021	1.9 (J)			<0.75	<0.75	<0.75	
9/10/2021							1.9 (J)
9/6/2022		2.1	1.4 (J)				
9/7/2022					1.1 (J)		
9/8/2022				<0.75		<0.75	2.6
9/9/2022	3.2						
9/11/2023			1.2 (J)				
9/12/2023		1 (J)					
9/13/2023	1.4 (J)				0.79 (J)	0.55 (J)	
9/14/2023				0.55 (J)			

ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Barium (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	190	103	191	107	145	121	150
9/5/2017	154	109	190	141	127	118	164
4/25/2018							118
9/17/2018	137	132	197	111	134	124	91.1
4/23/2019							91
9/23/2019	140	110	200	110	160	140	81
9/21/2020			190				
9/22/2020		110			120		
9/23/2020				130		130	
9/24/2020	120						73
9/8/2021		98 (B)	180 (B)				
9/9/2021	120 (B)			120 (B)	120 (B)	120 (B)	
9/10/2021							76 (B)
9/6/2022		130	200				
9/7/2022					140		
9/8/2022				130		130	98
9/9/2022	130						
9/11/2023			170				
9/12/2023		90					
9/13/2023	100				120	120	
9/14/2023				110			

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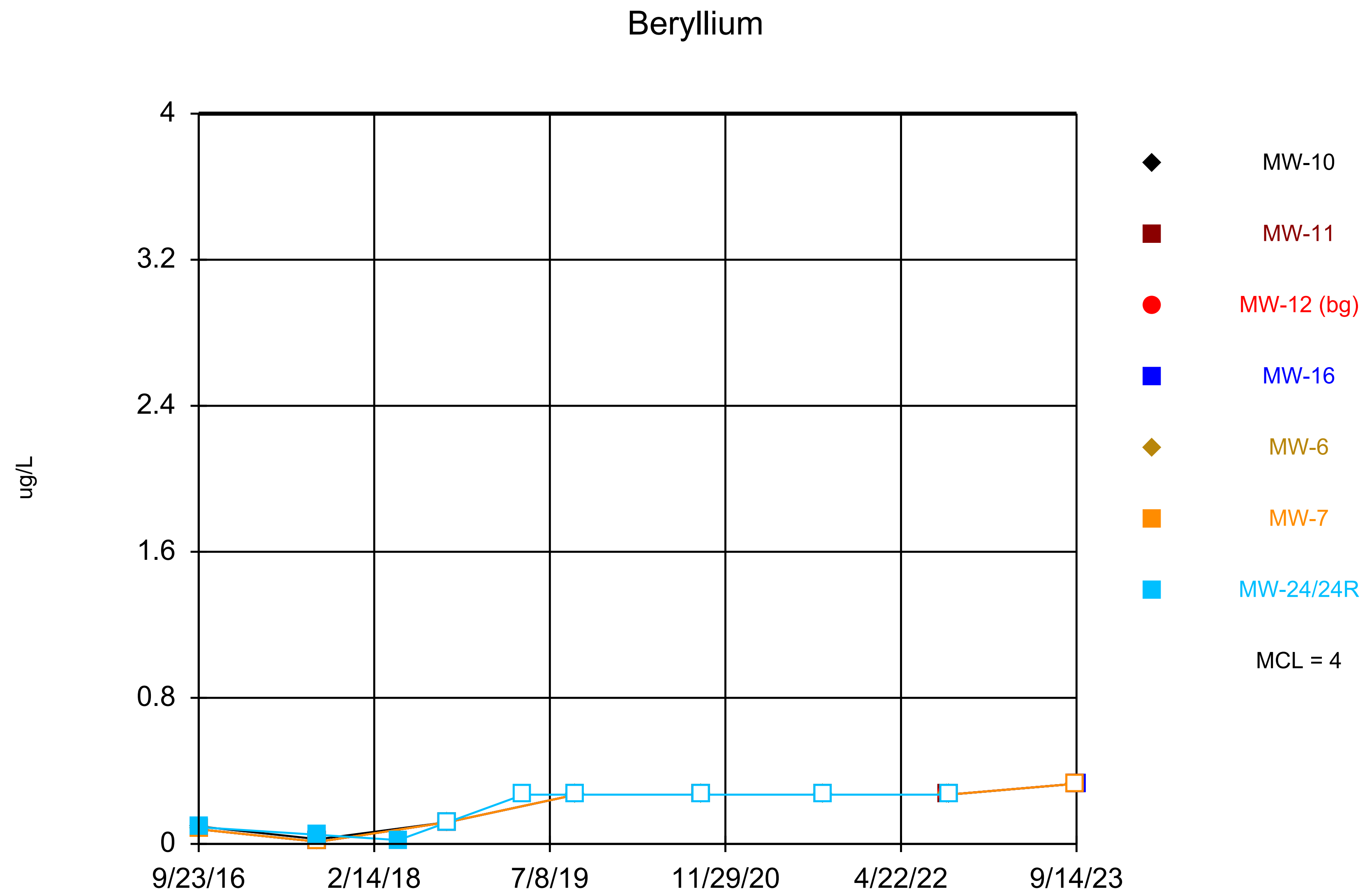
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

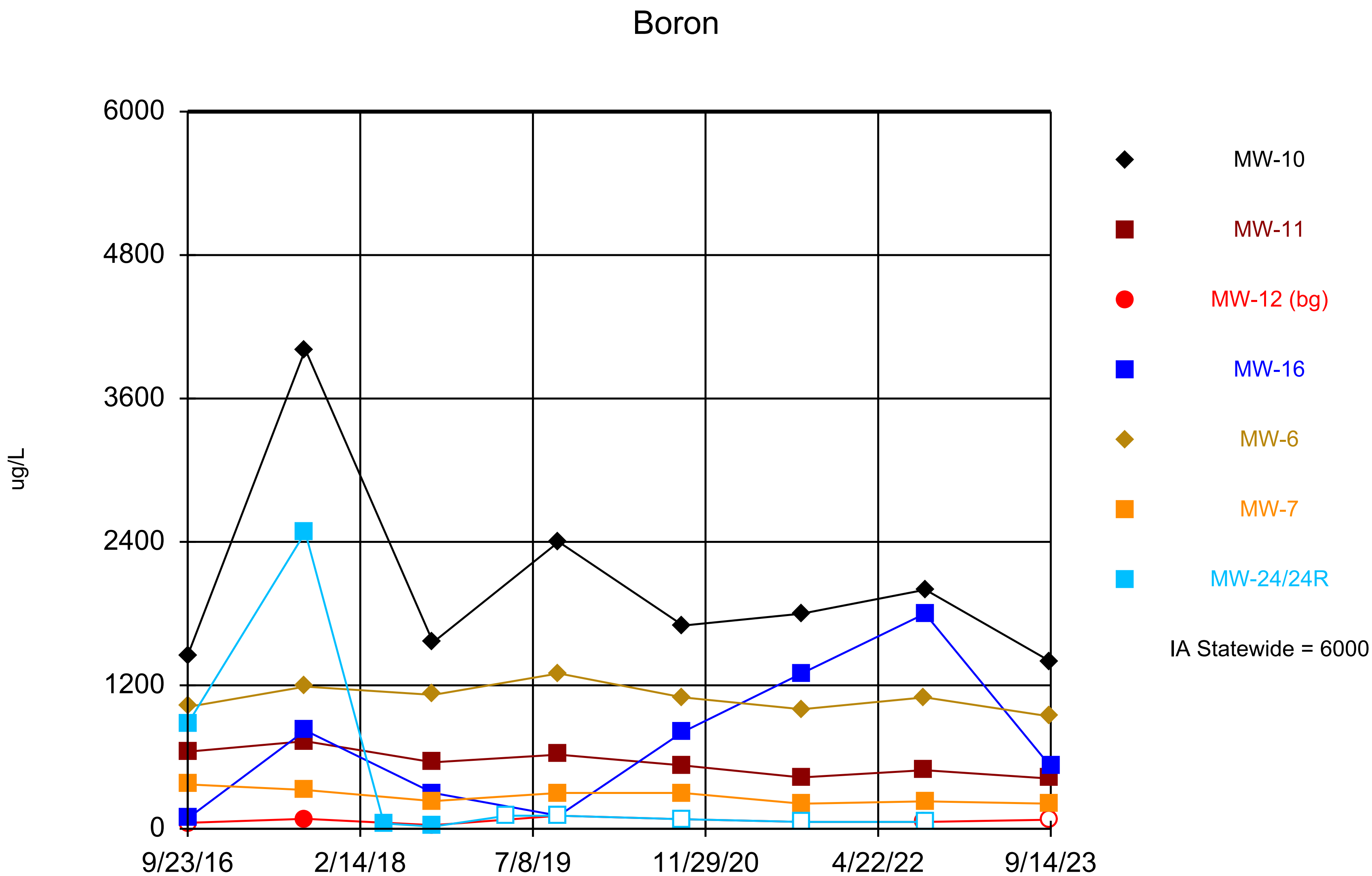
Constituent: Beryllium (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	0.096 (J)	<0.08	<0.08	<0.08	<0.08	<0.08	0.092 (J)
9/5/2017	0.026 (J)	<0.012	<0.012	<0.012	<0.012	<0.012	0.05 (J)
4/25/2018							0.021 (J)
9/17/2018	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
4/23/2019							<0.27
9/23/2019	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
9/21/2020			<0.27				
9/22/2020		<0.27			<0.27		
9/23/2020				<0.27		<0.27	
9/24/2020	<0.27						<0.27
9/8/2021		<0.27	<0.27				
9/9/2021	<0.27			<0.27	<0.27	<0.27	
9/10/2021							<0.27
9/6/2022		<0.27	<0.27				
9/7/2022					<0.27		
9/8/2022				<0.27		<0.27	<0.27
9/9/2022	<0.27						
9/11/2023			<0.33 (U)				
9/12/2023		<0.33 (U)					
9/13/2023	<0.33 (U)				<0.33 (U)	<0.33 (U)	
9/14/2023				<0.33 (U)			

ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series   Analysis Run 10/23/2023 11:37 AM   View: Deep
Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Boron (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	1450	645	<50	87.1 (J)	1020	371	879
9/5/2017	4010	733	83.4 (J)	823	1190	325	2480
4/25/2018							44.3 (J)
9/17/2018	1560	556	30.4 (J)	300	1120	232	18.3 (J)
4/23/2019							<110
9/23/2019	2400	620	<110	110 (J)	1300	300	<110
9/21/2020			<80				
9/22/2020		530			1100		
9/23/2020				810		300	
9/24/2020	1700						<80
9/8/2021		430	<58				
9/9/2021	1800			1300	1000	210	
9/10/2021							<58
9/6/2022		490	<58				
9/7/2022					1100		
9/8/2022				1800		230	<58
9/9/2022	2000						
9/11/2023			<76 (U)				
9/12/2023		420					
9/13/2023	1400				940	210	
9/14/2023				520			

ND substitution: RL or RL/2 if <15% NDs.

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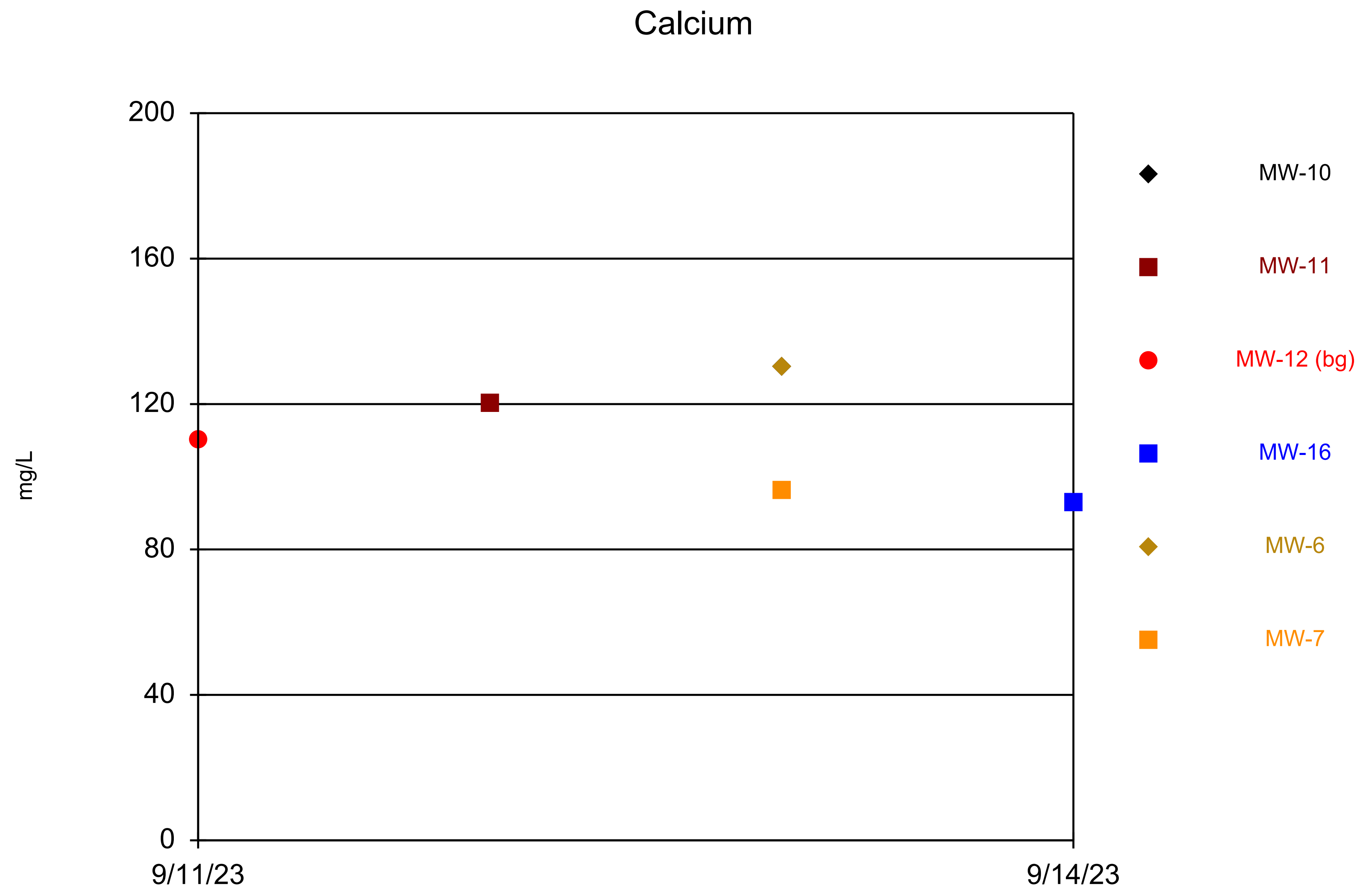

Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Calcium (mg/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7
9/11/2023			110			
9/12/2023		120				
9/13/2023	130				130	96
9/14/2023				93		

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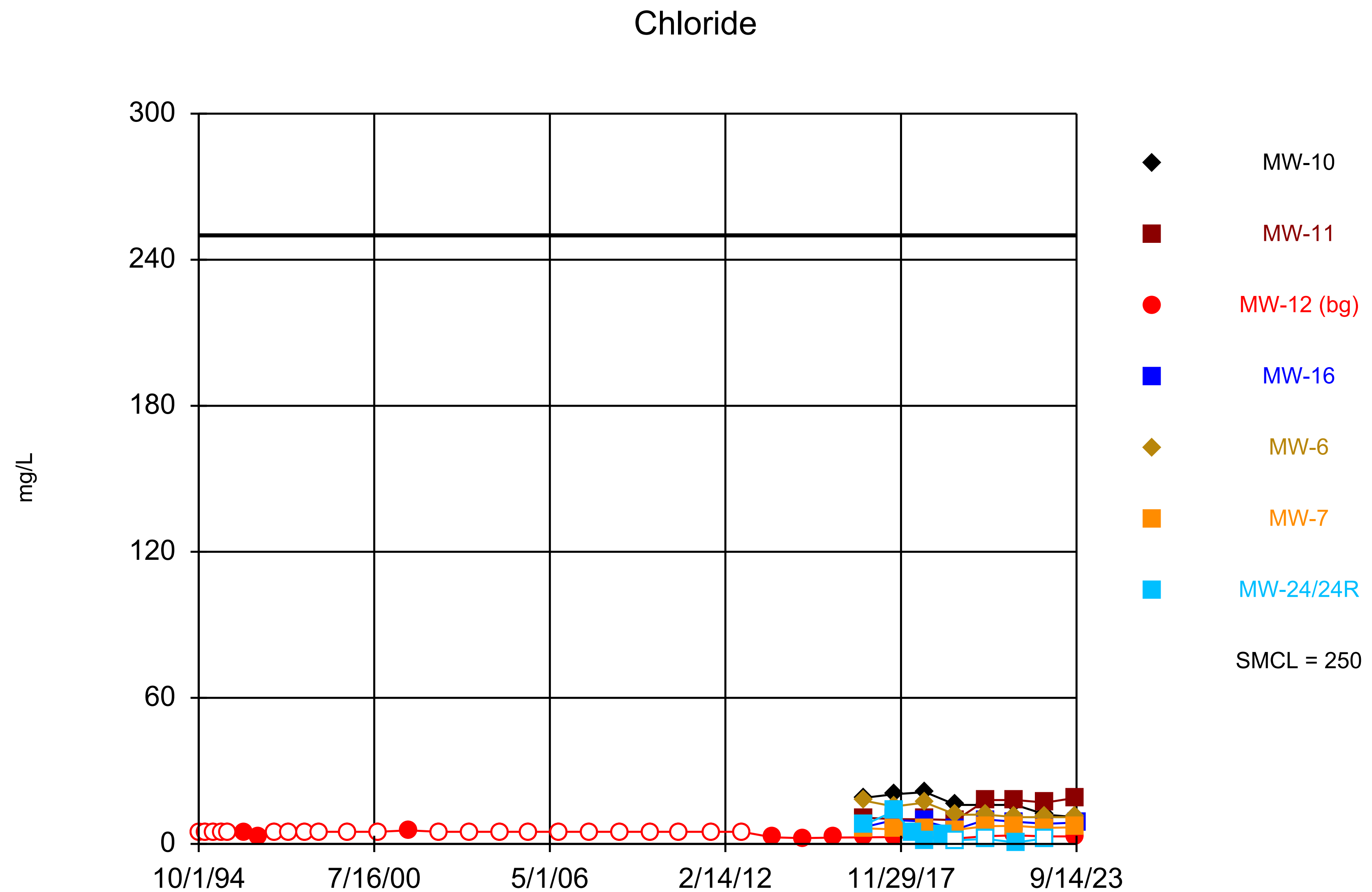
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
10/1/1994			<5 (X)				
1/1/1995			<5 (X)				
4/1/1995			<5 (X)				
7/1/1995			<5 (X)				
10/1/1995			<5 (X)				
4/1/1996			4.3 (X)				
10/1/1996			2.6 (X)				
4/1/1997			<5 (X)				
10/1/1997			<5 (X)				
4/1/1998			<5 (X)				
10/1/1998			<5 (X)				
9/1/1999			<5 (X)				
9/1/2000			<5 (X)				
9/1/2001			5.6 (X)				
9/1/2002			<5 (X)				
9/1/2003			<5 (X)				
9/1/2004			<5 (X)				
9/1/2005			<5 (X)				
9/1/2006			<5 (X)				
9/1/2007			<5 (X)				
9/1/2008			<5 (X)				
9/1/2009			<5 (X)				
8/1/2010			<5 (X)				
9/1/2011			<5 (X)				
9/1/2012			<5 (X)				
9/1/2013			2.7				
9/1/2014			2.4				
9/1/2015			2.6				
9/23/2016	19	10.8	2.7	7	17.7	6.4	8
9/5/2017	20.4	10.2	2.8	9.8	15.4	6	13.4
4/25/2018							4.5
9/17/2018	21.3	10.1	2.4	9.2	17	6.1	1.6
4/23/2019							3.4 (J)
9/23/2019	16	9.8	2.2 (J)	6	12	5.8	<1.5
9/21/2020			3.2 (J)				
9/22/2020		18			12		
9/23/2020				10		7.3	
9/24/2020	16						<2
9/8/2021		18	3.5 (J)				
9/9/2021	16			9.1	11	7.4	
9/10/2021							0.59 (J)
9/6/2022		17	3.1 (J)				
9/7/2022					11		
9/8/2022				8.3		6.6	<2.3
9/9/2022	12						
9/11/2023			3.1 (J)				
9/12/2023		19					
9/13/2023	11				11	6.8	
9/14/2023				8.8			

ND substitution: RL or RL/2 if <15% NDs.

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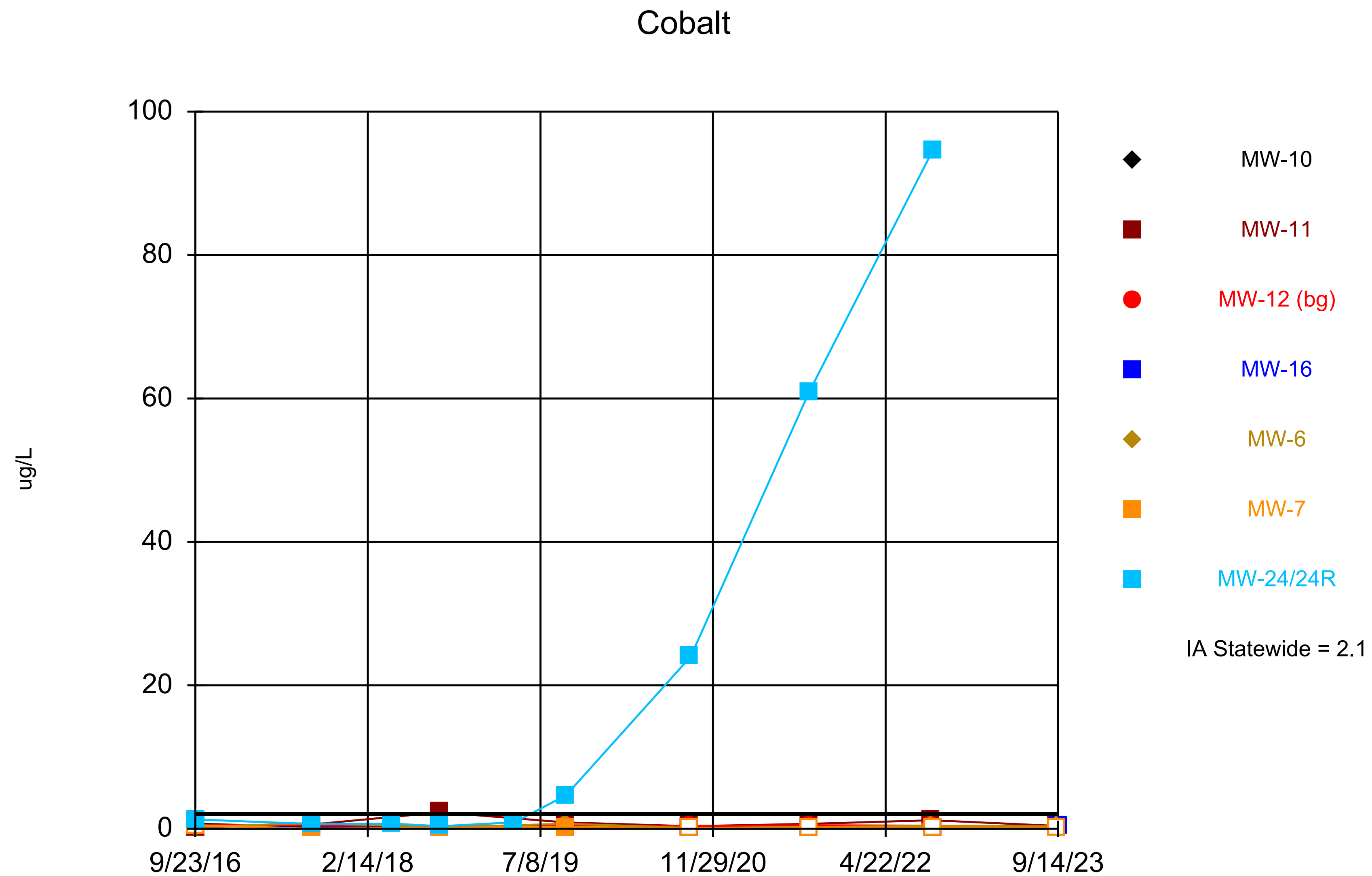
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

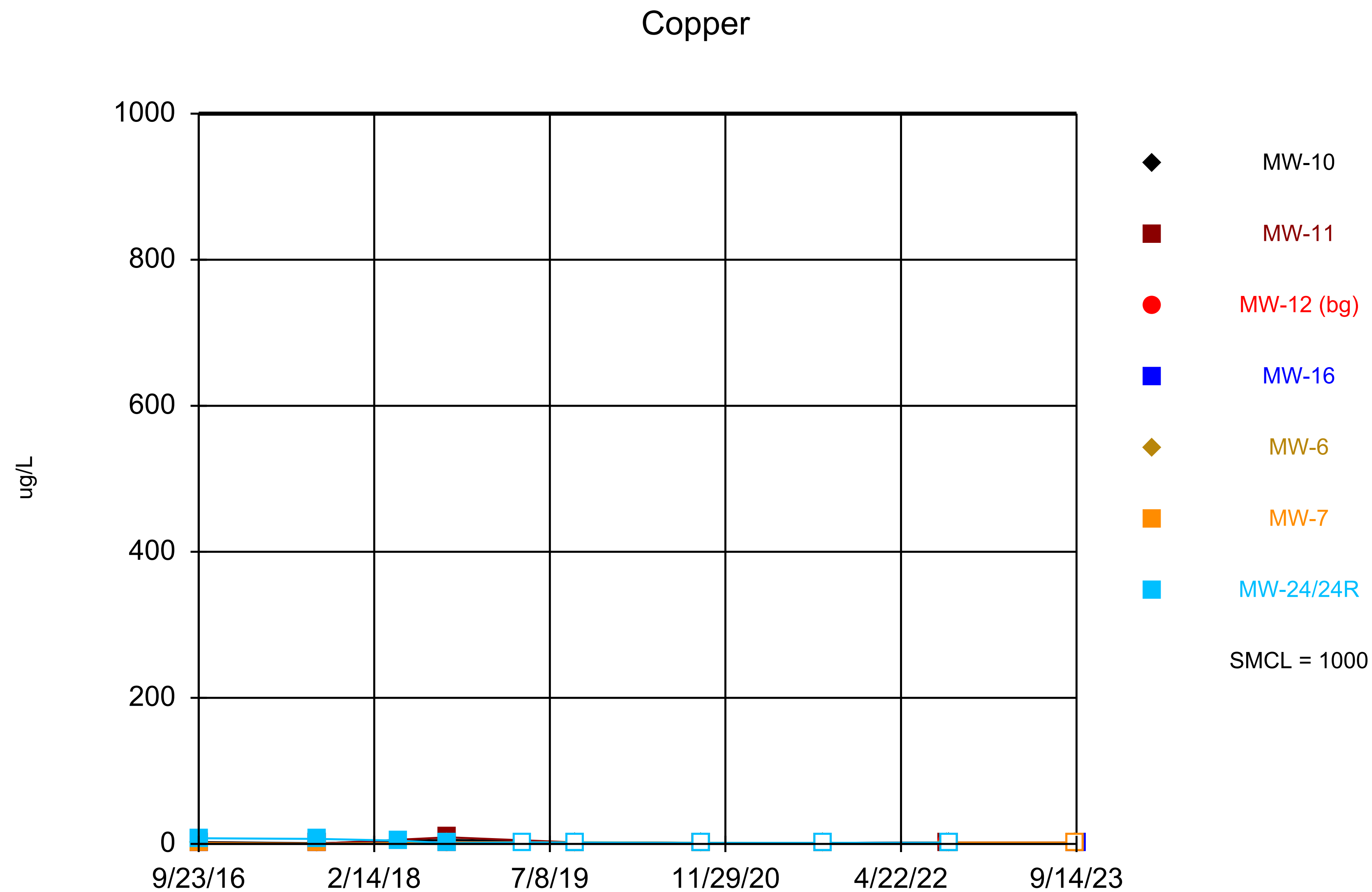
Constituent: Cobalt (ug/L) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	0.68 (J)	<0.5	0.57 (J)	<0.5	<0.5	<0.5	1.3
9/5/2017	0.31 (J)	0.61 (J)	0.46 (J)	0.12 (J)	0.8 (J)	0.024 (J)	0.67 (J)
4/25/2018							0.72 (J)
9/17/2018	0.22 (J)	2.3	0.44 (J)	0.22 (J)	0.2 (J)	<0.15	0.37 (J)
4/23/2019							0.9
9/23/2019	0.2 (J)	0.89	0.4 (J)	0.16 (J)	0.71	0.25 (J)	4.7
9/21/2020			0.4 (J)				
9/22/2020		0.37 (J)			0.13 (J)		
9/23/2020				<0.091		<0.091	
9/24/2020	0.14 (J)						24
9/8/2021		0.69	0.49 (J)				
9/9/2021	<0.19			<0.19	0.23 (J)	<0.19	
9/10/2021							61
9/6/2022		1.2	0.43 (J)				
9/7/2022					0.44 (J)		
9/8/2022				<0.19		<0.19	94.5 (D)
9/9/2022	0.19 (J)						
9/11/2023			0.35 (J)				
9/12/2023		0.4 (J)					
9/13/2023	<0.17 (U)				0.34 (J)	<0.17 (U)	
9/14/2023				0.29 (J)			

ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

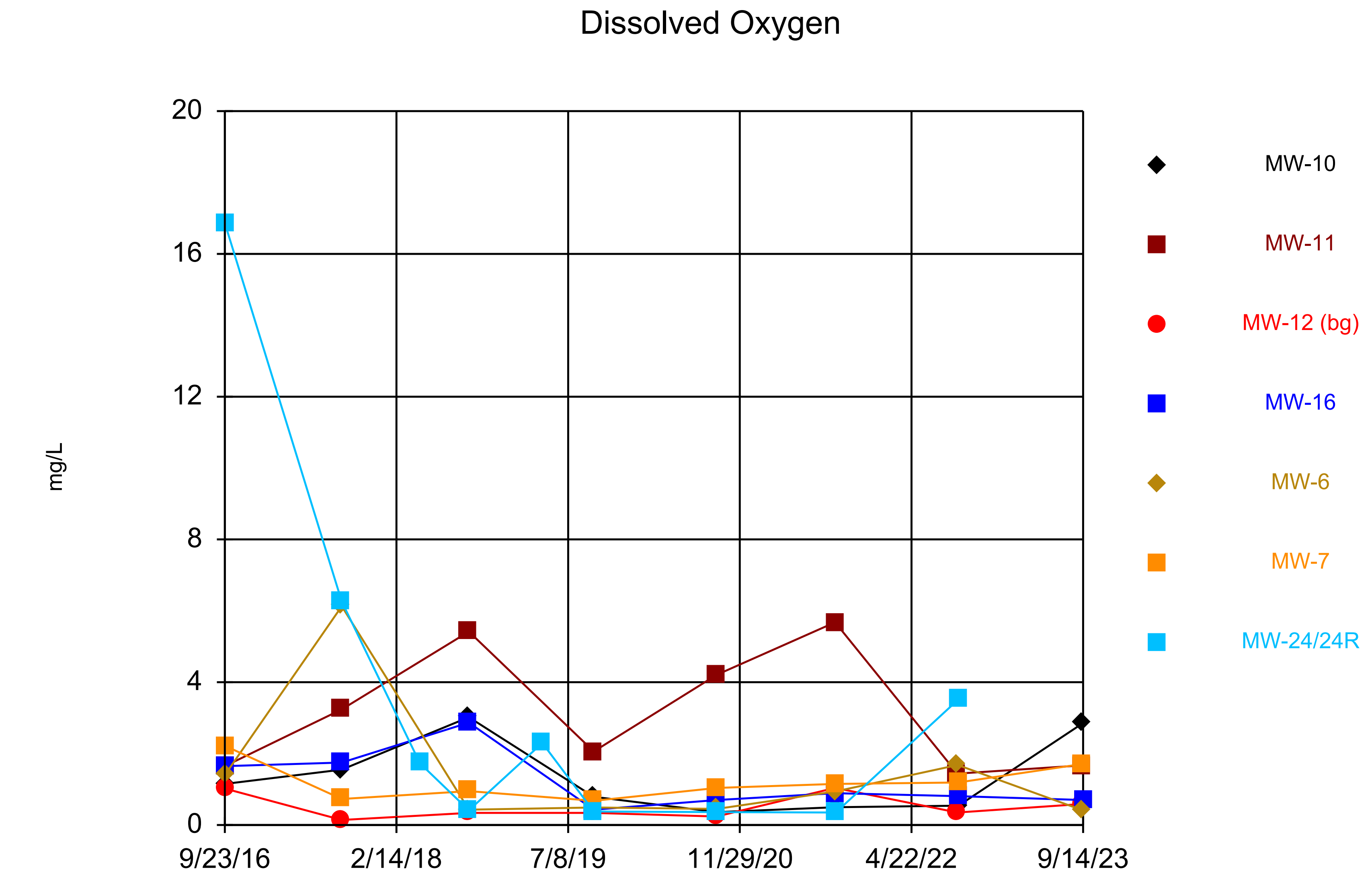
Constituent: Copper (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	2.5	1.6	0.57 (J)	0.21 (J)	1.3	0.95 (J)	7.7
9/5/2017	1	0.35 (J)	0.24 (J)	0.31 (J)	0.2 (J)	0.36 (J)	6.8
4/25/2018							4.6
9/17/2018	5.7	9	<0.48	2.5	2.4	1.7	1.2
4/23/2019							<2
9/23/2019	<2	<2	<2	<2	2.4 (J)	<2	<2
9/21/2020			<1.5				
9/22/2020		<1.5			1.6 (J)		
9/23/2020				1.5 (J)		<1.5	
9/24/2020	<1.5						<1.5
9/8/2021		<1.4	<1.4				
9/9/2021	<1.4			<1.4	<1.4	<1.4	
9/10/2021							<1.4
9/6/2022		<1.8	<1.8				
9/7/2022					<1.8		
9/8/2022				<1.8		<1.8	<1.8
9/9/2022	<1.8						
9/11/2023			<1.8 (U)				
9/12/2023		<1.8 (U)					
9/13/2023	<1.8 (U)				<1.8 (U)	<1.8 (U)	
9/14/2023				<1.8 (U)			

ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Dissolved Oxygen (mg/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	1.15	1.65	1.02	1.65	1.4	2.22	16.86
9/5/2017	1.55	3.24	0.14	1.75	6.13	0.73	6.26
4/25/2018							1.73
9/17/2018	3.02	5.42	0.34	2.87	0.43	0.95	0.41
4/23/2019							2.3
9/23/2019	0.79	2.06	0.34	0.43	0.49	0.68	0.38
9/21/2020			0.24				
9/22/2020		4.21			0.45		
9/23/2020				0.7		1.04	
9/24/2020	0.36						0.36
9/8/2021		5.68	1.04		0.94		
9/9/2021	0.5			0.89		1.15	
9/10/2021							0.35
9/6/2022		1.44	0.35				
9/7/2022					1.68		
9/8/2022				0.81		1.19	3.51
9/9/2022	0.54						
9/11/2023			0.59				
9/12/2023		1.67					
9/13/2023	2.85				0.41	1.71	
9/14/2023				0.7			

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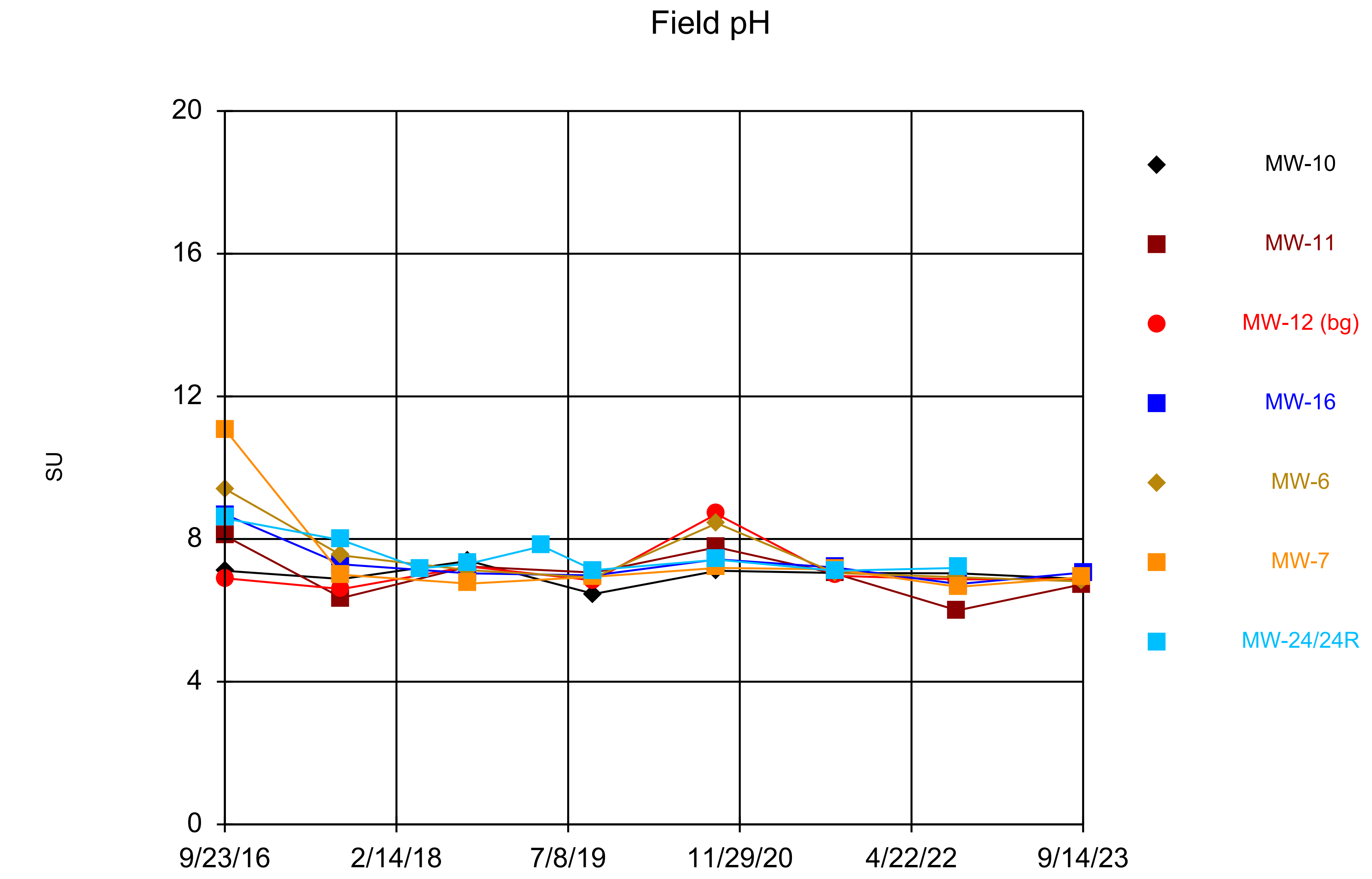


Time Series Analysis Run 10/23/2023 11:37 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

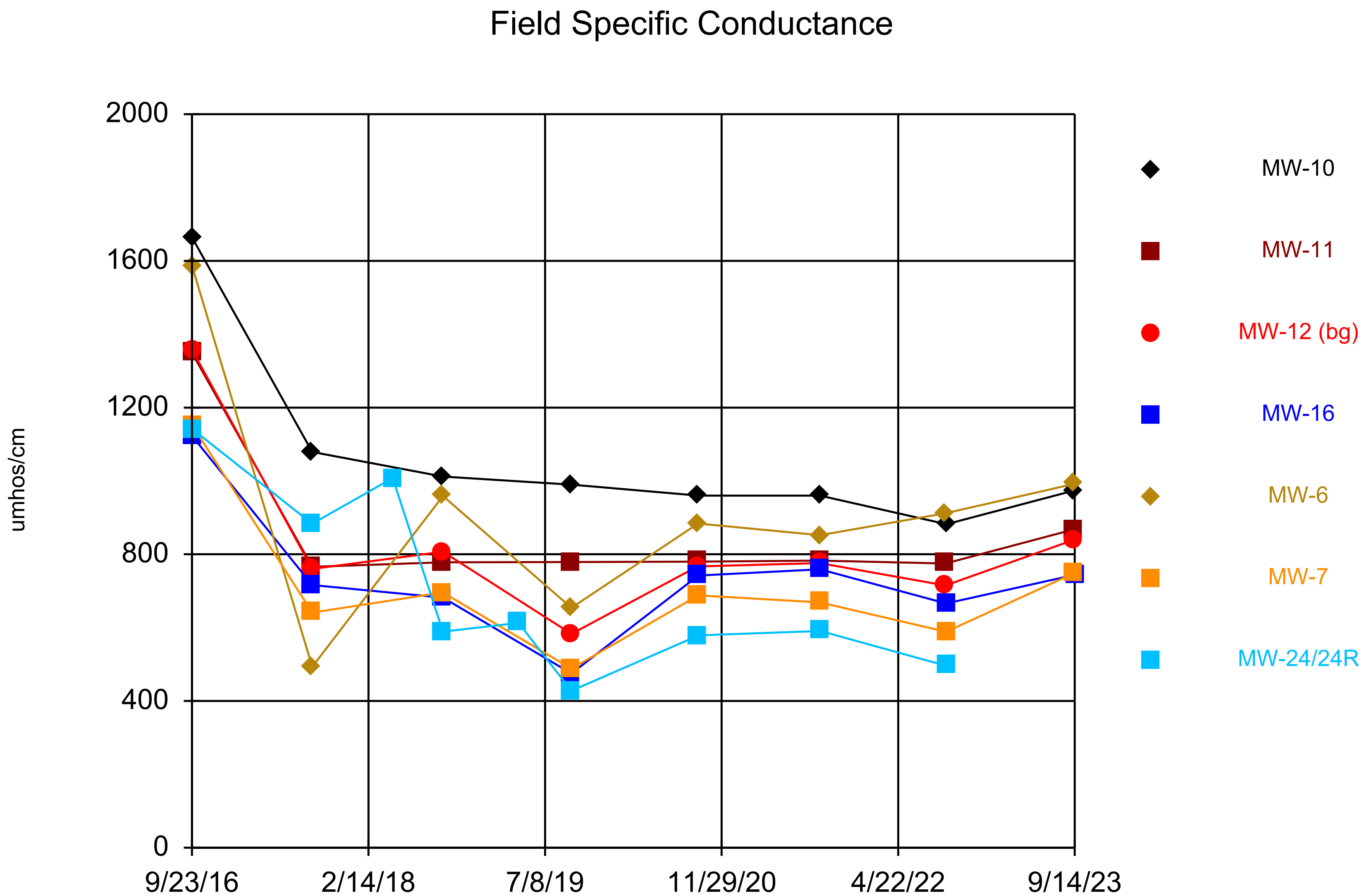
Time Series

Constituent: Field pH (SU)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	7.11	8.09	6.9	8.69	9.41	11.08	8.58
9/5/2017	6.88	6.35	6.6	7.29	7.54	7	7.97
4/25/2018							7.18
9/17/2018	7.39	7.23	7.23	7.04	7.13	6.75	7.31
4/23/2019							7.8
9/23/2019	6.46	7.06	6.84	6.98	6.92	6.94	7.13
9/21/2020			8.7				
9/22/2020		7.77			8.44		
9/23/2020				7.43		7.19	
9/24/2020	7.11						7.42
9/8/2021		7.03	6.97				
9/9/2021	7.05			7.2	7.05	7.15	
9/10/2021							7.11
9/6/2022		6	6.87				
9/7/2022					6.93		
9/8/2022				6.74		6.66	7.19
9/9/2022	7.04						
9/11/2023			6.88				
9/12/2023		6.73					
9/13/2023	6.88				6.81	6.93	
9/14/2023				7.06			

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

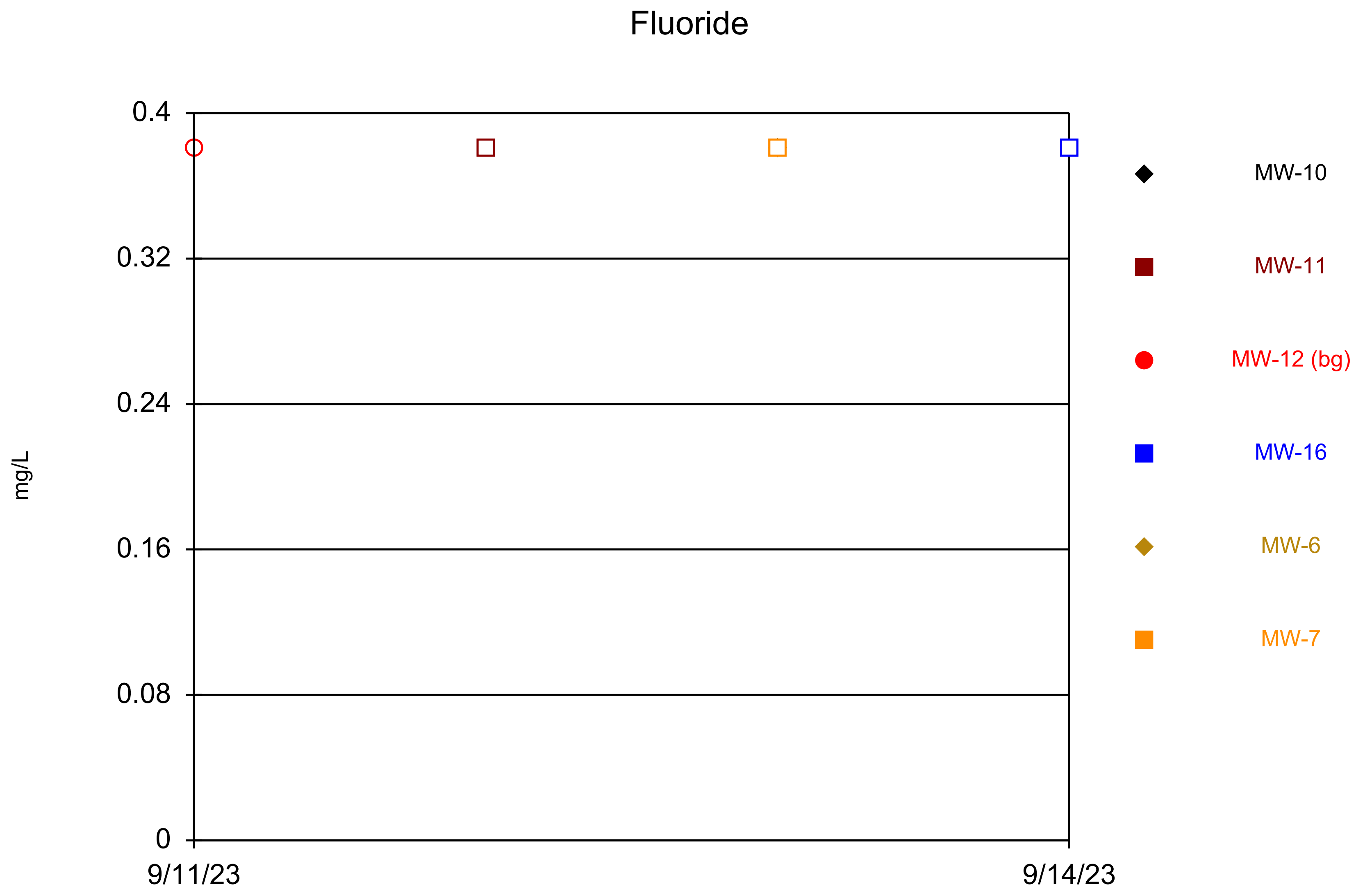
Time Series

Constituent: Field Specific Conductance (umhos/cm)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	1664	1349	1358	1123	1587	1153	1142
9/5/2017	1079	766	760	716	493.2	641	883
4/25/2018							1008
9/17/2018	1012	778	807	682	959	696	589
4/23/2019							613
9/23/2019	990	779	583	475	654	488	428
9/21/2020			767				
9/22/2020		780			884		
9/23/2020				742		688	
9/24/2020	960						579
9/8/2021		783	776				
9/9/2021	960			759	852	669	
9/10/2021							590.8
9/6/2022		775	715				
9/7/2022					912		
9/8/2022				666		588.9	496.1
9/9/2022	882						
9/11/2023			839				
9/12/2023		868					
9/13/2023	974				992	749	
9/14/2023				744			

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Fluoride (mg/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7
9/11/2023			<0.38 (U)			
9/12/2023		<0.38 (U)				
9/13/2023	<0.38 (U)				<0.38 (U)	<0.38 (U)
9/14/2023				<0.38 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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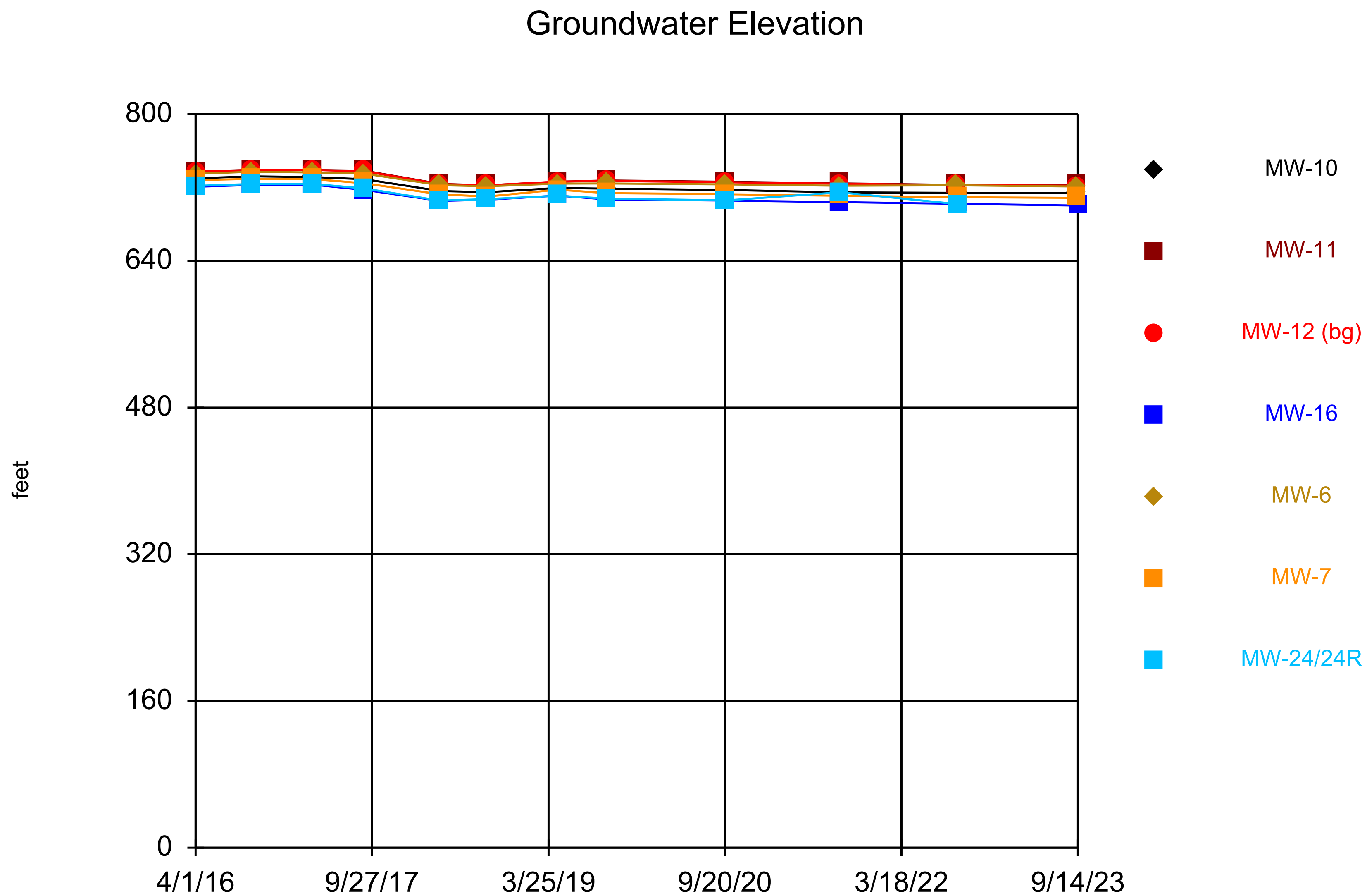

Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Groundwater Elevation (feet)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
4/1/2016	730.04	737.41	737.23	720.76	734.9	727.93	721.76
9/23/2016	732.17	739.21	739.05	722.77	737.25	729.45	723.84
4/1/2017	731.27	739.14	739.04	722.96	736.38	729.16	723.8
9/5/2017	728.95	738.2	737.7	717.24	735.01	724.49	718.93
4/25/2018	716.1465	723.9643	723.5664	705.3648	722.5274	712.5044	705.63
9/17/2018	714.7965	722.3643	722.3064	706.5848	721.3174	710.1244	707.32
4/23/2019	719.4365	726.3043	726.3964	711.0948	724.1674	717.5244	710.87
9/23/2019	718.7665	727.6043	727.1164	706.8948	724.4274	713.8844	707.87
9/21/2020			725.66				
9/22/2020		726.21			723.4		
9/23/2020				705.71		712.7	
9/24/2020	717.3						705.82
9/8/2021		724.48	724.06				
9/9/2021	714.74			704	721.94	710.87	
9/10/2021							714.69
9/6/2022		722.7	722.52				
9/7/2022					722.27		
9/8/2022				702.2		709.39	701.81
9/9/2022	714.05						
9/11/2023			721.9				
9/12/2023		722.14					
9/13/2023	713.82				721.09	708.66	
9/14/2023				700.25			

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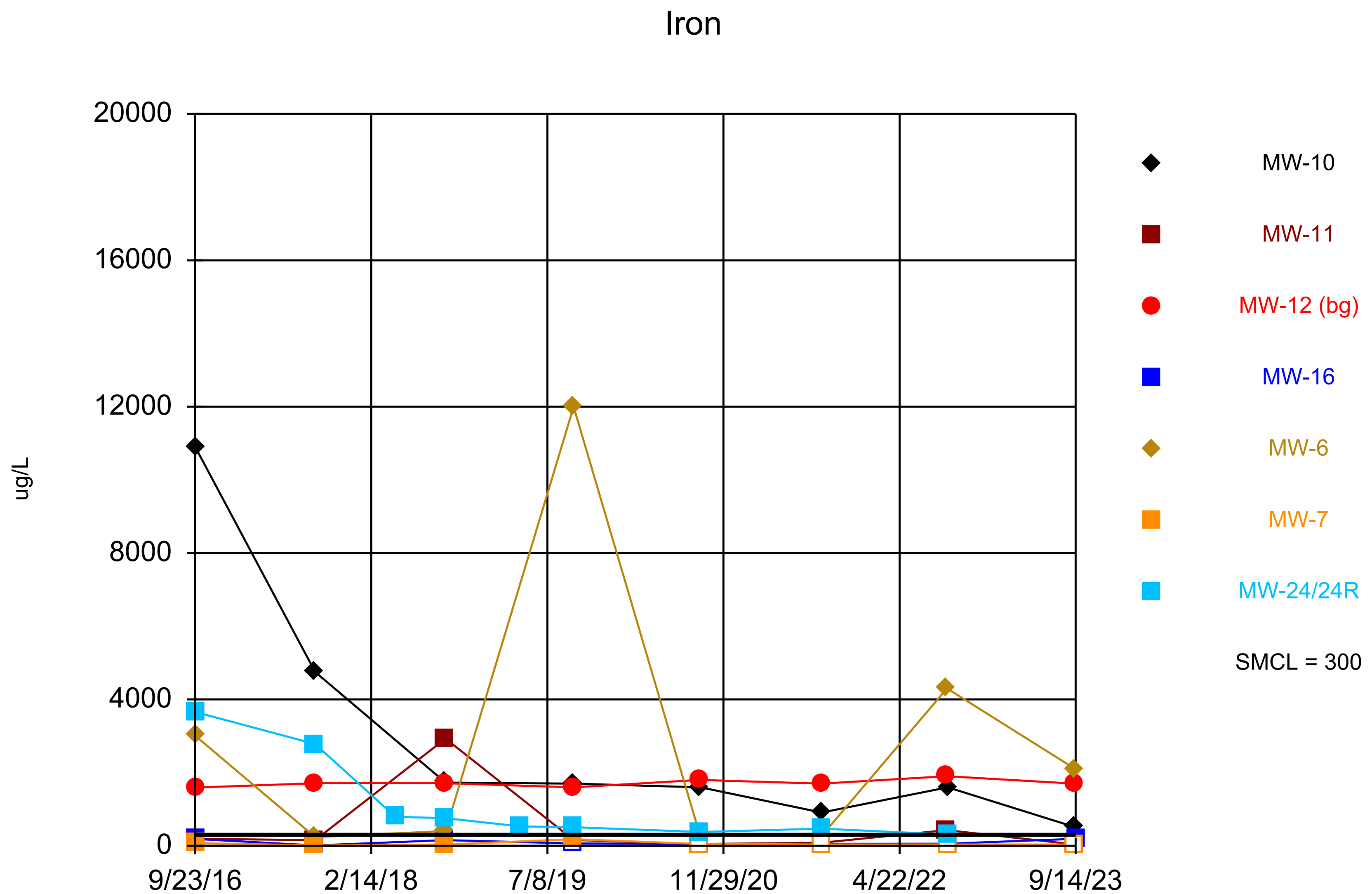
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Iron (ug/L) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	10900	193	1590	187	3010	77.8	3660
9/5/2017	4750	154	1710	<9.6	240	11.4 (J)	2780
4/25/2018							793
9/17/2018	1730	2930	1710	157	403	35.6 (J)	755
4/23/2019							530
9/23/2019	1700	160	1600	<66	12000	180	510
9/21/2020			1800				
9/22/2020		<50			290		
9/23/2020				<50		<50	
9/24/2020	1600						380
9/8/2021		82 (J)	1700				
9/9/2021	910			53 (J)	270	<36	
9/10/2021							470
9/6/2022		430	1900				
9/7/2022					4300		
9/8/2022				59 (J)		<36	310
9/9/2022	1600						
9/11/2023			1700				
9/12/2023		<36 (U)					
9/13/2023	510				2100	<36 (U)	
9/14/2023				190			

ND substitution: RL or RL/2 if <15% NDs.

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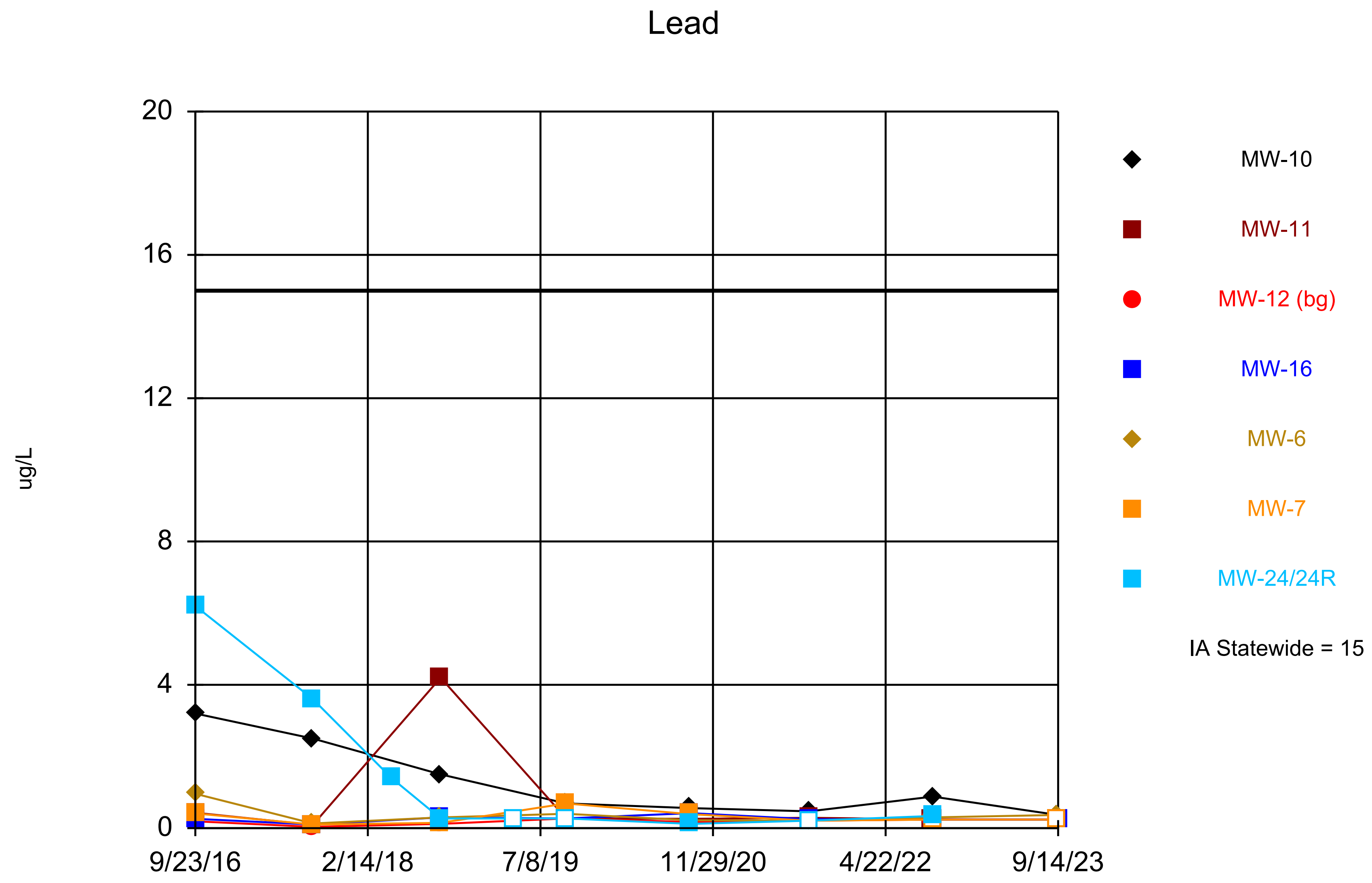

Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Lead (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	3.2	0.43 (J)	<0.19	0.26 (J)	0.96 (J)	0.41 (J)	6.2
9/5/2017	2.5	0.089 (J)	0.038 (J)	0.1 (J)	0.13 (J)	0.1 (J)	3.6
4/25/2018							1.4
9/17/2018	1.5	4.2	<0.12	0.3 (J)	0.3 (J)	0.15 (J)	0.27 (J)
4/23/2019							<0.27
9/23/2019	0.69	<0.27	<0.27	<0.27	0.4 (J)	0.69	<0.27
9/21/2020			0.17 (J)				
9/22/2020		0.26 (J)			0.22 (J)		
9/23/2020				0.42 (J)		0.39 (J)	
9/24/2020	0.56						0.12 (J)
9/8/2021		0.29 (J)	<0.21				
9/9/2021	0.47 (J)			0.25 (J)	0.21 (J)	<0.21	
9/10/2021							<0.21
9/6/2022		0.25 (J)	<0.24				
9/7/2022					0.3 (J)		
9/8/2022				<0.24		<0.24	0.34 (J)
9/9/2022	0.88						
9/11/2023			<0.24 (U)				
9/12/2023		<0.24 (U)					
9/13/2023	0.37 (J)				0.37 (J)	<0.24 (U)	
9/14/2023				<0.24 (U)			

ND substitution: RL or RL/2 if <15% NDs.

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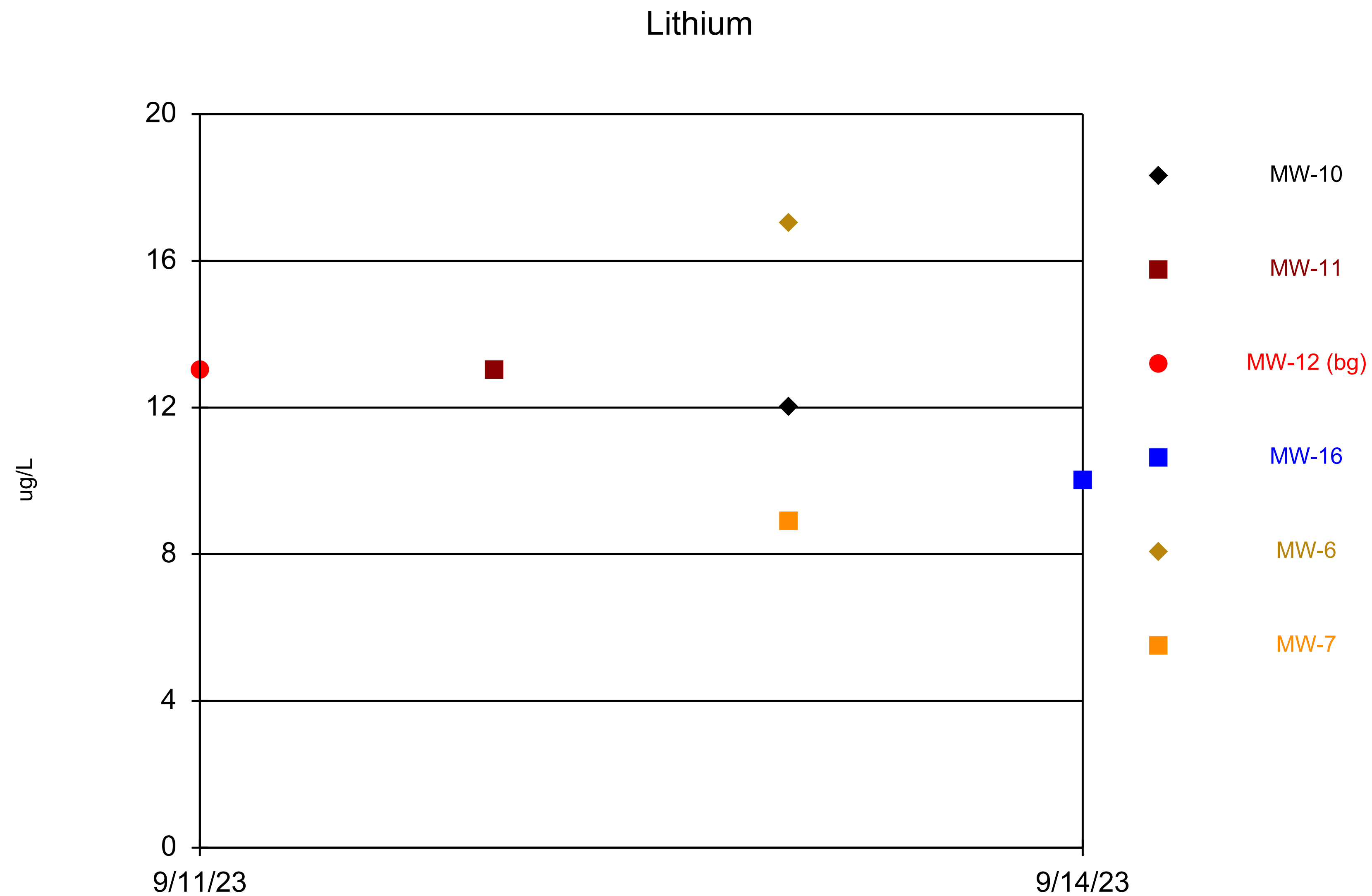

Time Series   Analysis Run 10/23/2023 11:38 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Lithium (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7
9/11/2023			13			
9/12/2023		13				
9/13/2023	12				17	8.9 (J)
9/14/2023				10		

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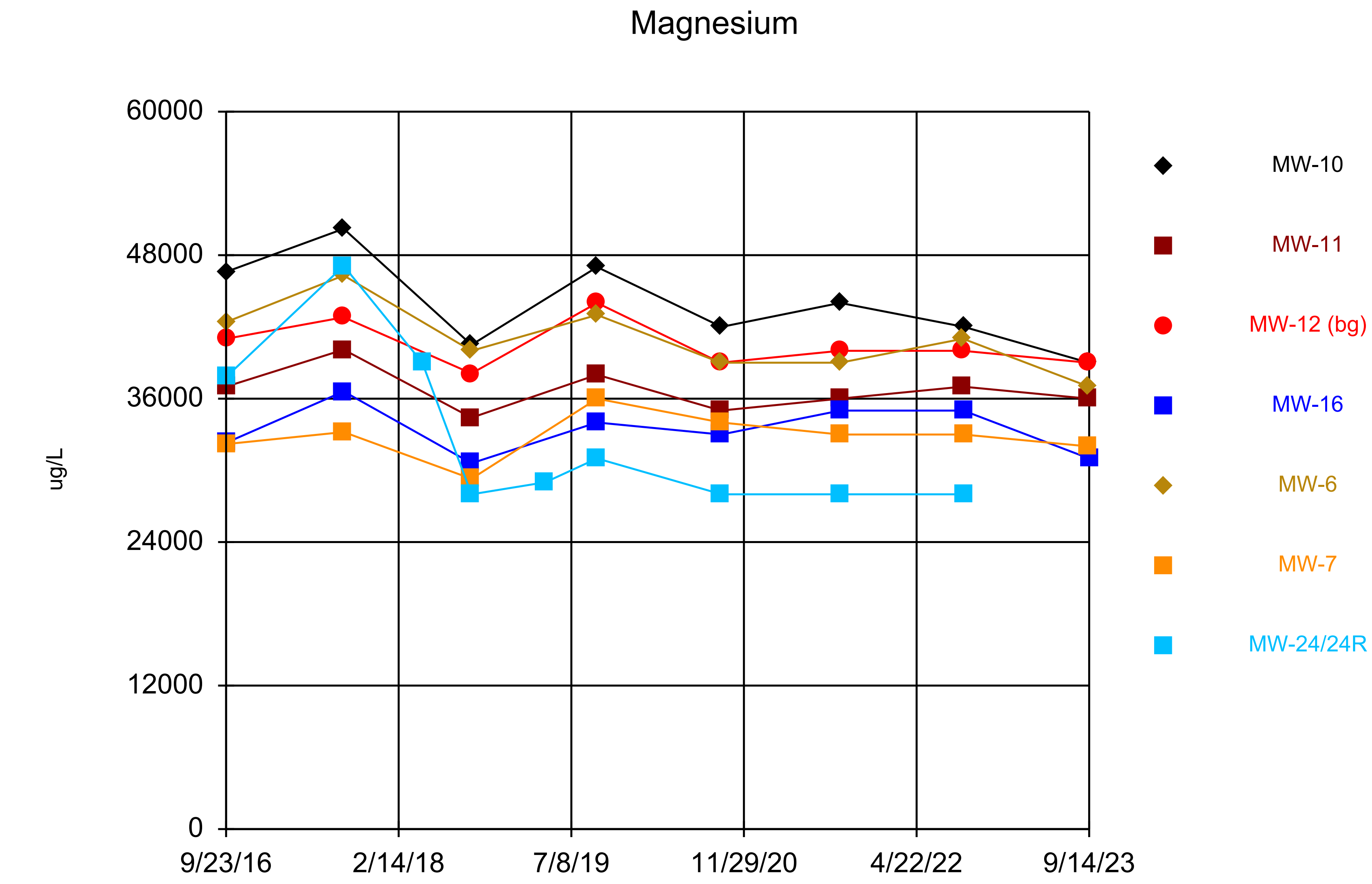

Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Magnesium (ug/L) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	46600	37000	41000	32300	42400	32200	37800
9/5/2017	50200	40100	42800	36600	46300	33200	47100
4/25/2018							39000
9/17/2018	40500	34400	38100	30600	40000	29300	28000
4/23/2019							29000
9/23/2019	47000	38000	44000	34000	43000	36000	31000
9/21/2020			39000				
9/22/2020		35000			39000		
9/23/2020				33000		34000	
9/24/2020	42000						28000
9/8/2021		36000	40000				
9/9/2021	44000			35000	39000	33000	
9/10/2021							28000
9/6/2022		37000	40000				
9/7/2022					41000		
9/8/2022				35000		33000	28000
9/9/2022	42000						
9/11/2023			39000				
9/12/2023		36000					
9/13/2023	39000				37000	32000	
9/14/2023				31000			

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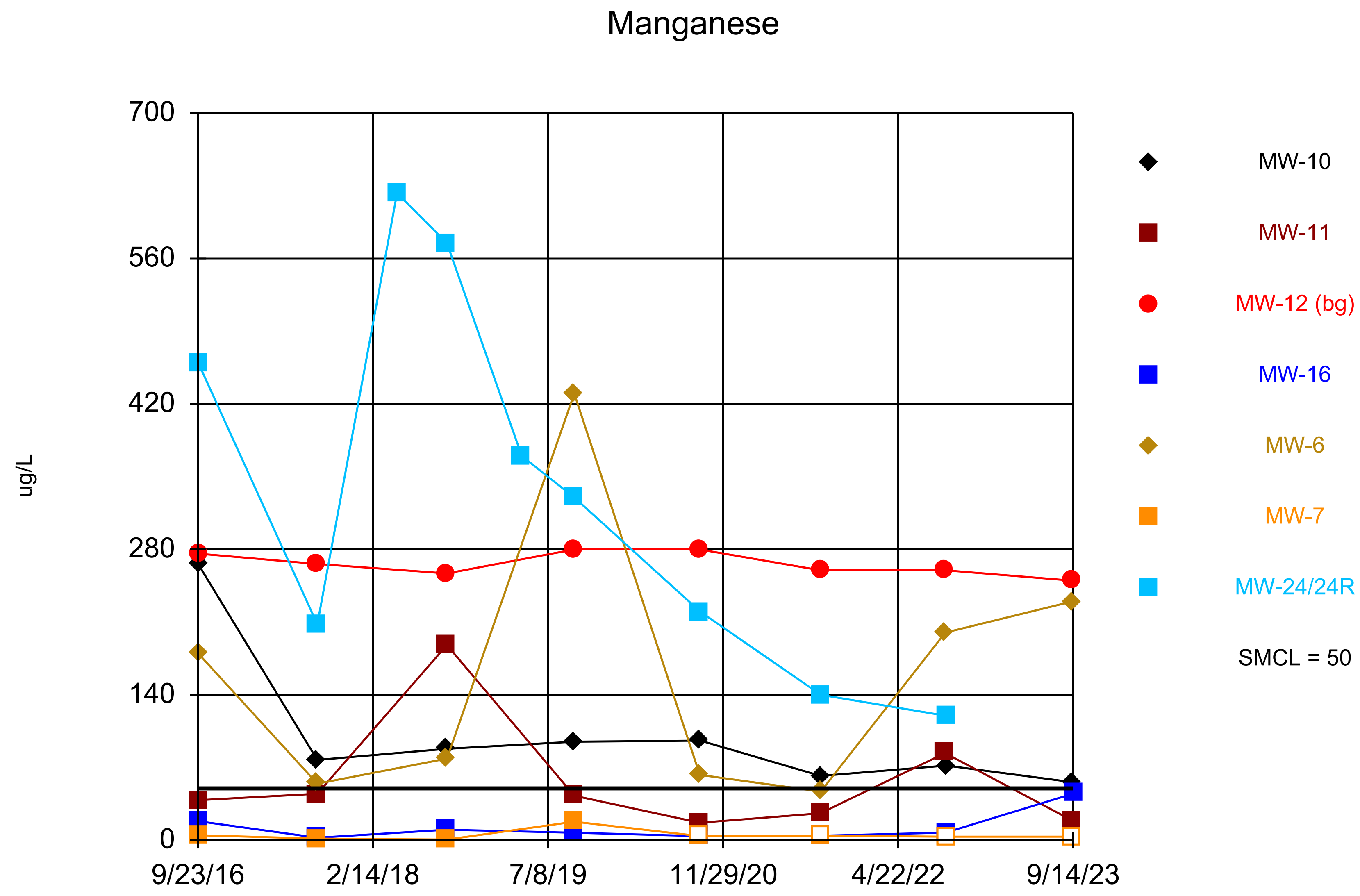
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep
Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Manganese (ug/L) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	266	38.6	276	18.4	180	5	460
9/5/2017	77.4	44.8	266	2.5	54.6	1.7	208
4/25/2018							623
9/17/2018	88.2	188	257	10.3	78.7	0.81 (J)	575
4/23/2019							370
9/23/2019	95	43	280	7.3 (J)	430	18	330
9/21/2020			280				
9/22/2020		17			63		
9/23/2020				<4		<4	
9/24/2020	96						220
9/8/2021		26	260				
9/9/2021	62			<4.4	47	<4.4	
9/10/2021							140
9/6/2022		84	260				
9/7/2022					200		
9/8/2022				7.5 (J)		<3.6	120
9/9/2022	72						
9/11/2023			250				
9/12/2023		19					
9/13/2023	56				230	<3.6 (U)	
9/14/2023				45			

ND substitution: RL or RL/2 if <15% NDs.

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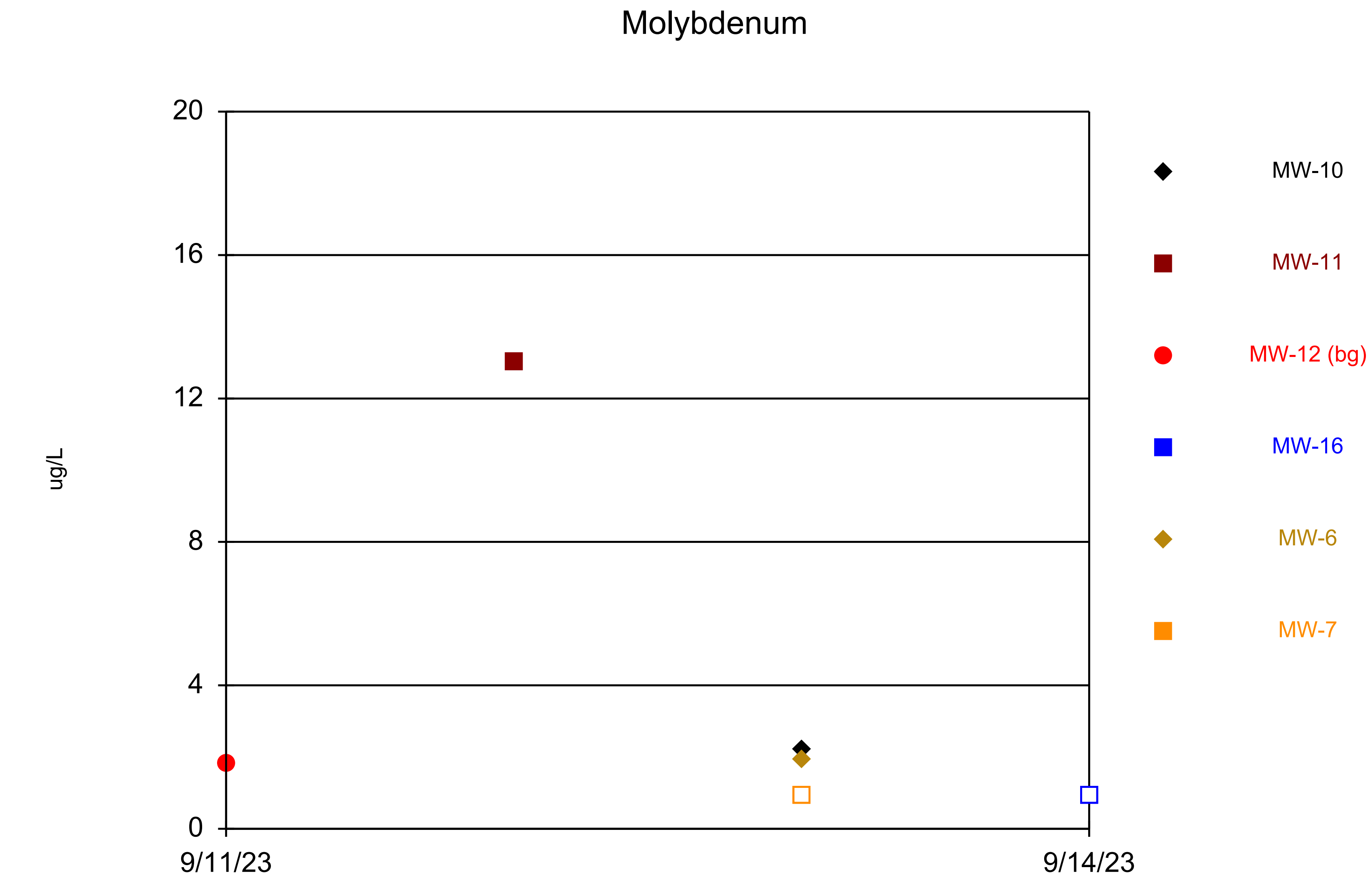
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Molybdenum (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7
9/11/2023			1.8 (J)			
9/12/2023		13				
9/13/2023	2.2				1.9 (J)	<0.91 (U)
9/14/2023				<0.91 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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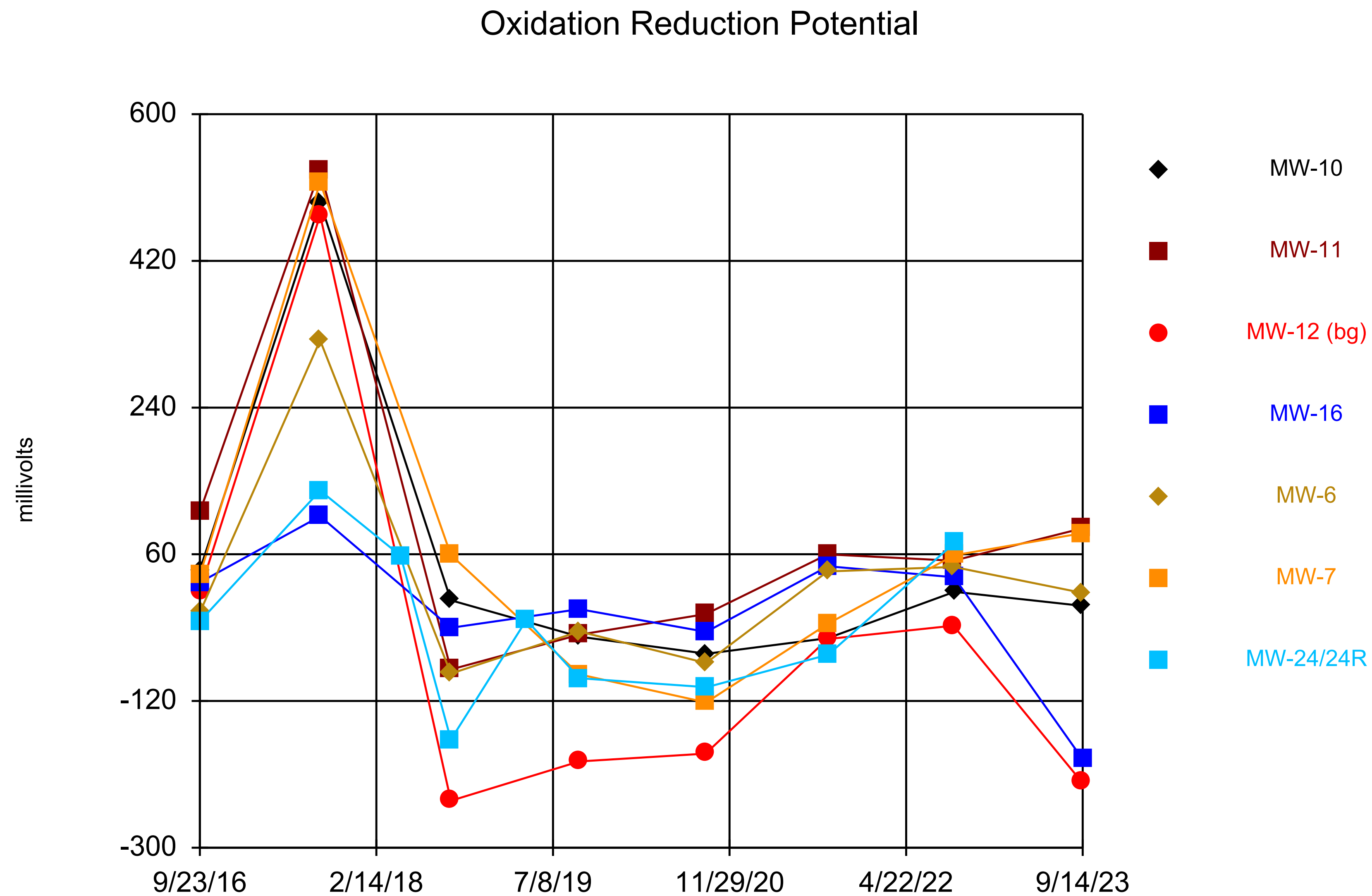

Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Oxidation Reduction Potential (millivolts)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	40.7	112	15	25.5	-11.4	34.3	-22.4
9/5/2017	491.7	531.5	476.1	106.7	322.6	516.3	138.2
4/25/2018							58.3
9/17/2018	3.6	-81.3	-242.3	-30.2	-86.4	59.3	-167.3
4/23/2019							-20.6
9/23/2019	-41	-38.7	-194.1	-7.3	-34.8	-87.3	-92.1
9/21/2020			-184.5				
9/22/2020		-13.3			-73.3		
9/23/2020				-35.3		-121.7	
9/24/2020	-62						-103.1
9/8/2021		59.9	-44		38.9		
9/9/2021	-42.8			45.3		-25.1	
9/10/2021							-63.2
9/6/2022		52.1	-27.6				
9/7/2022					44.5		
9/8/2022				31.8		58.7	73.6
9/9/2022	14						
9/11/2023			-219.1				
9/12/2023		91.7					
9/13/2023	-3.3				12.7	85.9	
9/14/2023				-191.5			

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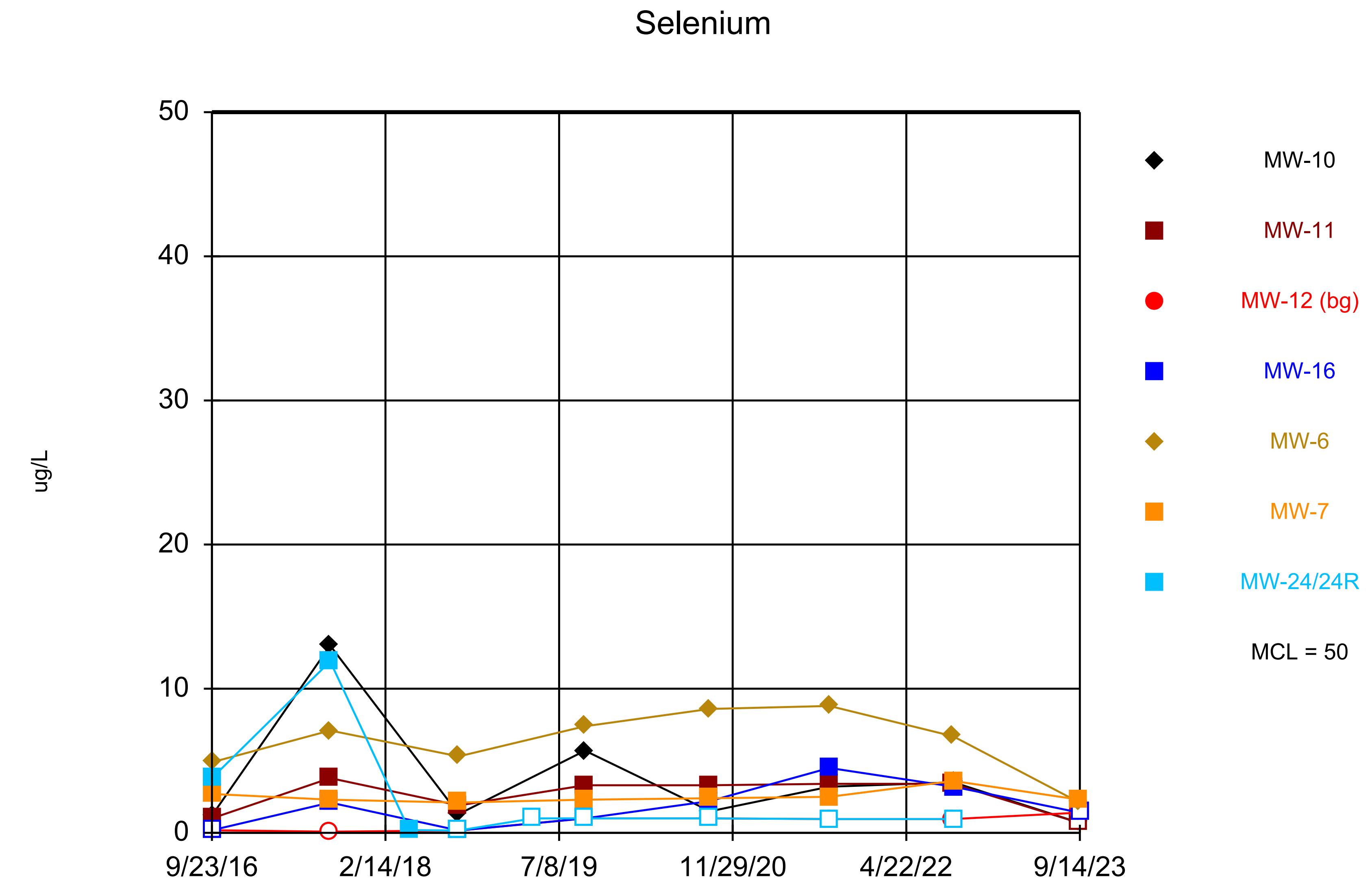
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Selenium (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	1.2	1	<0.18	<0.18	4.9	2.7	3.8
9/5/2017	13	3.8	<0.086	2.1	7.1	2.3	11.9
4/25/2018							0.19 (J)
9/17/2018	1.3	1.9	<0.16	<0.16	5.3	2.1	<0.16
4/23/2019							<1
9/23/2019	5.7	3.3 (J)	<1	<1	7.4	2.3 (J)	<1
9/21/2020			<1				
9/22/2020		3.3 (J)			8.6		
9/23/2020				2.2 (J)		2.4 (J)	
9/24/2020	1.5 (J)						<1
9/8/2021		3.4 (J)	<0.96				
9/9/2021	3.2 (J)			4.5 (J)	8.8	2.5 (J)	
9/10/2021							<0.96
9/6/2022		3.4 (J,B)	<0.96				
9/7/2022					6.7		
9/8/2022				3.2 (J)		3.6 (J,B)	<0.96
9/9/2022	3.5 (J,B)						
9/11/2023			<1.4 (U)				
9/12/2023		<1.4 (U)					
9/13/2023	<1.4 (U)				2.1 (J)	2.3 (J)	
9/14/2023				<1.4 (U)			

ND substitution: RL or RL/2 if <15% NDs.

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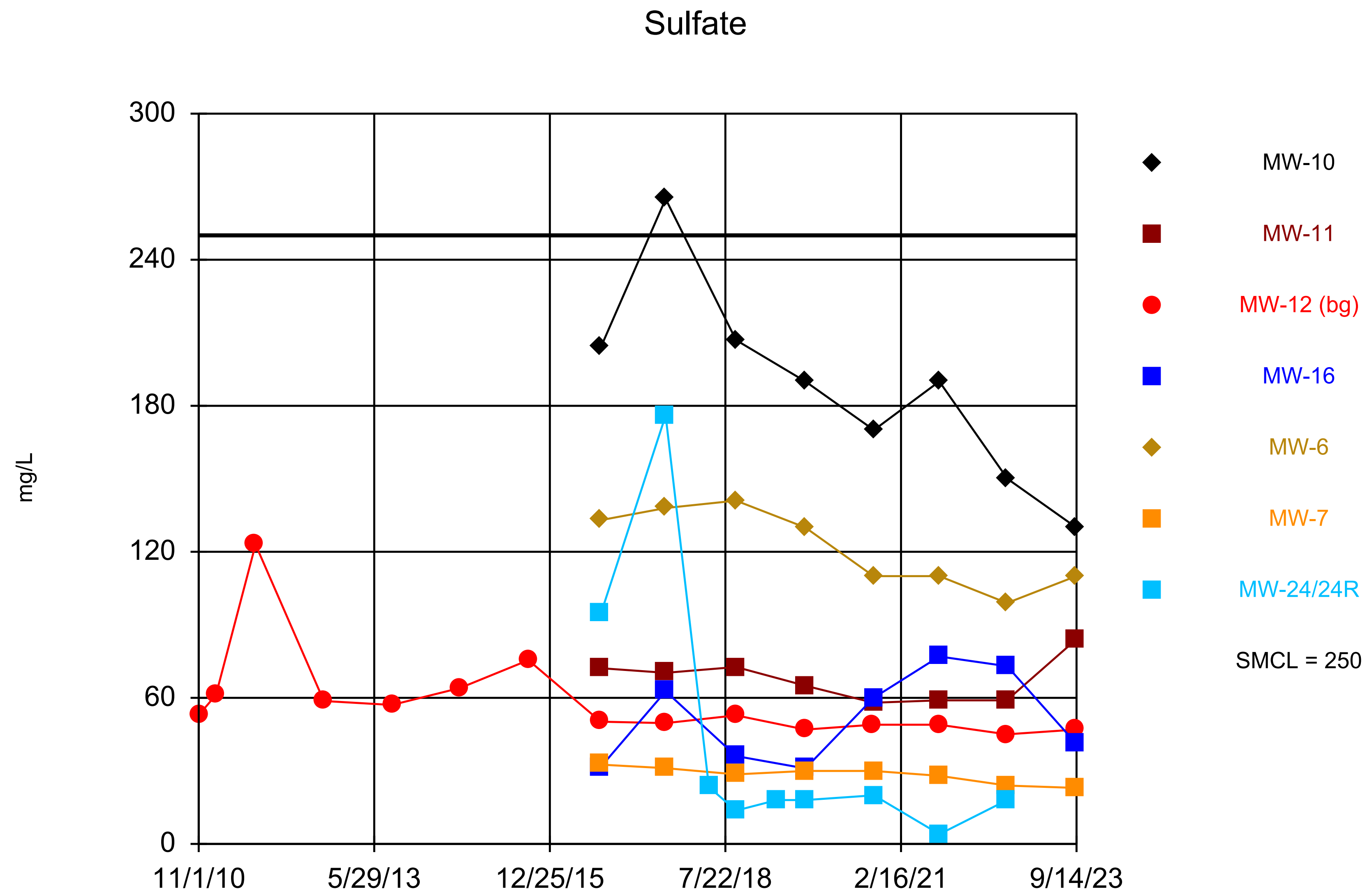

Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Sulfate (mg/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
11/1/2010			52.9				
2/1/2011			61.2				
9/1/2011			123				
9/1/2012			58.7				
9/1/2013			57.1				
9/1/2014			64.1				
9/1/2015			75.5				
9/23/2016	204	72.2	50.2	31.6	133	32.6	94.5
9/5/2017	265	70.3	49.6	62.7	138	31.1	176
4/25/2018							23.4
9/17/2018	207	72.7	52.8	36.1	141	28.6	13.7
4/23/2019							18
9/23/2019	190	65	47	31	130	30	18
9/21/2020			49				
9/22/2020		58			110		
9/23/2020				60		30	
9/24/2020	170						20
9/8/2021		59	49				
9/9/2021	190			77	110	28	
9/10/2021							4
9/6/2022		59	45				
9/7/2022					99		
9/8/2022				73		24	18
9/9/2022	150						
9/11/2023			47				
9/12/2023		84					
9/13/2023	130				110	23	
9/14/2023				41			

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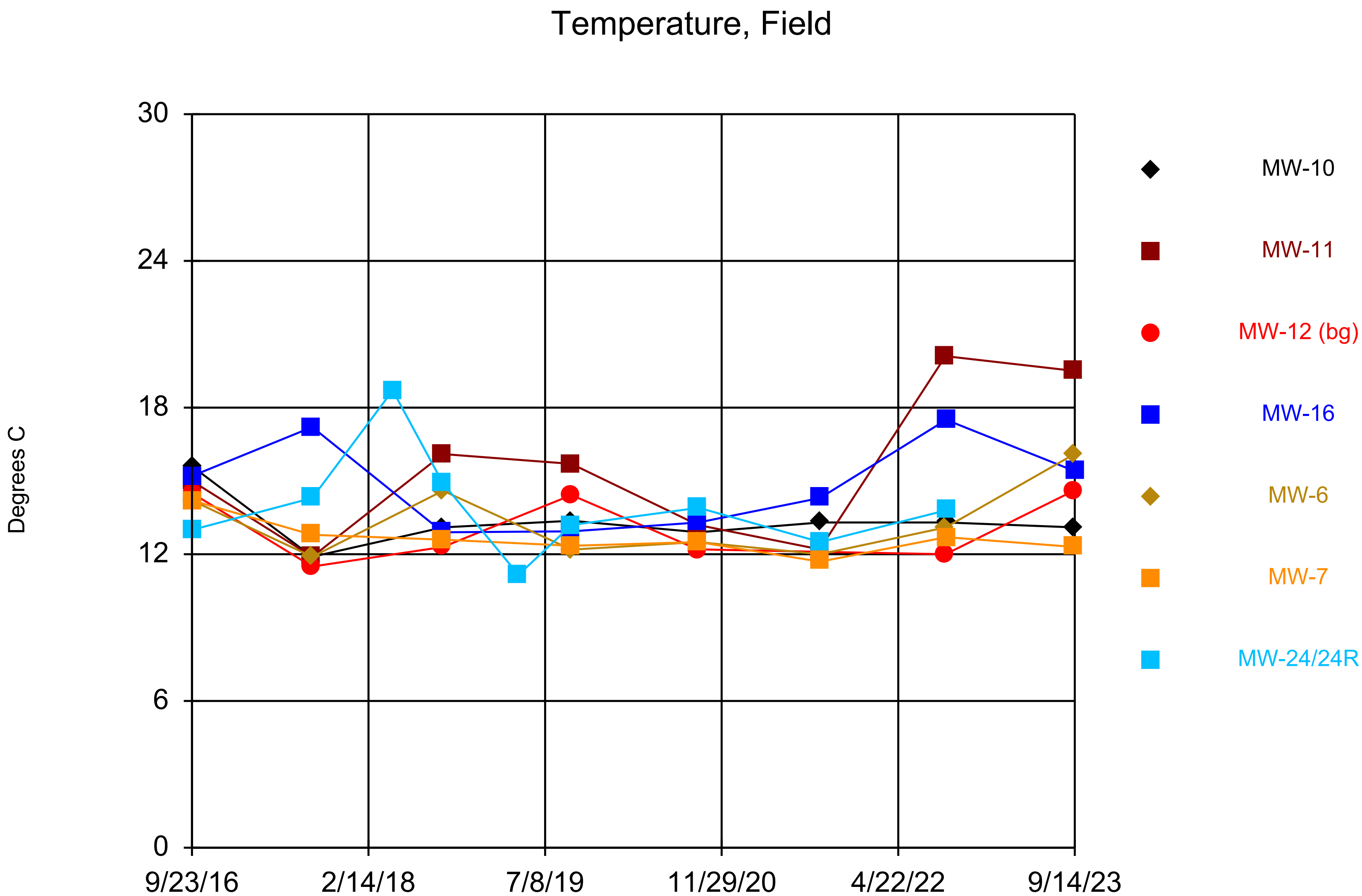

Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Temperature, Field (Degrees C) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	15.6	15	14.5	15.2	14.2	14.2	13
9/5/2017	11.9	11.9	11.5	17.2	11.9	12.8	14.3
4/25/2018							18.7
9/17/2018	13.1	16.1	12.3	12.9	14.6	12.6	14.9
4/23/2019							11.16
9/23/2019	13.37	15.7	14.42	12.94	12.19	12.35	13.2
9/21/2020			12.2				
9/22/2020		13.2			12.5		
9/23/2020				13.3		12.5	
9/24/2020	12.9						13.9
9/8/2021		12.2	12.1				
9/9/2021	13.3			14.3	12	11.7	
9/10/2021							12.5
9/6/2022		20.1	12				
9/7/2022					13.1		
9/8/2022				17.5		12.7	13.8
9/9/2022	13.3						
9/11/2023			14.6				
9/12/2023		19.5					
9/13/2023	13.1				16.1	12.3	
9/14/2023				15.4			

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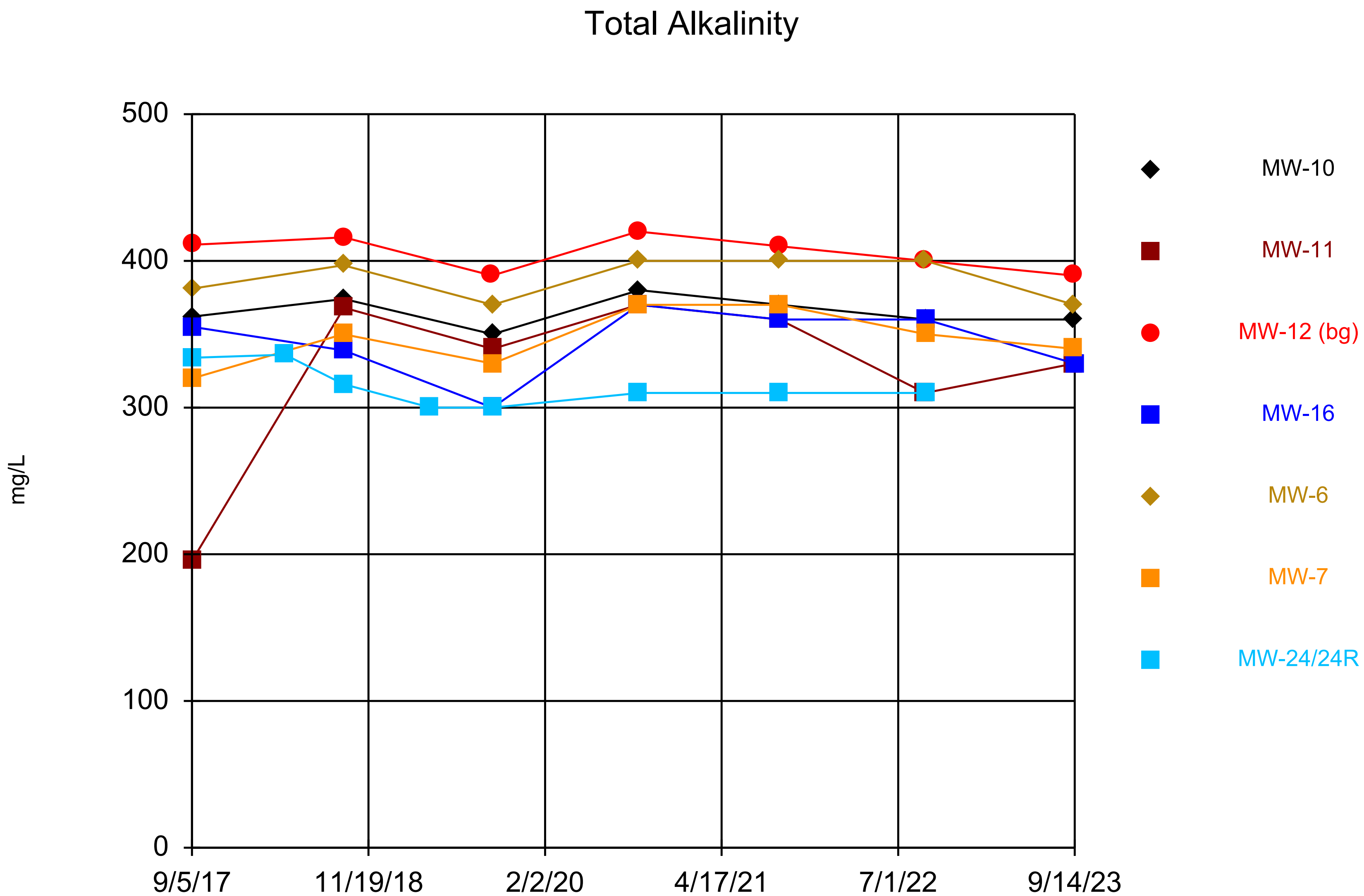

Time Series   Analysis Run 10/23/2023 11:38 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Total Alkalinity (mg/L) Analysis Run 10/23/2023 11:39 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/5/2017					381		
9/6/2017	362	196					334
9/7/2017			411	355		320	
4/25/2018							336
9/17/2018					397	350	316
9/18/2018				339			
9/19/2018	374	368	416				
4/23/2019							300
9/23/2019			390				
9/24/2019	350	340		300	370	330	300
9/21/2020			420				
9/22/2020		370			400		
9/23/2020				370		370	
9/24/2020	380						310
9/8/2021		360	410				
9/9/2021	370			360	400	370	
9/10/2021							310
9/6/2022		310	400				
9/7/2022					400		
9/8/2022				360		350	310
9/9/2022	360						
9/11/2023			390				
9/12/2023		330					
9/13/2023	360				370	340	
9/14/2023				330			

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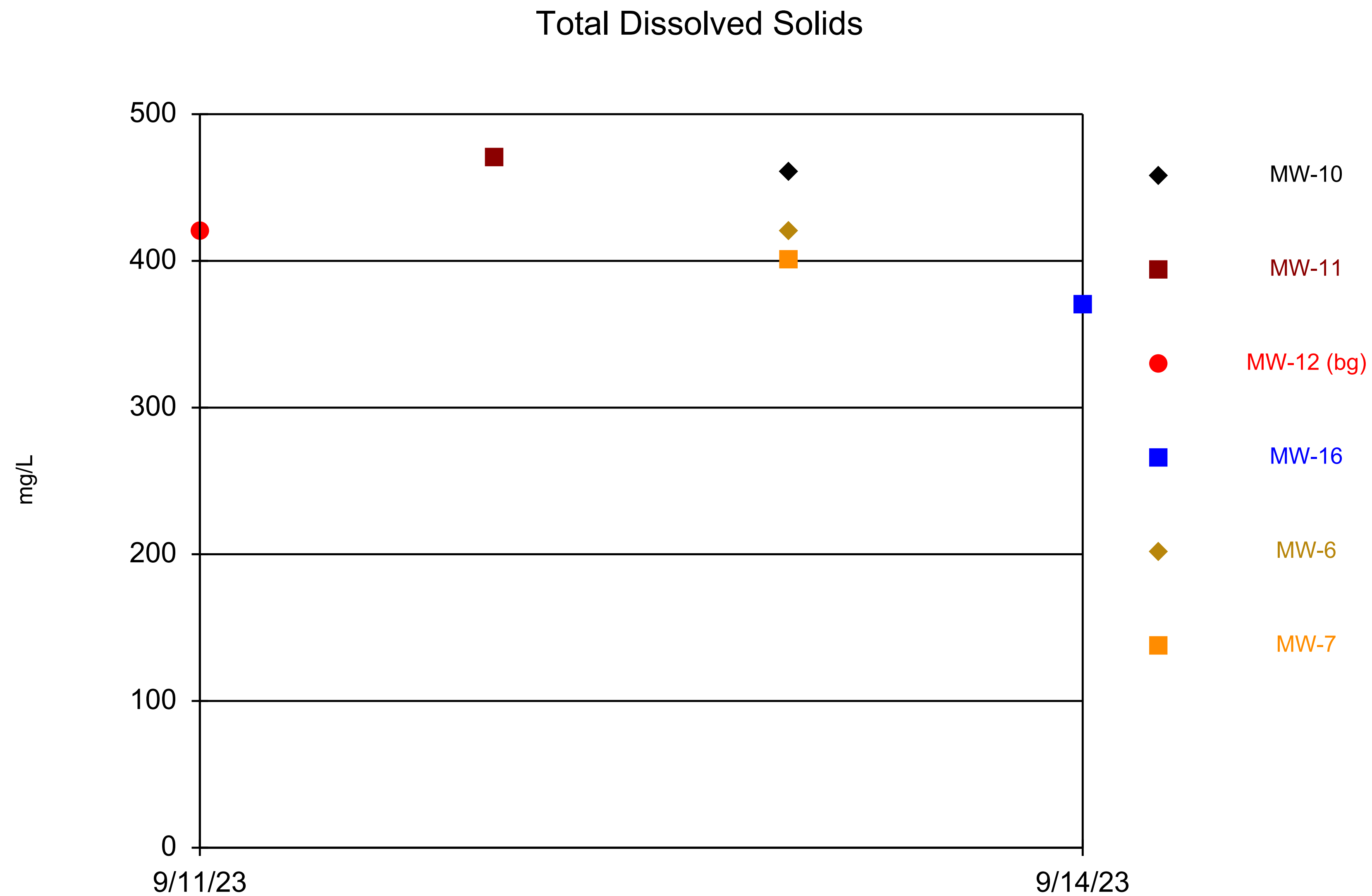


Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

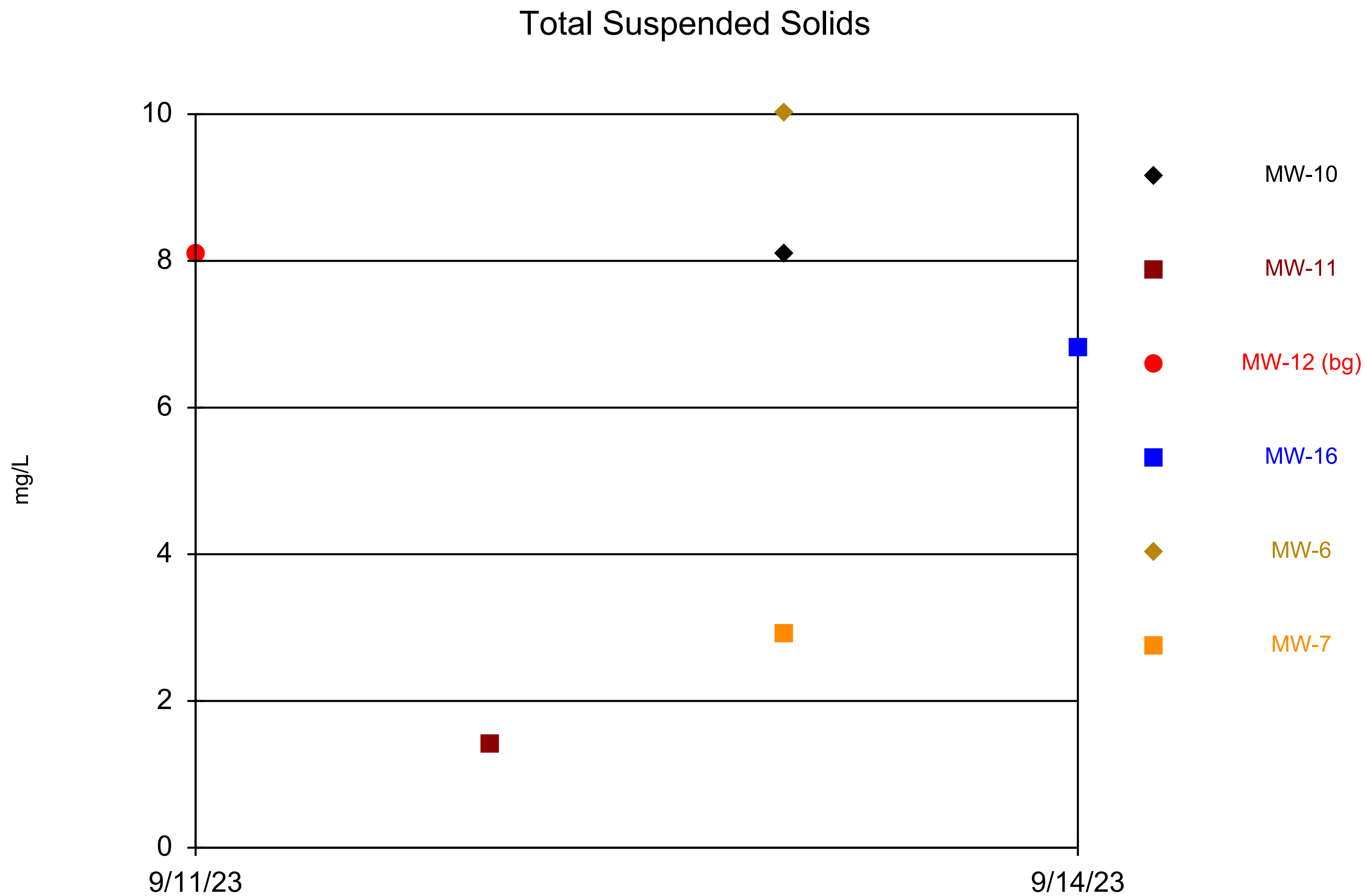
Time Series

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7
9/11/2023			420			
9/12/2023		470				
9/13/2023	460				420	400
9/14/2023				370		

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series   Analysis Run 10/23/2023 11:38 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Time Series

Constituent: Total Suspended Solids (mg/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7
9/11/2023			8.1			
9/12/2023		1.4 (J)				
9/13/2023	8.1				10	2.9
9/14/2023				6.8		

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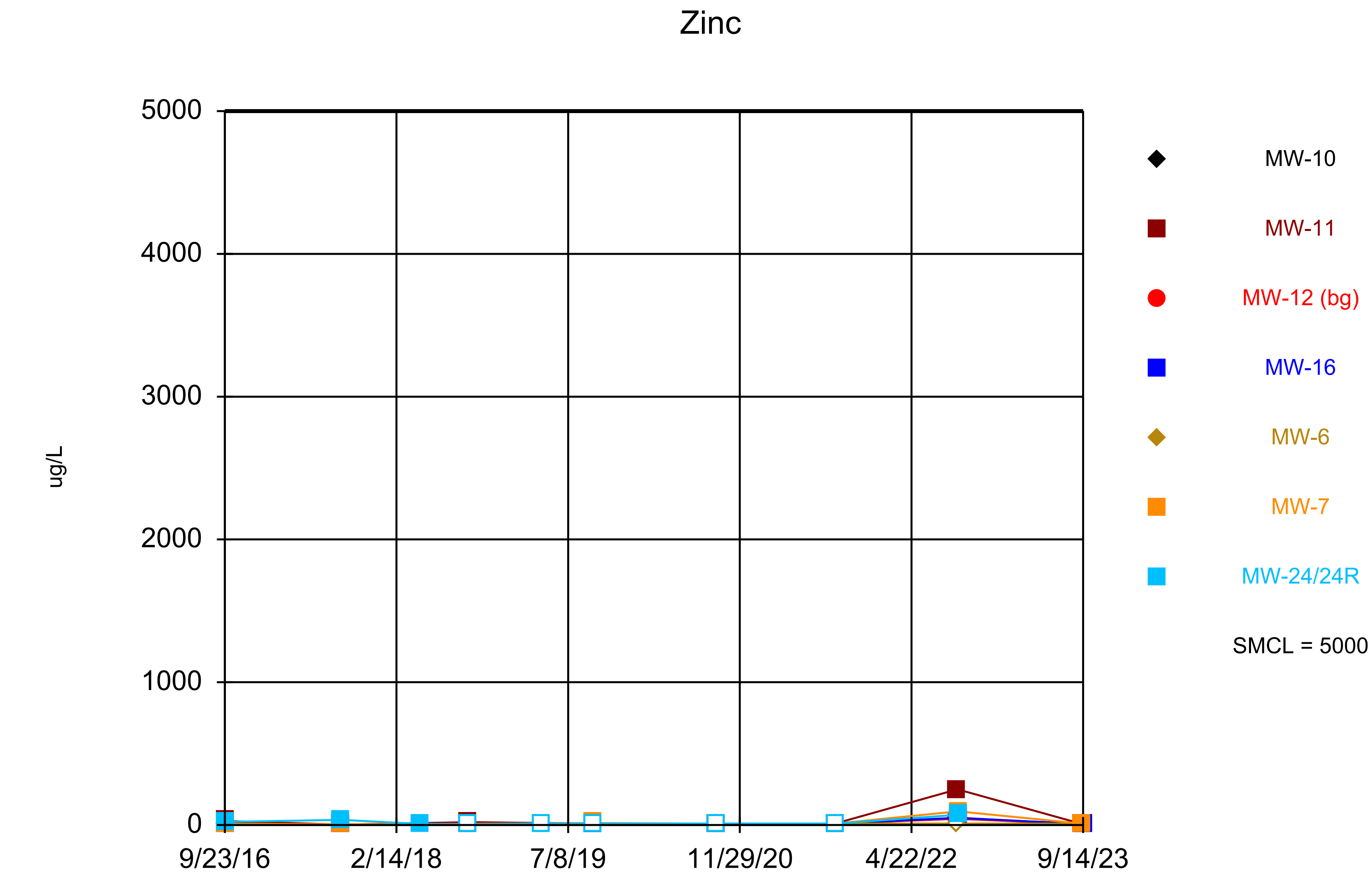
Hollow symbols indicate censored values.



Time Series Analysis Run 10/23/2023 11:38 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Time Series

Constituent: Zinc (ug/L)   Analysis Run 10/23/2023 11:39 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	12.7	28.3	3.2 (J)	2.5 (J)	8.1 (J)	8.1 (J)	22
9/5/2017	3.6 (J)	2.4 (J)	1.4 (J)	2.2 (J)	1.5 (J)	5.5 (J)	36.4
4/25/2018							7.7 (J)
9/17/2018	12.7	20.3	<3.7	6.4 (J)	6 (J)	8.4 (J)	<3.7
4/23/2019							<10
9/23/2019	<10	<10	<10	<10	<10	14 (J)	<10
9/21/2020			<10				
9/22/2020		<10			<10		
9/23/2020				<10		<10	
9/24/2020	<10						<10
9/8/2021		<10	<10				
9/9/2021	<10			<10	<10	<10	
9/10/2021							<10
9/6/2022		250	43				
9/7/2022					<10		
9/8/2022				51		96	71
9/9/2022	46						
9/11/2023			<6.4 (U)				
9/12/2023		<6.4 (U)					
9/13/2023	8.1 (J)				9.9 (J)	9.3 (J)	
9/14/2023				<6.4 (U)			

ND substitution: RL or RL/2 if <15% NDs.

Attachment E3

Outlier Analysis Results – Shallow

Outlier Analysis

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB   Printed 10/23/2023, 11:06 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Arsenic (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.8162	0.185	normal	ShapiroWilk
Barium (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	195.5	25.52	normal	ShapiroWilk
Beryllium (ug/L)	MW-21 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.205	0.1108	unknown	ShapiroWilk
Boron (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	98.58	32.13	normal	ShapiroWilk
Chloride (mg/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	14.6	9.898	ln(x)	ShapiroWilk
Cobalt (ug/L)	MW-21 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.3412	0.2196	unknown	ShapiroWilk
Copper (ug/L)	**MW-21 (bg)**	**Yes**	**2.8**	**9/17/2018**	**Dixon`s**	**0.05**	**8**	**1.862**	**0.4274**	**normal**	**ShapiroWilk**
Iron (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	285.5	409.6	ln(x)	ShapiroWilk
Lead (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.5987	0.533	ln(x)	ShapiroWilk
Magnesium (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	30963	6856	normal	ShapiroWilk
Manganese (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	25.25	23.18	ln(x)	ShapiroWilk
Selenium (ug/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1.287	0.4581	normal	ShapiroWilk
Sulfate (mg/L)	MW-21 (bg)	No	n/a	n/a	EPA 1989	0.05	24	50.1	5.367	normal	ShapiroWilk
Zinc (ug/L)	**MW-21 (bg)**	**Yes**	**130**	**9/7/2022**	**Dixon`s**	**0.05**	**8**	**24.16**	**42.86**	**normal**	**ShapiroWilk**

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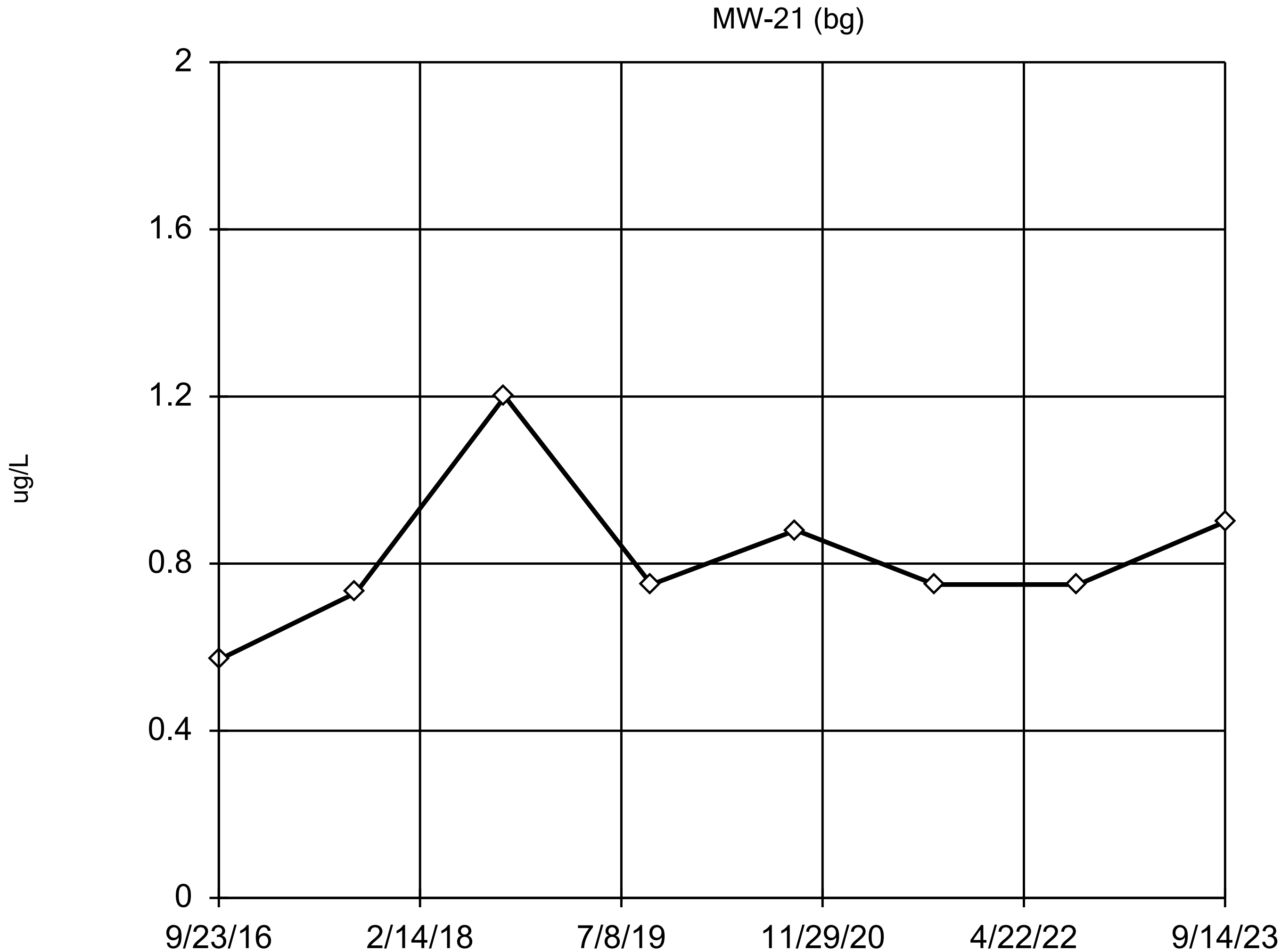
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.8162, std. dev. 0.185, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8745
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Arsenic Analysis Run 10/23/2023 10:59 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/23/2023 11:06 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-21 (bg)
9/23/2016	0.57 (J)
9/5/2017	0.73 (J)
9/17/2018	1.2
9/23/2019	<0.75
9/23/2020	<0.88
9/10/2021	<0.75
9/7/2022	<0.75
9/14/2023	0.9 (J)

ND substitution: RL or RL/2 if <15% NDs.

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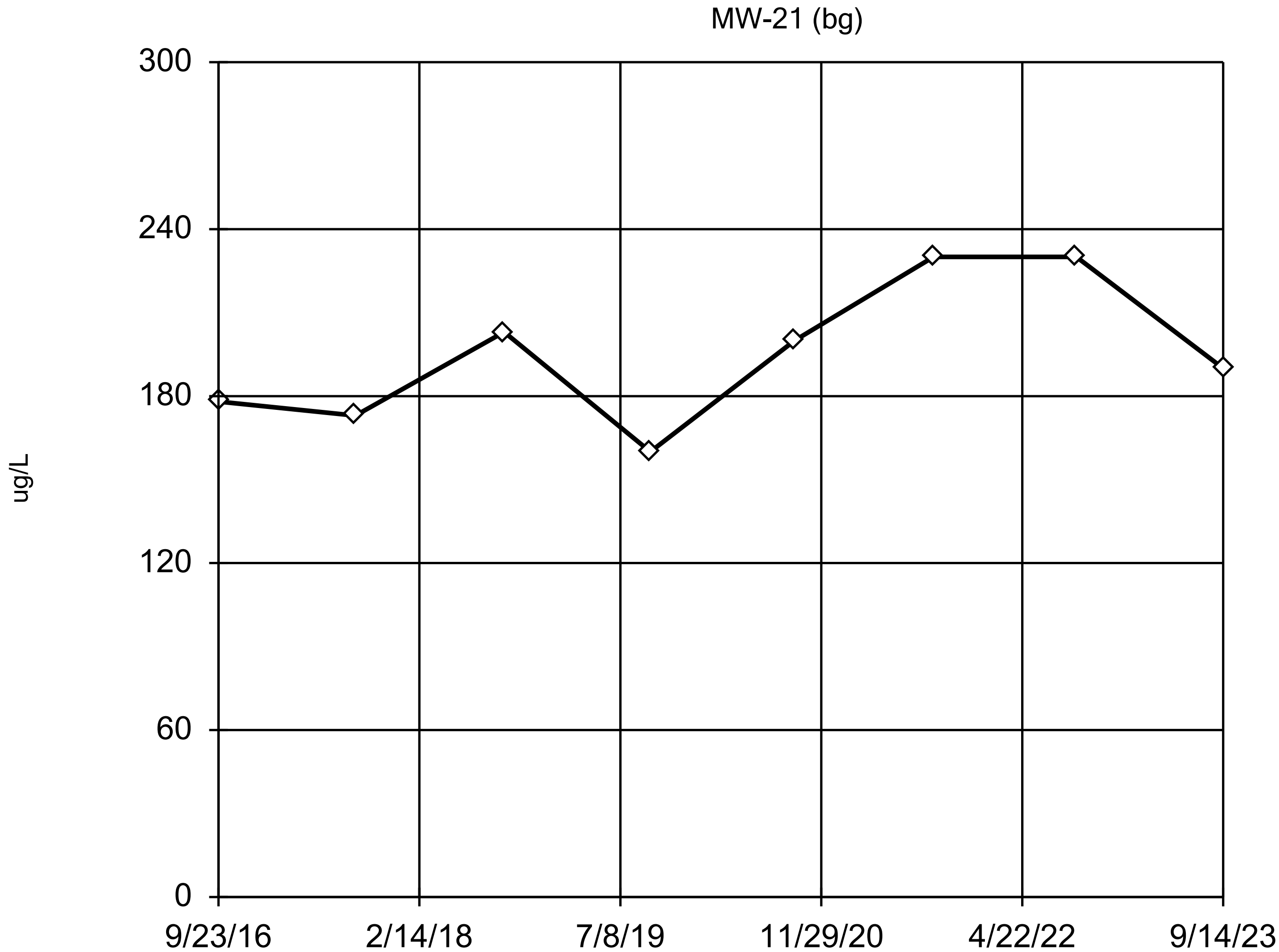
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 195.5, std. dev. 25.52, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9356
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Barium Analysis Run 10/23/2023 10:59 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

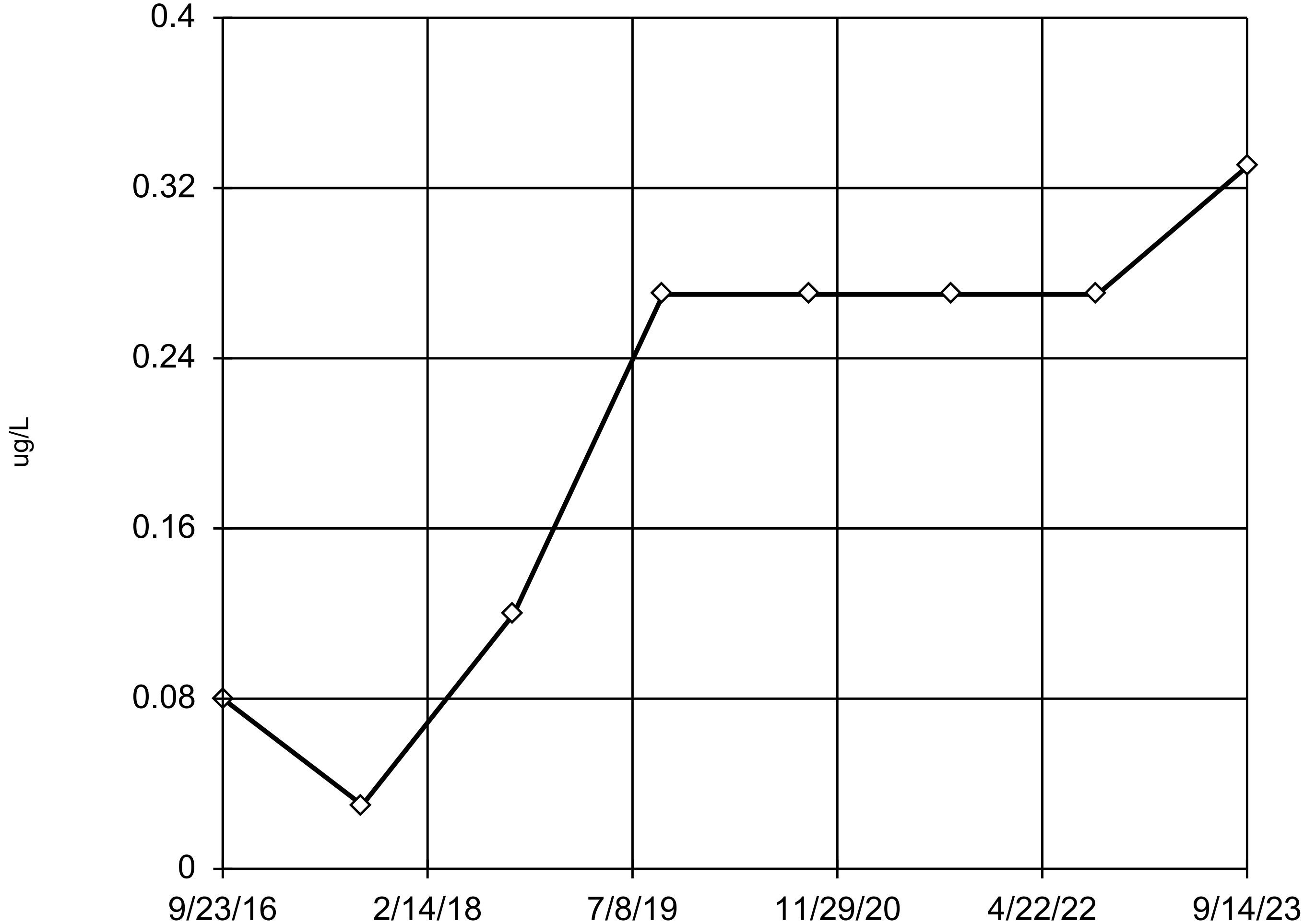
Constituent: Barium (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	178
9/5/2017	173
9/17/2018	203
9/23/2019	160
9/23/2020	200
9/10/2021	230 (B)
9/7/2022	230
9/14/2023	190

Tukey's Outlier Screening

MW-21 (bg)



n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were cube transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.4224, low cutoff = -0.3793, based on IQR multiplier of 3.

Constituent: Beryllium   Analysis Run 10/23/2023 10:59 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Tukey's Outlier Screening

Constituent: Beryllium (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	<0.08
9/5/2017	0.03 (J)
9/17/2018	<0.12
9/23/2019	<0.27
9/23/2020	<0.27
9/10/2021	<0.27
9/7/2022	<0.27
9/14/2023	<0.33 (U)

ND substitution: RL or RL/2 if <15% NDs.

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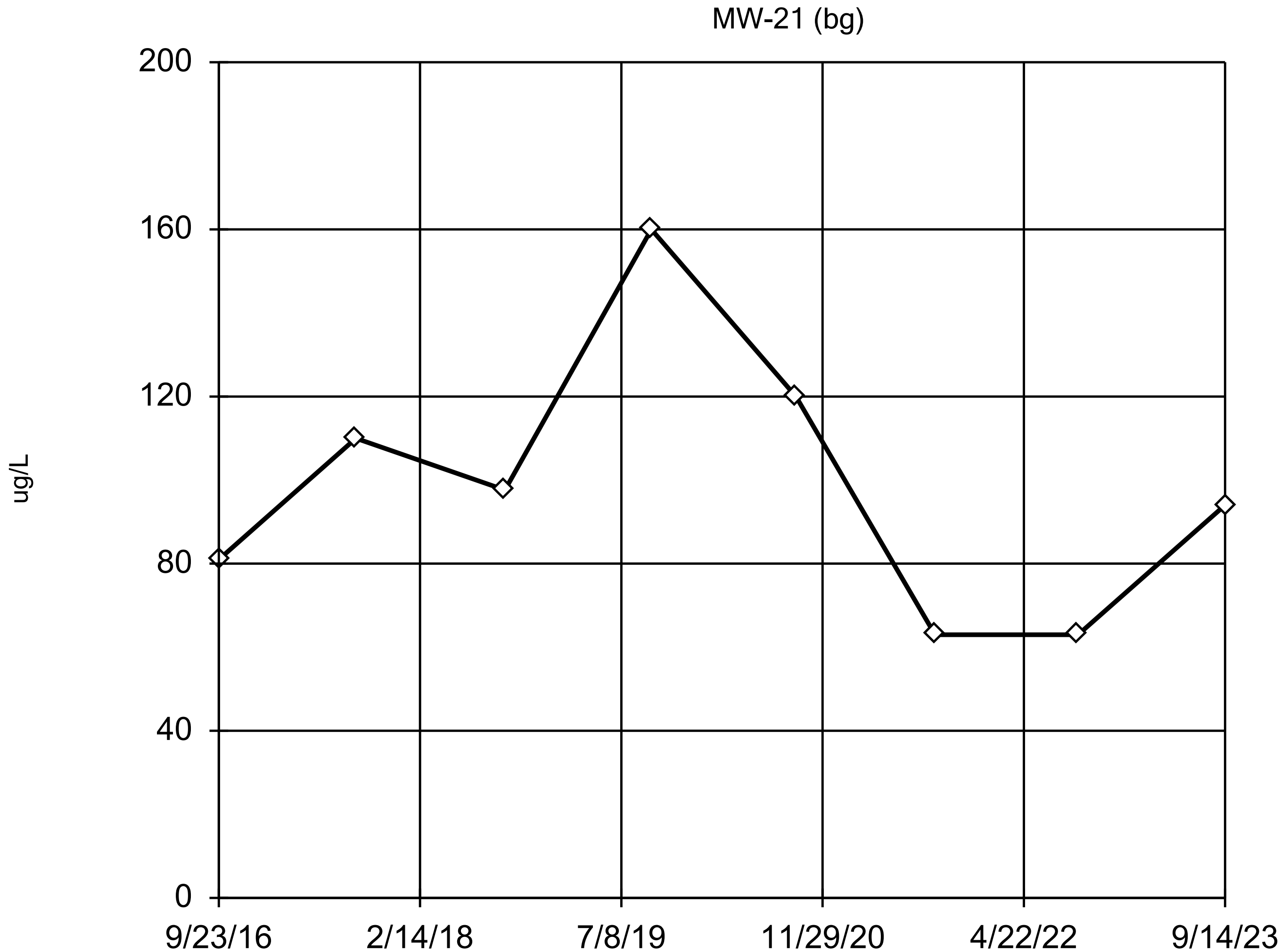
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 98.58, std. dev. 32.13, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9306
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Boron   Analysis Run 10/23/2023 10:59 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

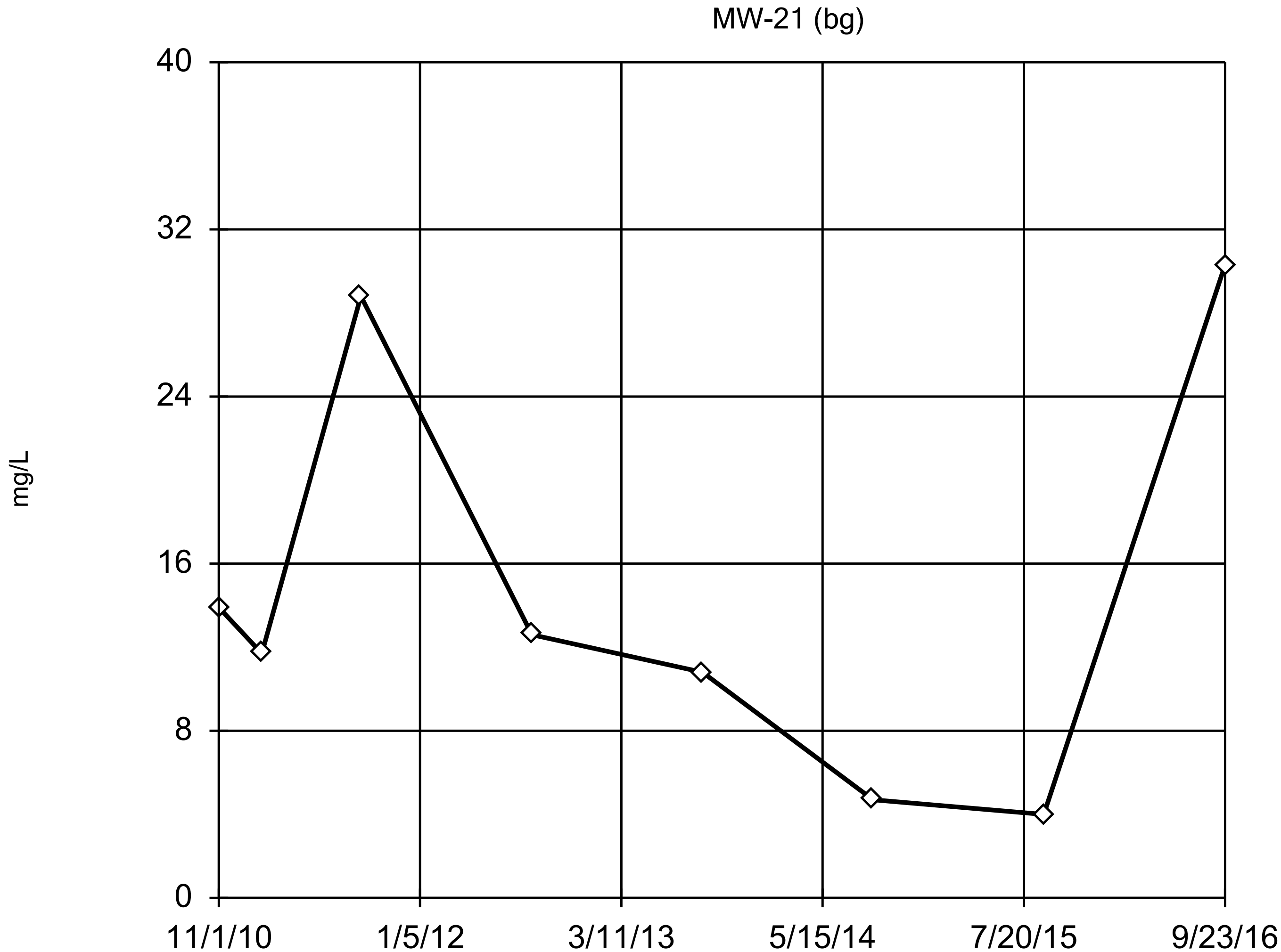
EPA 1989 Outlier Screening

Constituent: Boron (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	81 (J)
9/5/2017	110
9/17/2018	97.6 (J)
9/23/2019	160 (J,B)
9/23/2020	120
9/10/2021	63 (J)
9/7/2022	63 (J)
9/14/2023	94 (J)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 14.6, std. dev. 9.898, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9118
Critical = 0.851 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Chloride Analysis Run 10/23/2023 10:59 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Chloride (mg/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
11/1/2010	13.9
2/1/2011	11.7
9/1/2011	28.8
9/1/2012	12.6
9/1/2013	10.8
9/1/2014	4.7
9/1/2015	4
9/23/2016	30.3
9/5/2017	44.1 (X)
9/17/2018	85.2 (X)
9/23/2019	58 (X)
9/23/2020	110 (X)
9/10/2021	150 (X)
9/7/2022	140 (X)
9/14/2023	150 (X)

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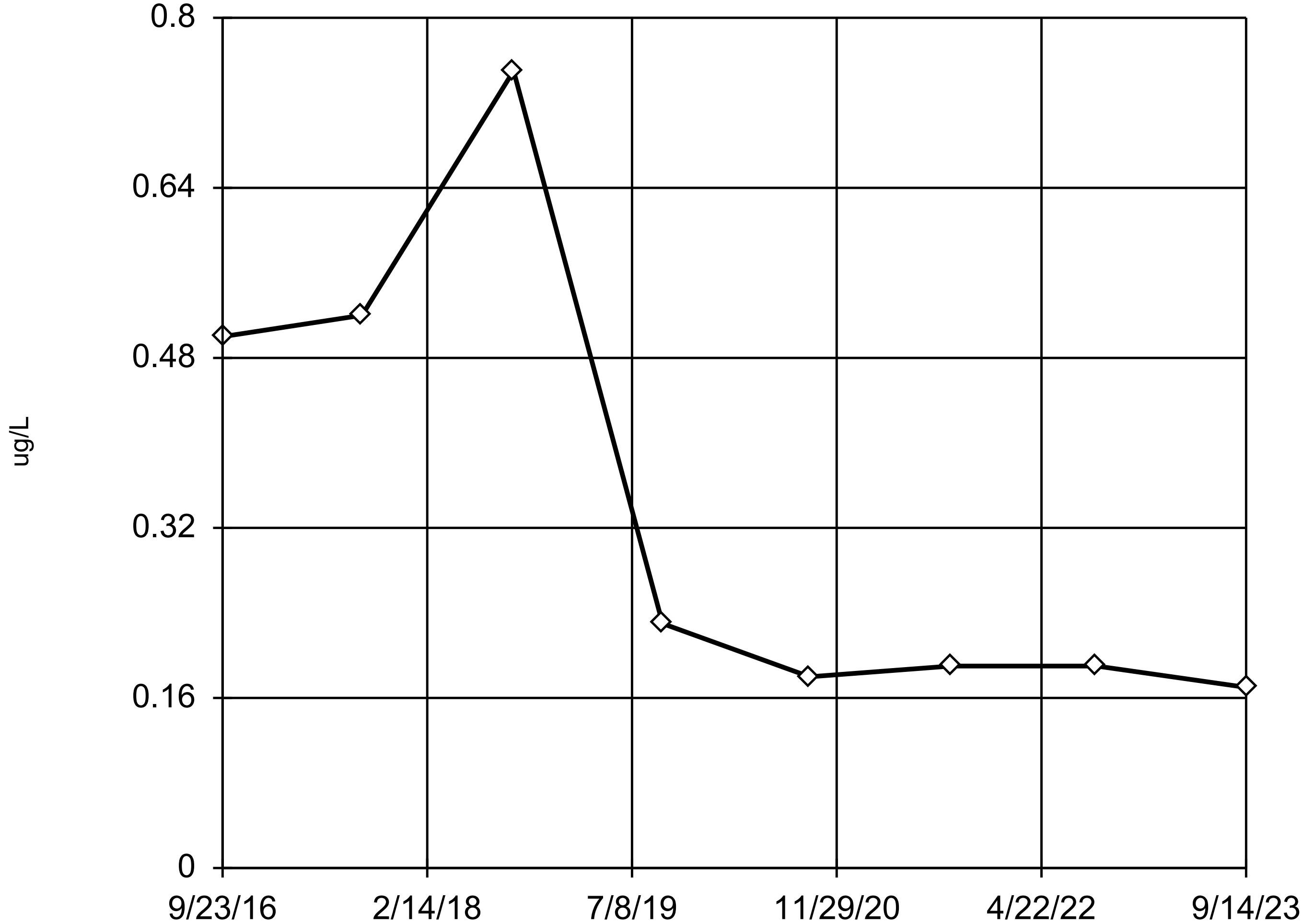
Tukey's Outlier Screening

MW-21 (bg)



n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 10.69, low cutoff = 0.008823, based on IQR multiplier of 3.

Constituent: Cobalt   Analysis Run 10/23/2023 10:59 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Tukey's Outlier Screening

Constituent: Cobalt (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

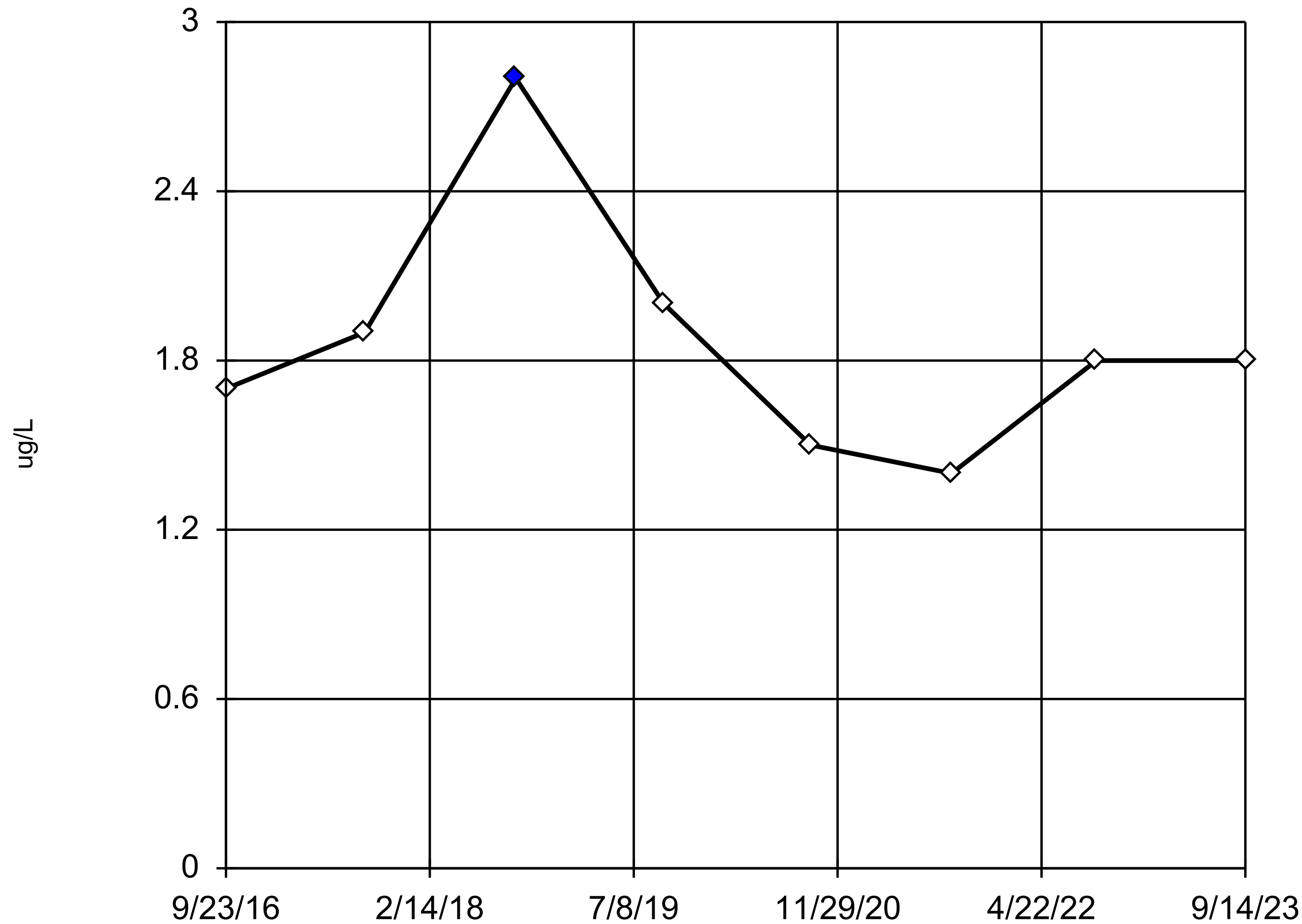
Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	<0.5
9/5/2017	0.52 (J)
9/17/2018	0.75 (J)
9/23/2019	0.23 (J)
9/23/2020	0.18 (J)
9/10/2021	<0.19
9/7/2022	<0.19
9/14/2023	<0.17 (U)

ND substitution: RL or RL/2 if <15% NDs.

Dixon's Outlier Test

MW-21 (bg)



n = 8

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 1.862.
Std. Dev. = 0.4274.
2.8: c = 0.6154
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9454
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Copper   Analysis Run 10/23/2023 10:59 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Dixon's Outlier Test

Constituent: Copper (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	1.7
9/5/2017	1.9
9/17/2018	2.8 (O)
9/23/2019	<2
9/23/2020	<1.5
9/10/2021	<1.4
9/7/2022	<1.8
9/14/2023	<1.8 (U)

ND substitution: RL or RL/2 if <15% NDs.

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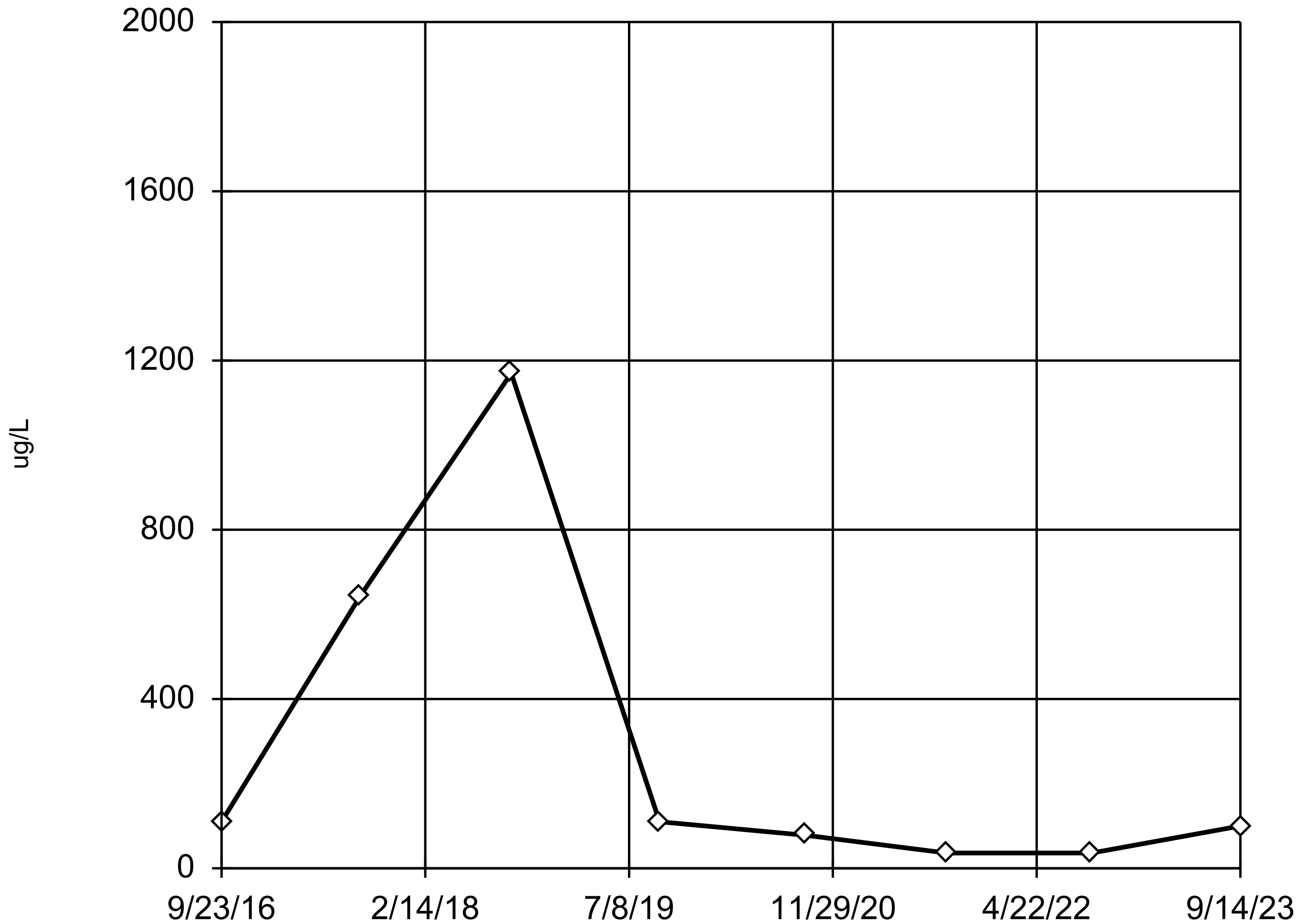
EPA Screening (suspected outliers for Dixon's Test)

MW-21 (bg)



n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 285.5, std. dev. 409.6, critical Tn 2.032

Normality test used: Shapiro Wilk@alpha = 0.1 Calculated = 0.8596 Critical = 0.851 (after natural log transformation) The distribution was found to be log-normal.

Constituent: Iron   Analysis Run 10/23/2023 11:00 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/23/2023 11:06 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-21 (bg)
9/23/2016	110
9/5/2017	644
9/17/2018	1170
9/23/2019	110
9/23/2020	78 (J)
9/10/2021	<36
9/7/2022	<36
9/14/2023	100

ND substitution: RL or RL/2 if <15% NDs.

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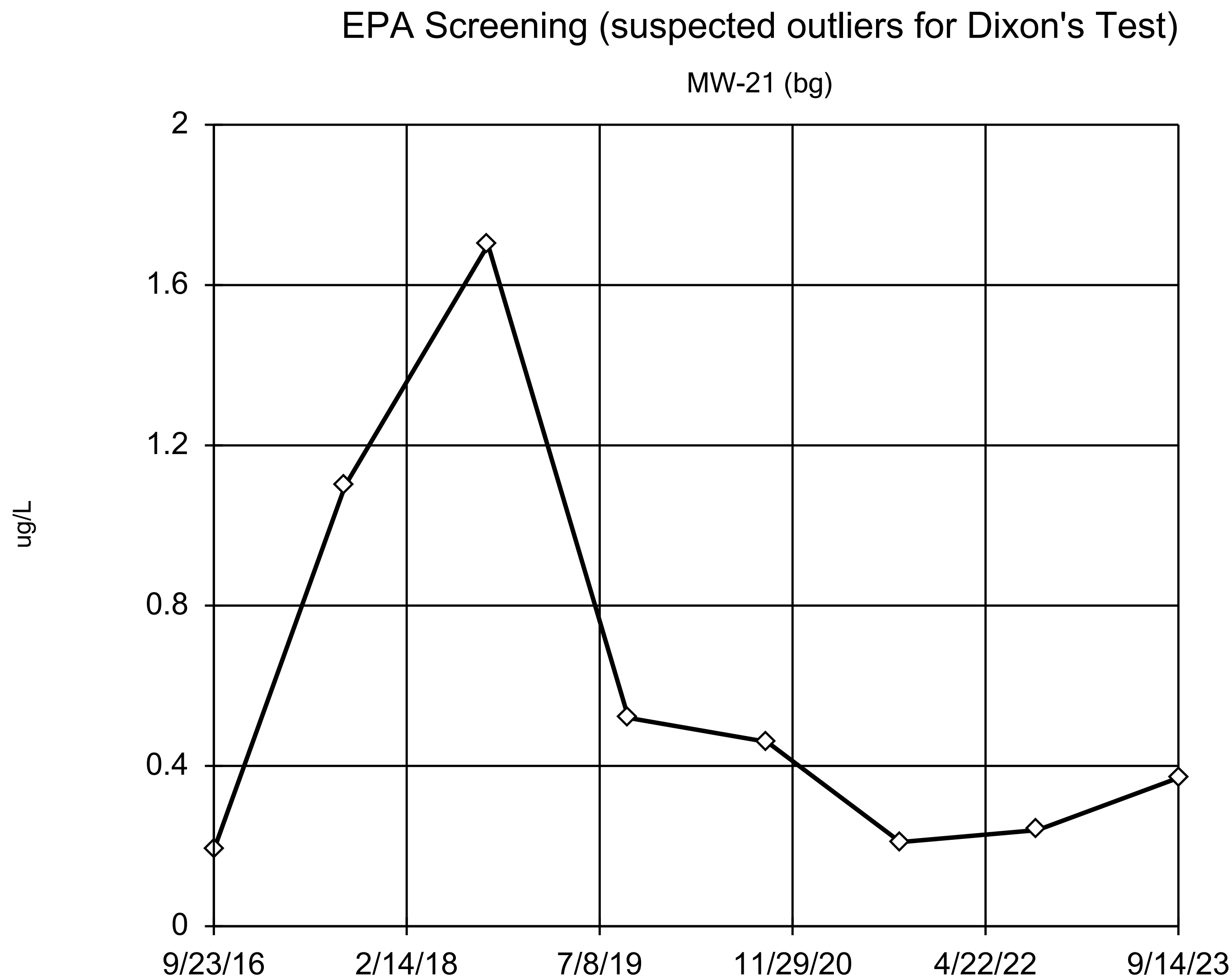


n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.5987, std. dev. 0.533, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9181
Critical = 0.851 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Lead   Analysis Run 10/23/2023 11:00 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

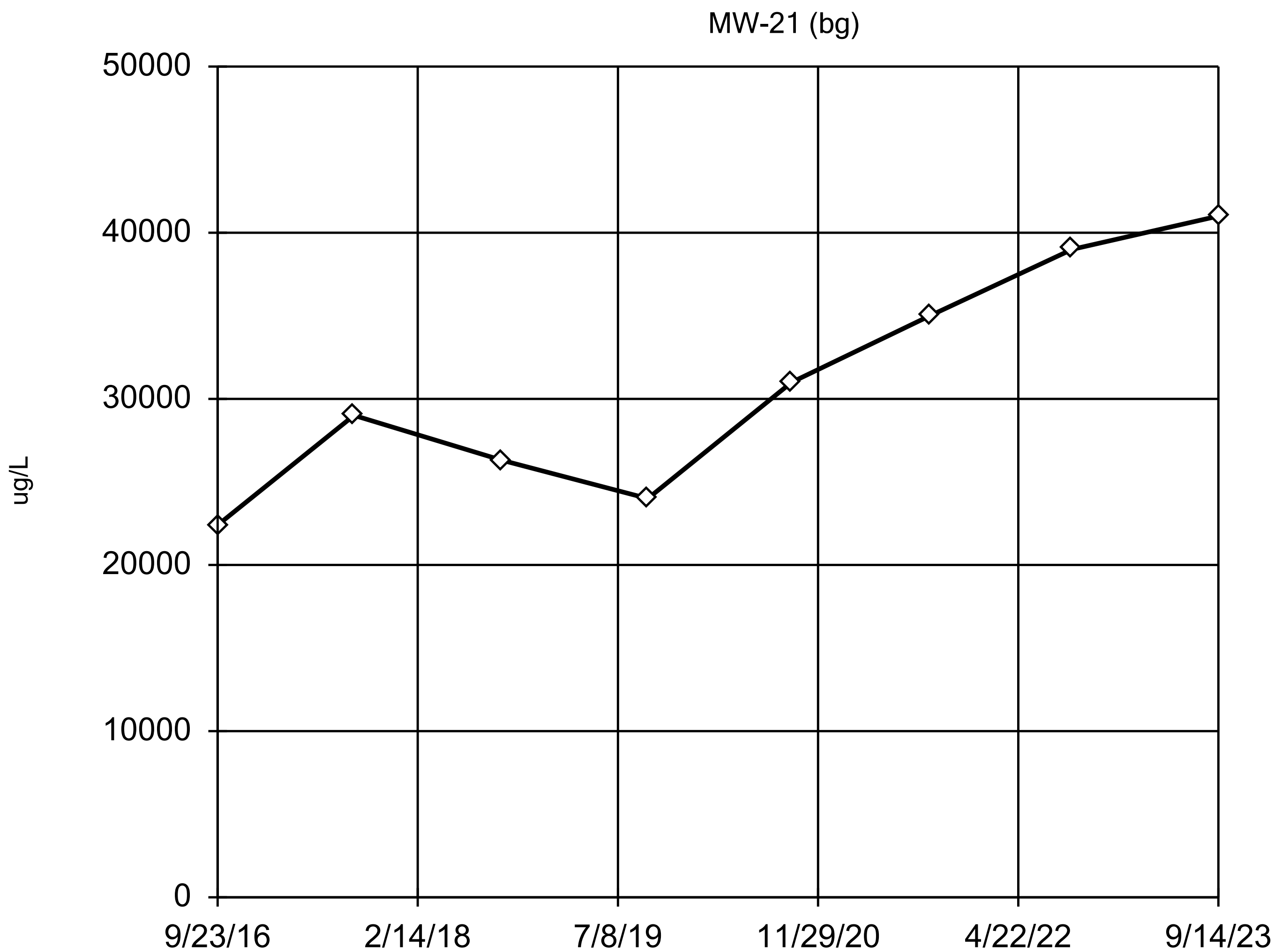
Constituent: Lead (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	<0.19
9/5/2017	1.1
9/17/2018	1.7
9/23/2019	0.52
9/23/2020	0.46 (J)
9/10/2021	<0.21
9/7/2022	<0.24
9/14/2023	0.37 (J)

ND substitution: RL or RL/2 if <15% NDs.

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 30963, std. dev. 6856, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9448
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Magnesium   Analysis Run 10/23/2023 11:00 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Magnesium (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	22400
9/5/2017	29000
9/17/2018	26300
9/23/2019	24000
9/23/2020	31000
9/10/2021	35000
9/7/2022	39000
9/14/2023	41000

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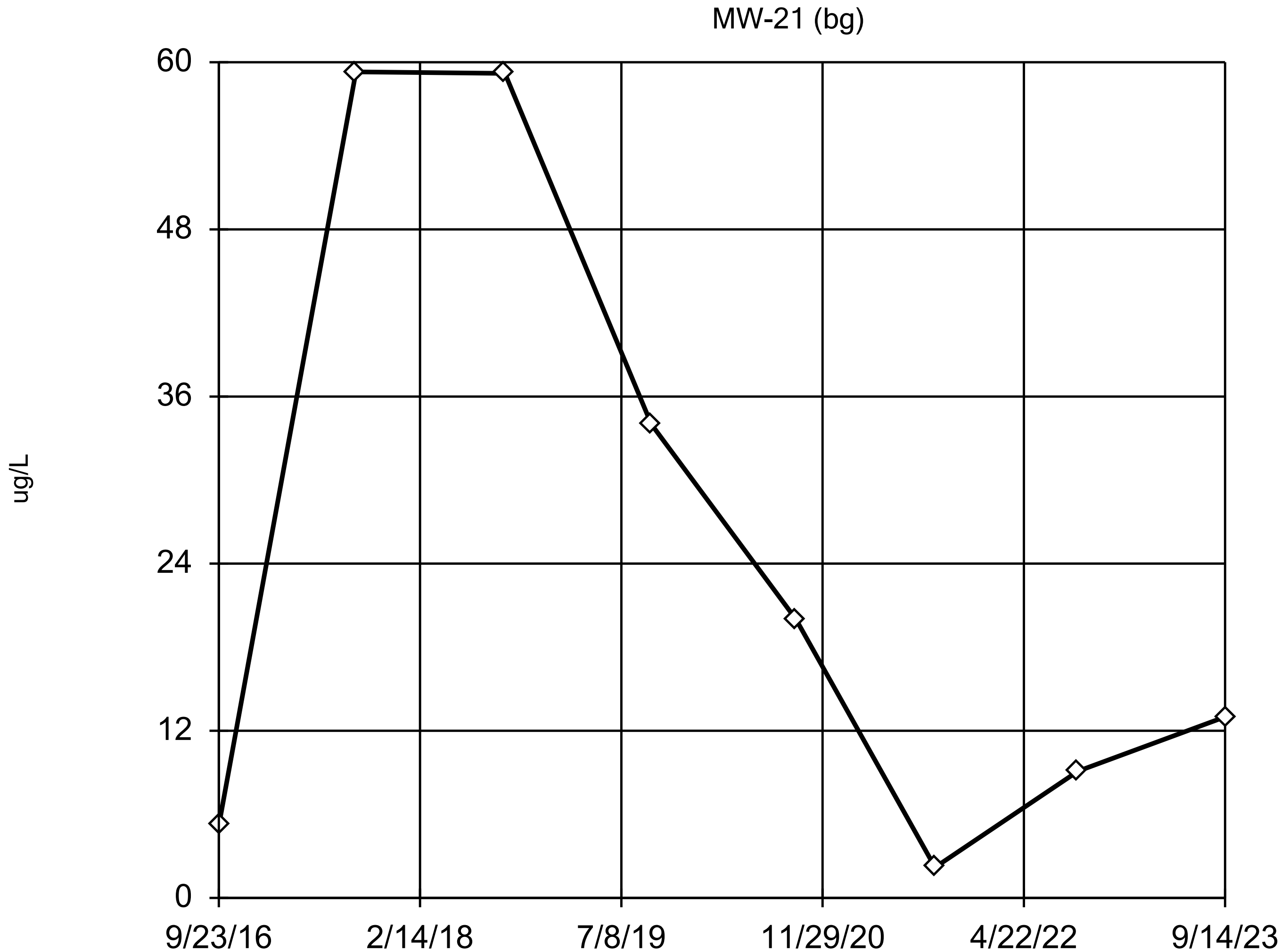
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 25.25, std. dev. 23.18, critical Tn 2.032

Normality test used: Shapiro Wilk@alpha = 0.1
Calculated = 0.9485
Critical = 0.851 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Manganese   Analysis Run 10/23/2023 11:00 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

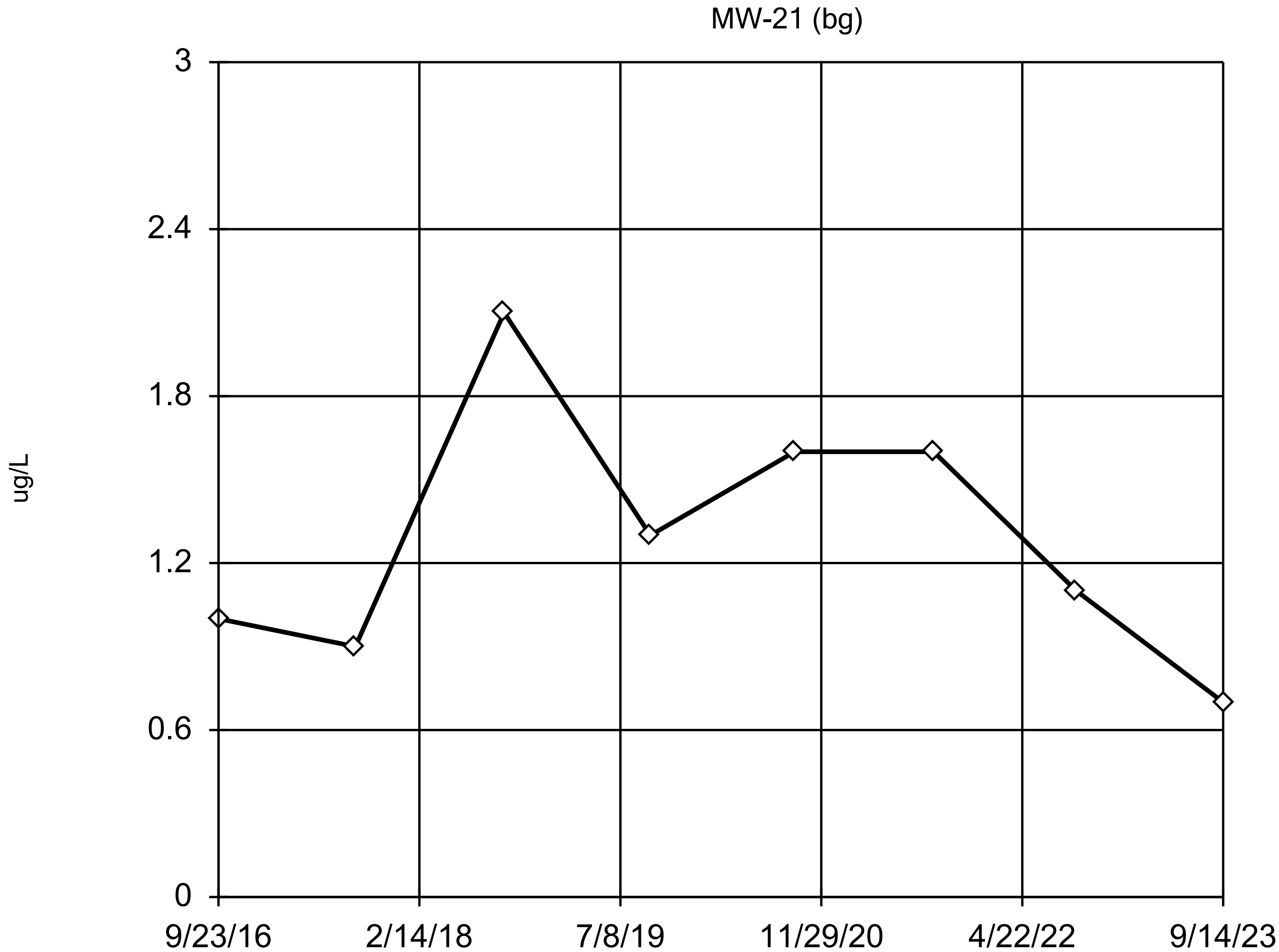
Constituent: Manganese (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	5.2
9/5/2017	59.3
9/17/2018	59.2
9/23/2019	34
9/23/2020	20
9/10/2021	<4.4
9/7/2022	9.1 (J)
9/14/2023	13

ND substitution: RL or RL/2 if <15% NDs.

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1.287, std. dev. 0.4581, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9554
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Selenium Analysis Run 10/23/2023 11:00 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/23/2023 11:06 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-21 (bg)
9/23/2016	1
9/5/2017	0.9 (J)
9/17/2018	2.1
9/23/2019	1.3 (J)
9/23/2020	1.6 (J)
9/10/2021	1.6 (J)
9/7/2022	1.1 (J)
9/14/2023	<1.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

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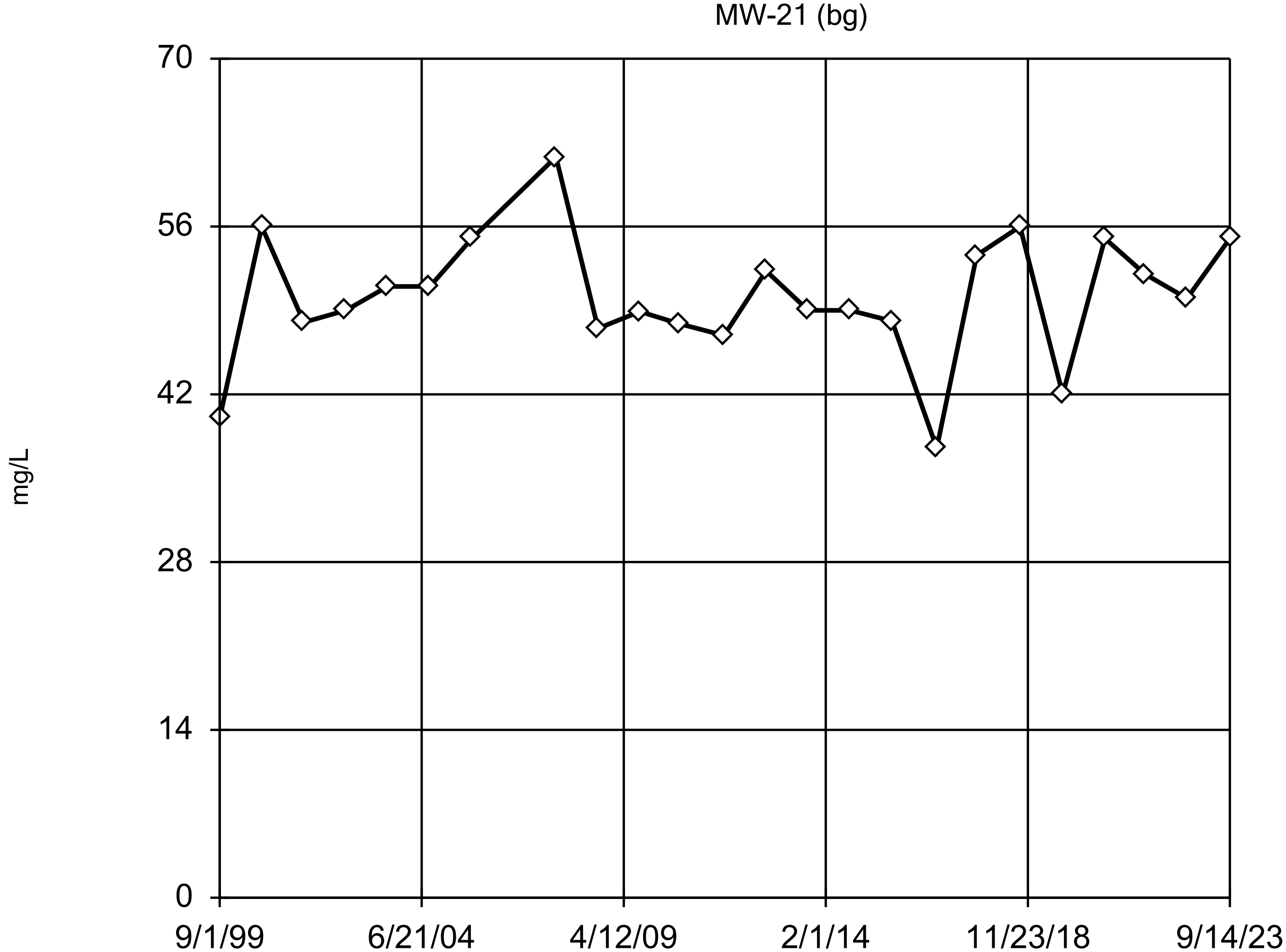
EPA Screening (suspected outliers for Dixon's Test)



n = 24

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 50.1, std. dev. 5.367, critical Tn 2.644

Normality test used:
Shapiro Wilk@alpha = 0.01
Calculated = 0.9548
Critical = 0.884
The distribution was found to be normally distributed.

Constituent: Sulfate   Analysis Run 10/23/2023 11:00 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Sulfate (mg/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/1/1999	40
9/1/2000	56
9/1/2001	48
9/1/2002	49
9/1/2003	51
9/1/2004	51
9/1/2005	55
9/1/2006	248 (X)
9/1/2007	61.8
9/1/2008	47.5
9/1/2009	48.9
8/1/2010	47.9
9/1/2011	46.9
9/1/2012	52.3
9/1/2013	49
9/1/2014	49
9/1/2015	48.1
9/23/2016	37.5
9/5/2017	53.6
9/17/2018	56
9/23/2019	42
9/23/2020	55
9/10/2021	52
9/7/2022	50
9/14/2023	55

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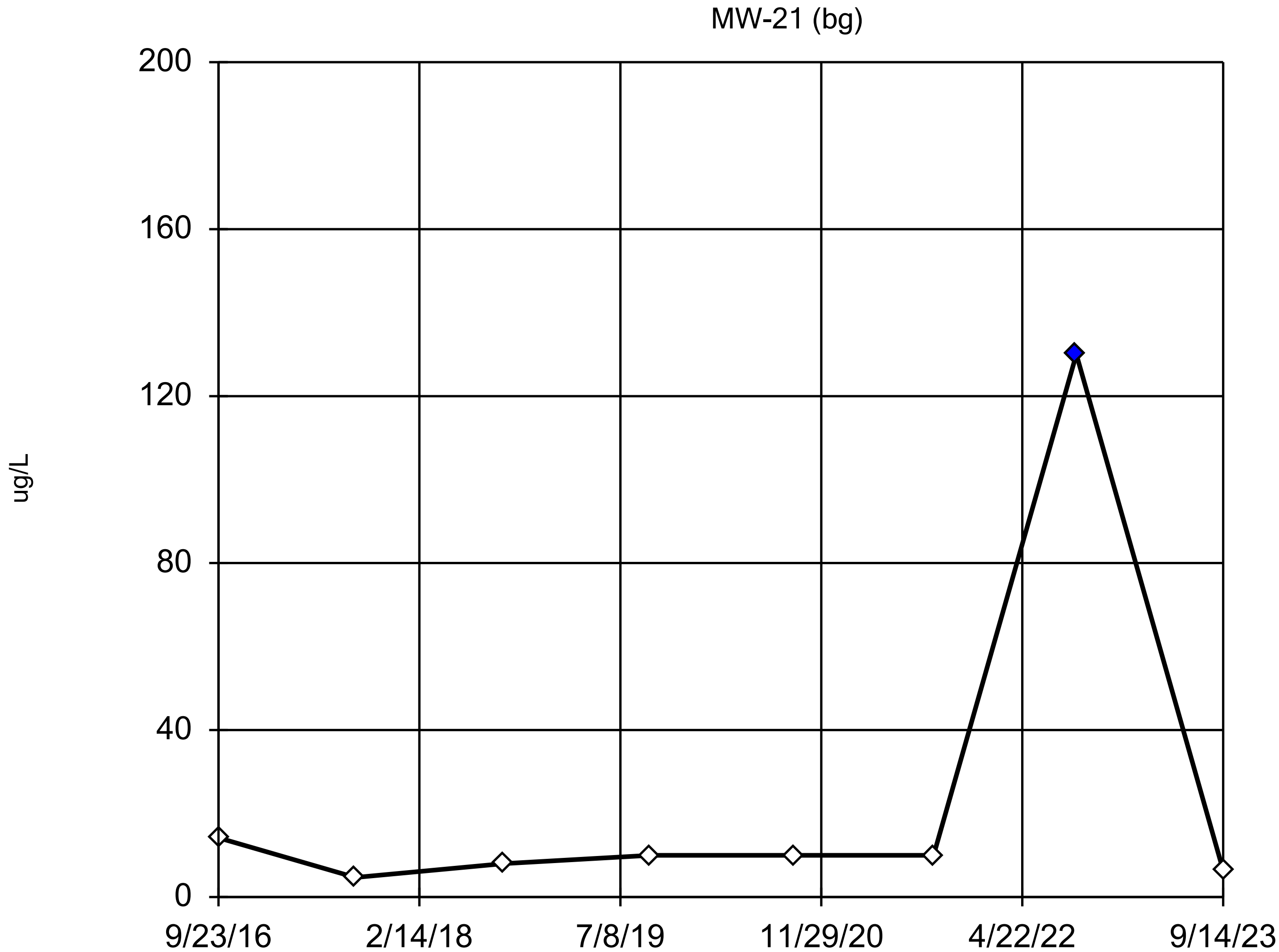
Dixon's Outlier Test



n = 8

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 24.16.
Std. Dev. = 42.86.
130: c = 0.9369
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.945
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Zinc Analysis Run 10/23/2023 11:00 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Dixon's Outlier Test

Constituent: Zinc (ug/L)   Analysis Run 10/23/2023 11:06 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-21 (bg)
9/23/2016	14.2
9/5/2017	4.7 (J)
9/17/2018	8 (J)
9/23/2019	<10
9/23/2020	<10
9/10/2021	<10
9/7/2022	130 (O)
9/14/2023	<6.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

Attachment E4

Outlier Analysis Results - Deep

Outlier Analysis

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB   Printed 10/23/2023, 11:51 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Arsenic (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1.124	0.1828	normal	ShapiroWilk
Barium (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	189.8	10.35	normal	ShapiroWilk
Beryllium (ug/L)	MW-12 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.2028	0.115	unknown	ShapiroWilk
Boron (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	68.23	24.34	normal	ShapiroWilk
Chloride (mg/L)	MW-12 (bg)	No	n/a	n/a	NP (nrm)	NaN	36	4.256	1.094	unknown	ShapiroWilk
Cobalt (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	0.4425	0.06671	normal	ShapiroWilk
Copper (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1.224	0.6889	normal	ShapiroWilk
Iron (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	1714	100.6	normal	ShapiroWilk
Lead (ug/L)	MW-12 (bg)	No	n/a	n/a	Dixon`s	0.05	8	0.1847	0.07558	normal	ShapiroWilk
Magnesium (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	40488	2020	normal	ShapiroWilk
Manganese (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	266.1	11.34	normal	ShapiroWilk
Selenium (ug/L)	MW-12 (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.7182	0.4988	unknown	ShapiroWilk
Sulfate (mg/L)	**MW-12 (bg)**	**Yes**	**123**	**9/1/2011**	**Dixon`s**	**0.05**	**15**	**58.81**	**19.51**	**ln(x)**	**ShapiroWilk**
Zinc (ug/L)	MW-12 (bg)	No	n/a	n/a	EPA 1989	0.05	8	10.96	13.39	ln(x)	ShapiroWilk

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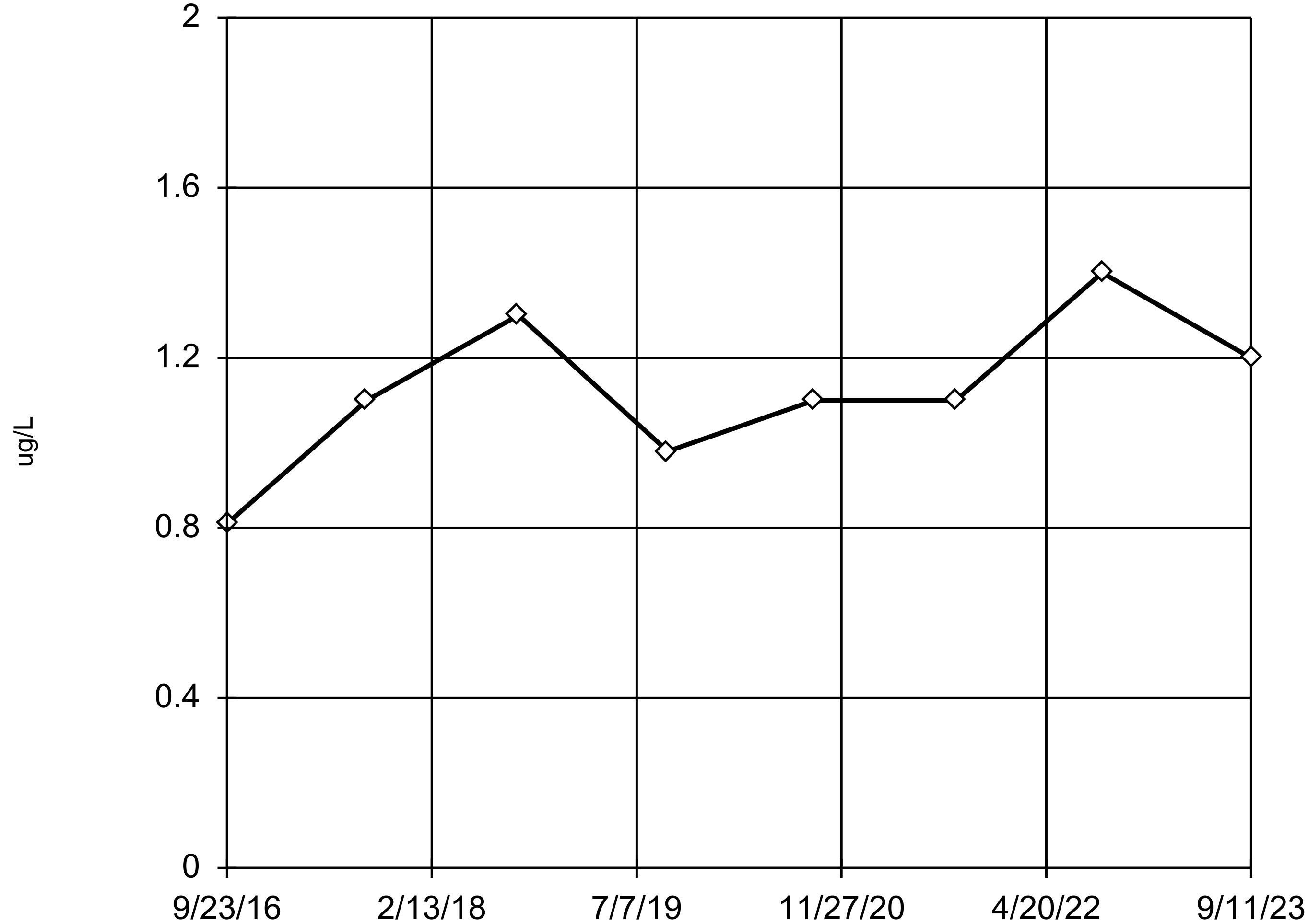
EPA Screening (suspected outliers for Dixon's Test)

MW-12 (bg)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1.124, std. dev. 0.1828, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9673
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Arsenic   Analysis Run 10/23/2023 11:46 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

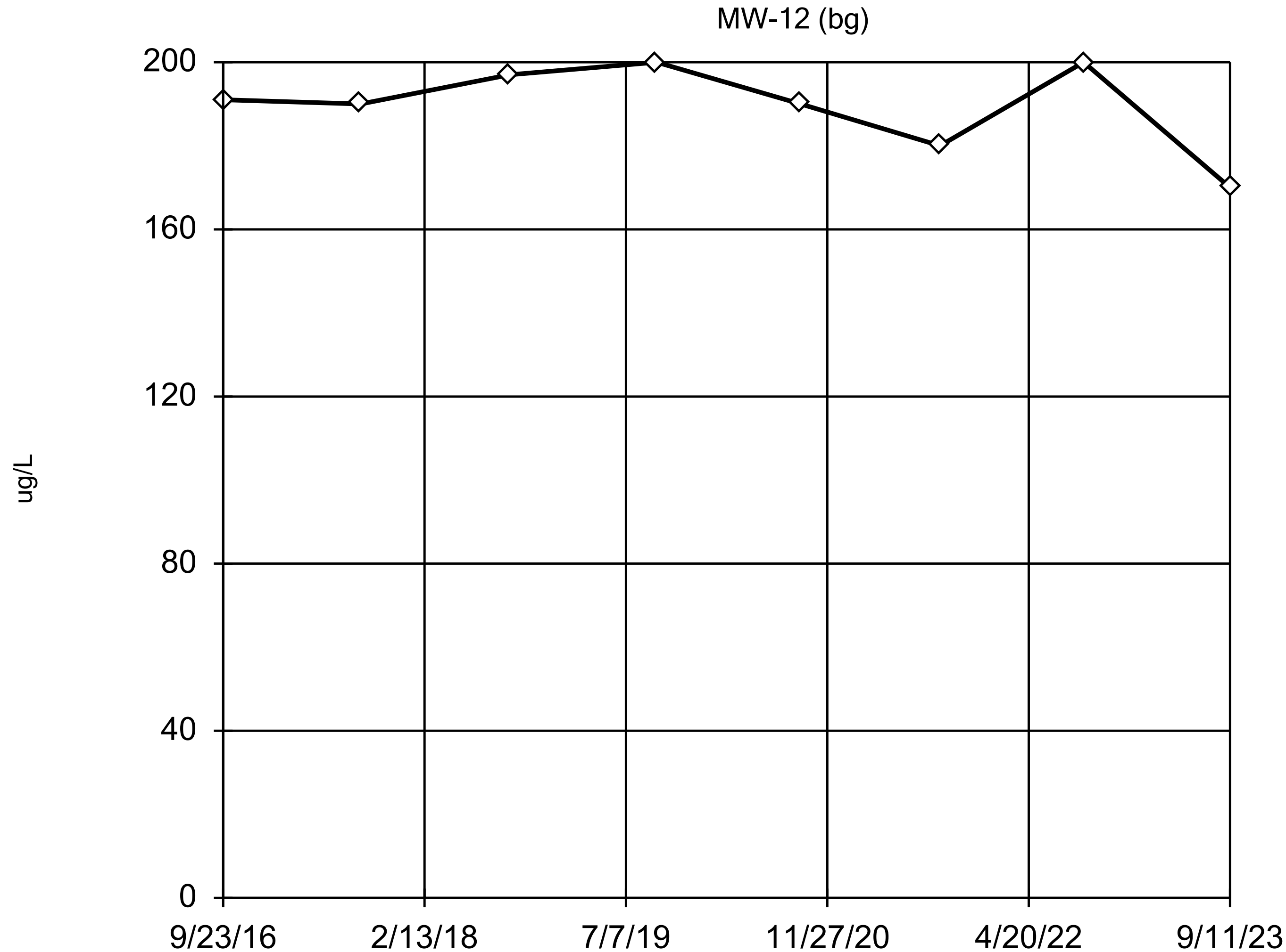
EPA 1989 Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/23/2023 11:51 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-12 (bg)
9/23/2016	0.81 (J)
9/5/2017	1.1
9/17/2018	1.3
9/23/2019	0.98 (J)
9/21/2020	1.1 (J)
9/8/2021	1.1 (J)
9/6/2022	1.4 (J)
9/11/2023	1.2 (J)

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 189.8, std. dev. 10.35, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8854
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Barium   Analysis Run 10/23/2023 11:46 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Barium (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	191
9/5/2017	190
9/17/2018	197
9/23/2019	200
9/21/2020	190
9/8/2021	180 (B)
9/6/2022	200
9/11/2023	170

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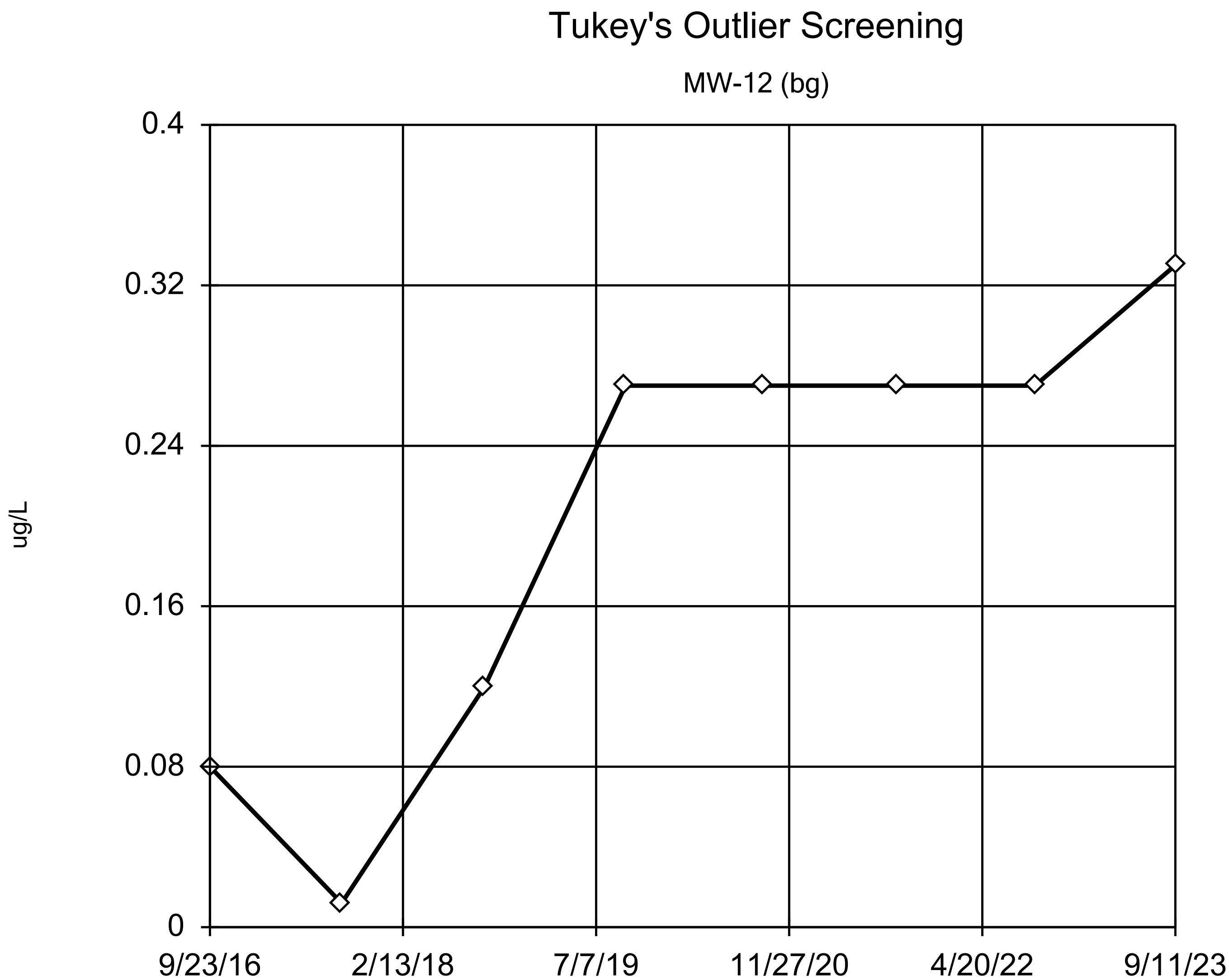


n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were square transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.5103, low cutoff = -0.4208, based on IQR multiplier of 3.

Constituent: Beryllium Analysis Run 10/23/2023 11:46 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Tukey's Outlier Screening

Constituent: Beryllium (ug/L) Analysis Run 10/23/2023 11:51 AM View: Deep

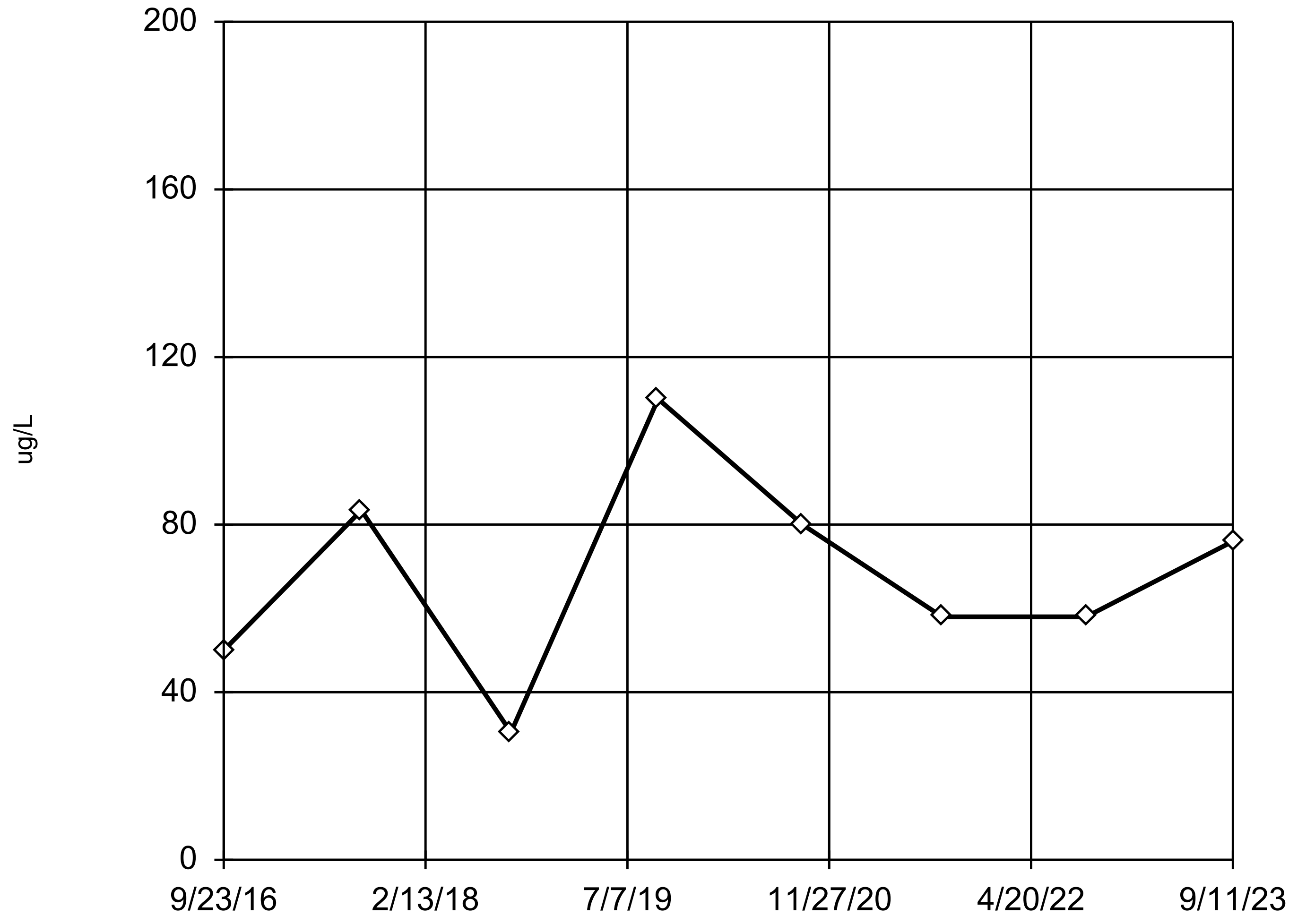
Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-12 (bg)
9/23/2016	<0.08
9/5/2017	<0.012
9/17/2018	<0.12
9/23/2019	<0.27
9/21/2020	<0.27
9/8/2021	<0.27
9/6/2022	<0.27
9/11/2023	<0.33 (U)

ND substitution: RL or RL/2 if <15% NDs.

EPA Screening (suspected outliers for Dixon's Test)

MW-12 (bg)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 68.23, std. dev. 24.34, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9751
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Boron   Analysis Run 10/23/2023 11:46 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Boron (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	<50
9/5/2017	83.4 (J)
9/17/2018	30.4 (J)
9/23/2019	<110
9/21/2020	<80
9/8/2021	<58
9/6/2022	<58
9/11/2023	<76 (U)

ND substitution: RL or RL/2 if <15% NDs.

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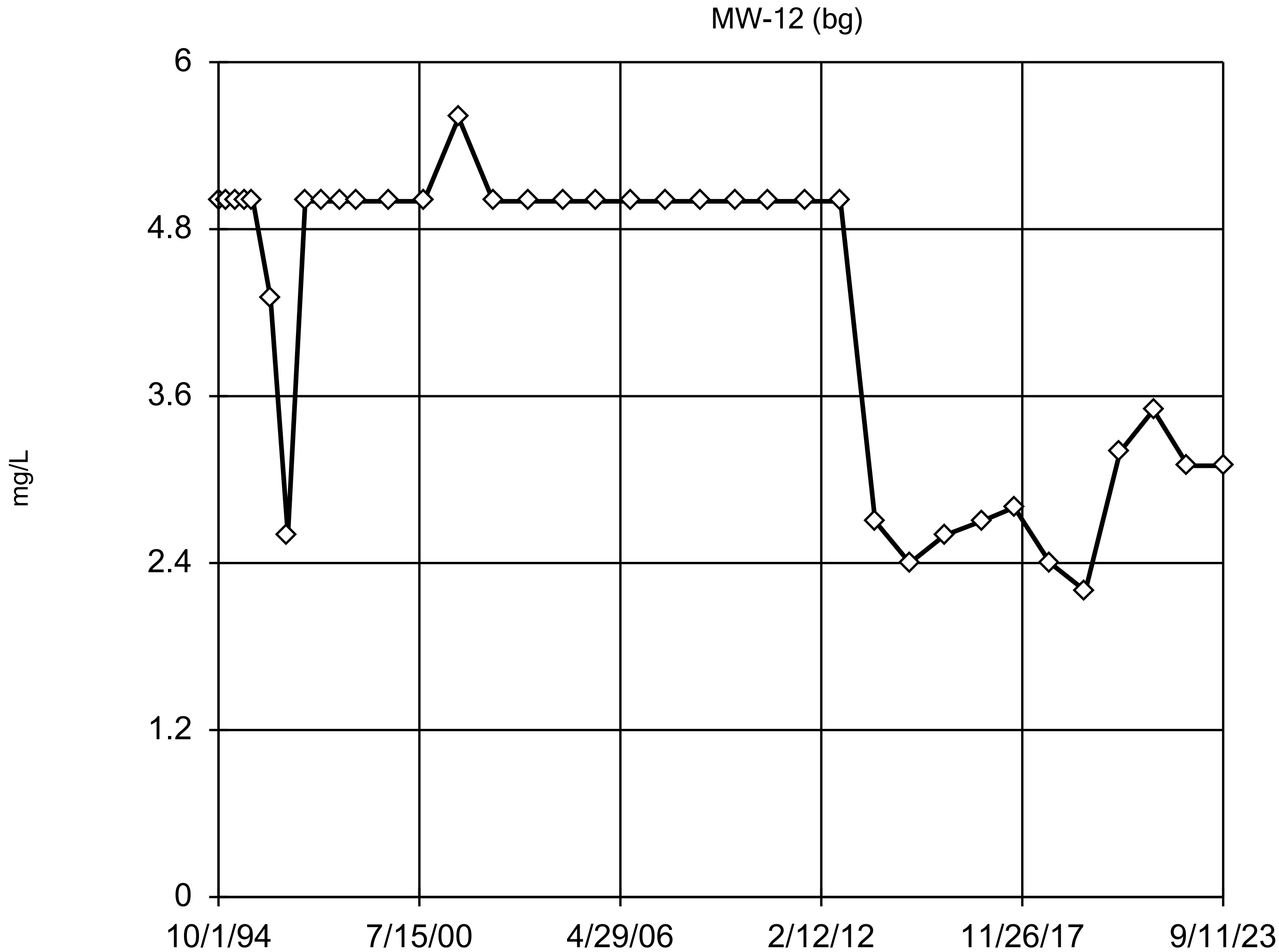
Tukey's Outlier Screening



n = 36

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.01 alpha level.

Data were x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6.254, low cutoff = -5.926, based on IQR multiplier of 3.

Constituent: Chloride   Analysis Run 10/23/2023 11:46 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Tukey's Outlier Screening

Constituent: Chloride (mg/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
10/1/1994	<5 (X)
1/1/1995	<5 (X)
4/1/1995	<5 (X)
7/1/1995	<5 (X)
10/1/1995	<5 (X)
4/1/1996	4.3 (X)
10/1/1996	2.6 (X)
4/1/1997	<5 (X)
10/1/1997	<5 (X)
4/1/1998	<5 (X)
10/1/1998	<5 (X)
9/1/1999	<5 (X)
9/1/2000	<5 (X)
9/1/2001	5.6 (X)
9/1/2002	<5 (X)
9/1/2003	<5 (X)
9/1/2004	<5 (X)
9/1/2005	<5 (X)
9/1/2006	<5 (X)
9/1/2007	<5 (X)
9/1/2008	<5 (X)
9/1/2009	<5 (X)
8/1/2010	<5 (X)
9/1/2011	<5 (X)
9/1/2012	<5 (X)
9/1/2013	2.7
9/1/2014	2.4
9/1/2015	2.6
9/23/2016	2.7
9/5/2017	2.8
9/17/2018	2.4
9/23/2019	2.2 (J)
9/21/2020	3.2 (J)
9/8/2021	3.5 (J)
9/6/2022	3.1 (J)
9/11/2023	3.1 (J)

ND substitution: RL or RL/2 if <15% NDs.

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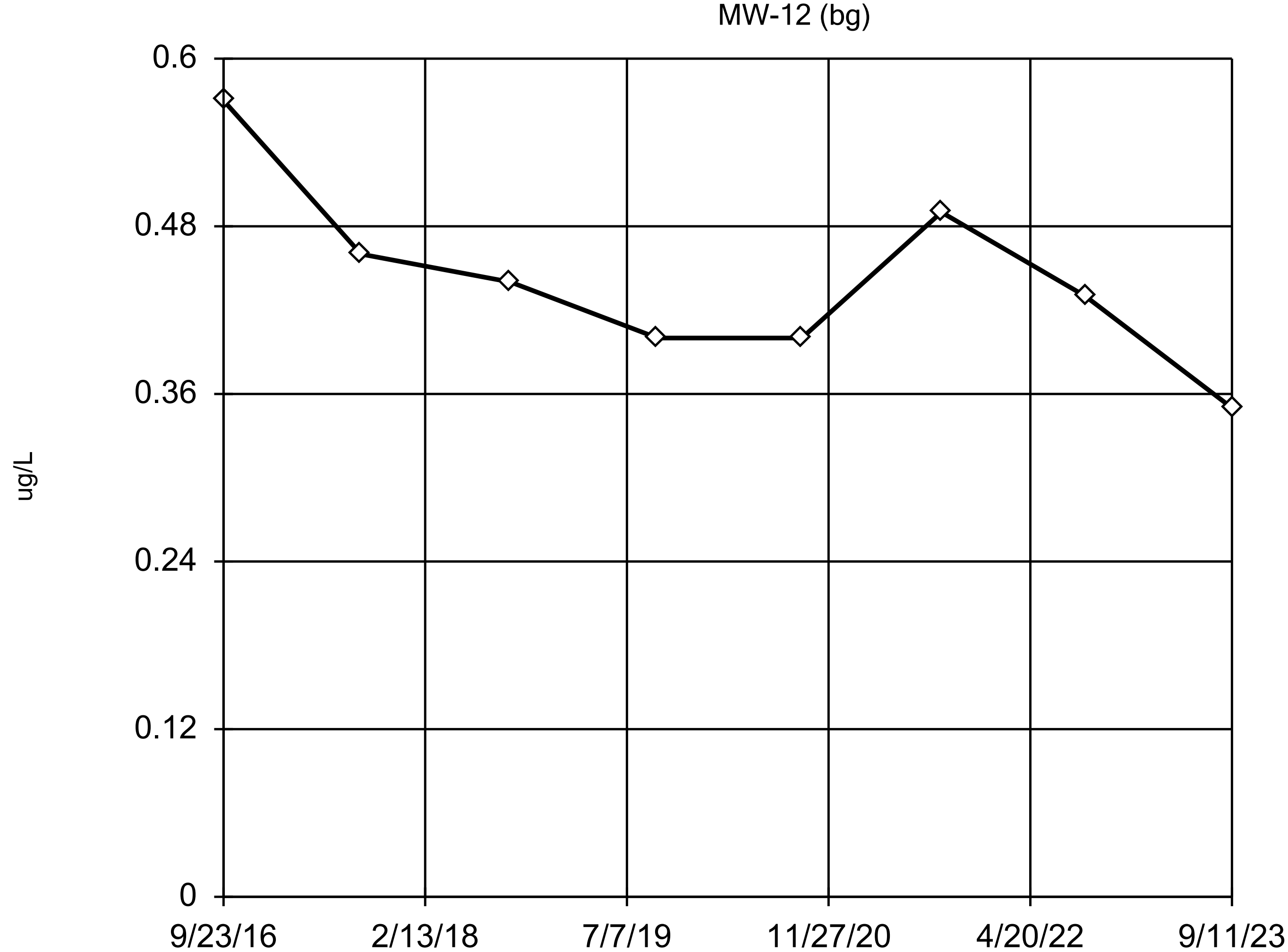
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 0.4425, std. dev. 0.06671, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9568
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Cobalt Analysis Run 10/23/2023 11:46 AM View: Deep

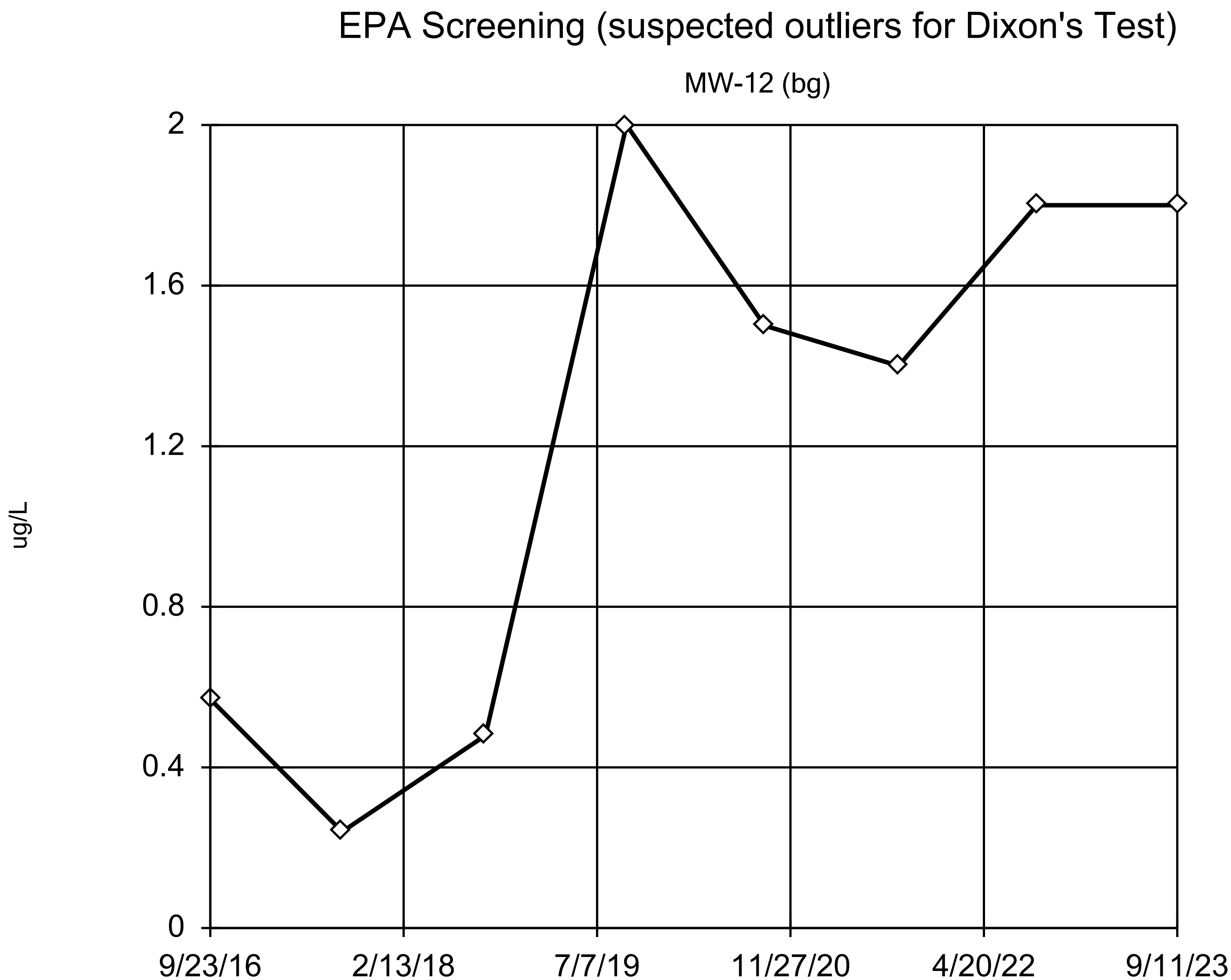
Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	0.57 (J)
9/5/2017	0.46 (J)
9/17/2018	0.44 (J)
9/23/2019	0.4 (J)
9/21/2020	0.4 (J)
9/8/2021	0.49 (J)
9/6/2022	0.43 (J)
9/11/2023	0.35 (J)



n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 1.224, std. dev. 0.6889, critical Tn 2.032

Normality test used: Shapiro Wilk@alpha = 0.1
Calculated = 0.8727
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Copper Analysis Run 10/23/2023 11:46 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Copper (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	0.57 (J)
9/5/2017	0.24 (J)
9/17/2018	<0.48
9/23/2019	<2
9/21/2020	<1.5
9/8/2021	<1.4
9/6/2022	<1.8
9/11/2023	<1.8 (U)

ND substitution: RL or RL/2 if <15% NDs.

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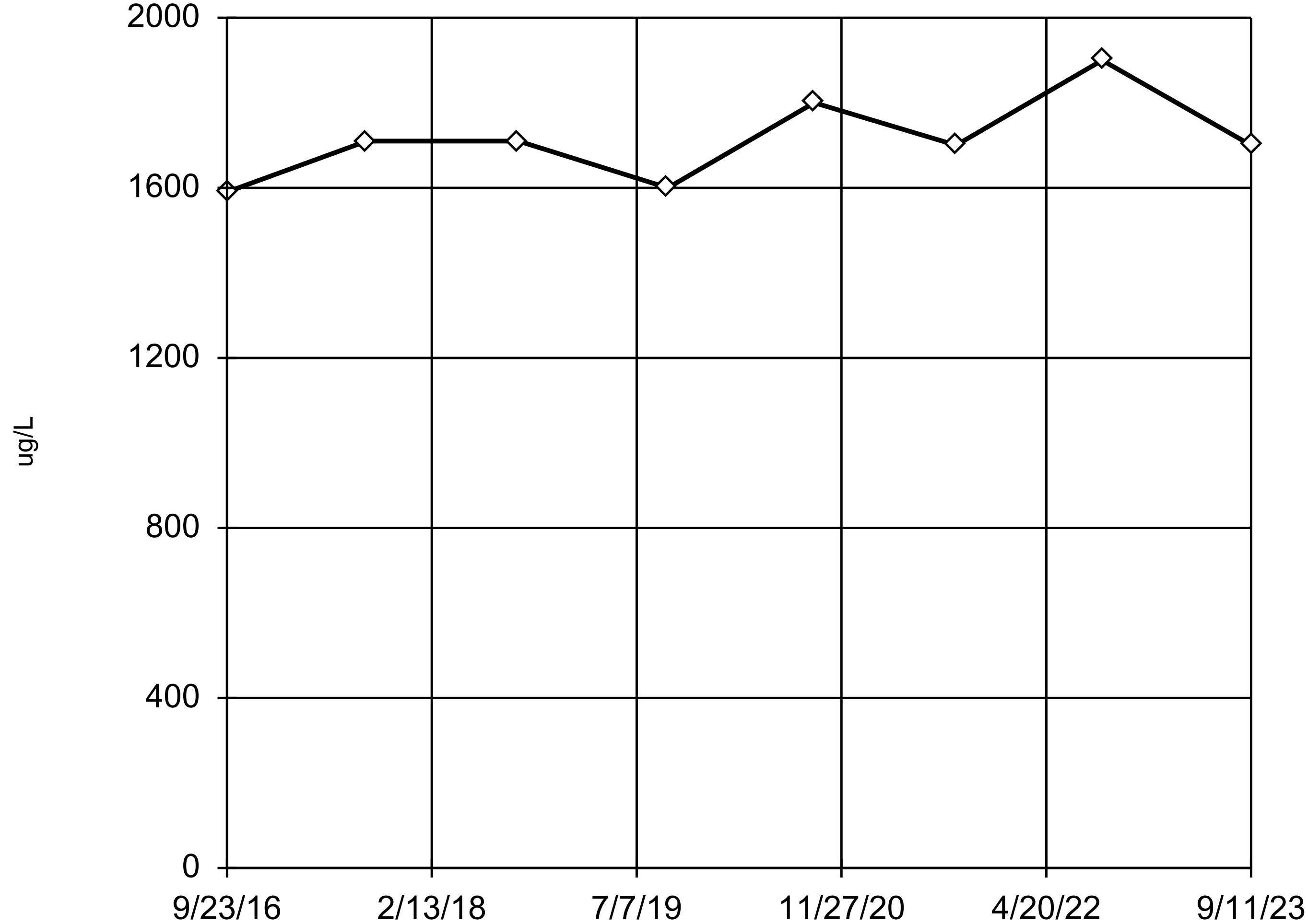
EPA Screening (suspected outliers for Dixon's Test)

MW-12 (bg)



n = 8

Dixon's will not be run.
No suspect values identi-
fied or unable to estab-
lish suspect values.
Mean 1714, std. dev. 100.6,
critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9056
Critical = 0.851
The distribution was found
to be normally distrib-
uted.

Constituent: Iron Analysis Run 10/23/2023 11:47 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

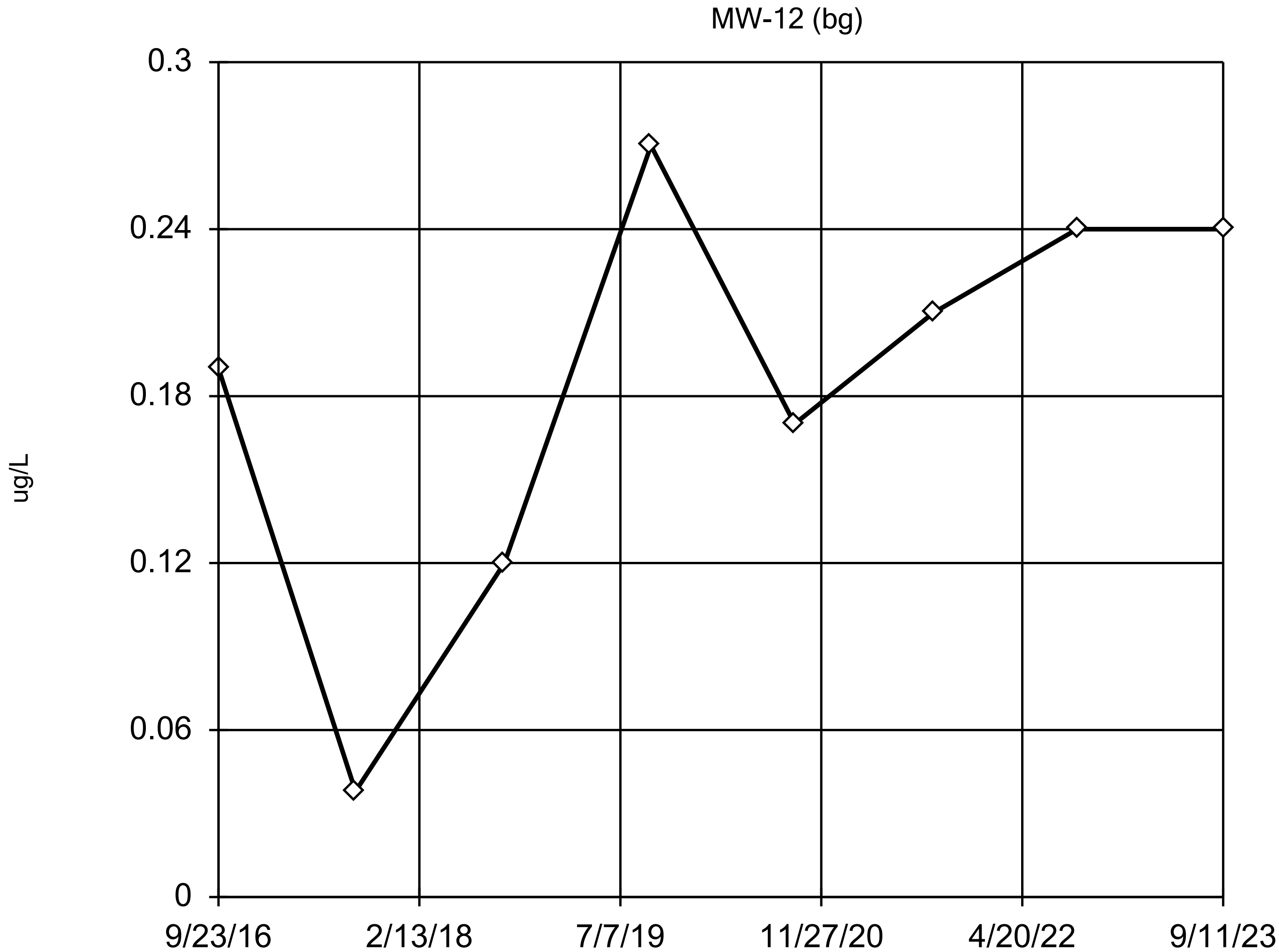
EPA 1989 Outlier Screening

Constituent: Iron (ug/L) Analysis Run 10/23/2023 11:51 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-12 (bg)
9/23/2016	1590
9/5/2017	1710
9/17/2018	1710
9/23/2019	1600
9/21/2020	1800
9/8/2021	1700
9/6/2022	1900
9/11/2023	1700

Dixon's Outlier Test



n = 8

No statistical outliers.
Testing for 1 low outlier.
Mean = 0.1847.
Std. Dev. = 0.07558.
0.038 (J): c = 0.4059
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9638
Critical = 0.838
The distribution was found to be normally distributed.

Constituent: Lead   Analysis Run 10/23/2023 11:47 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Dixon's Outlier Test

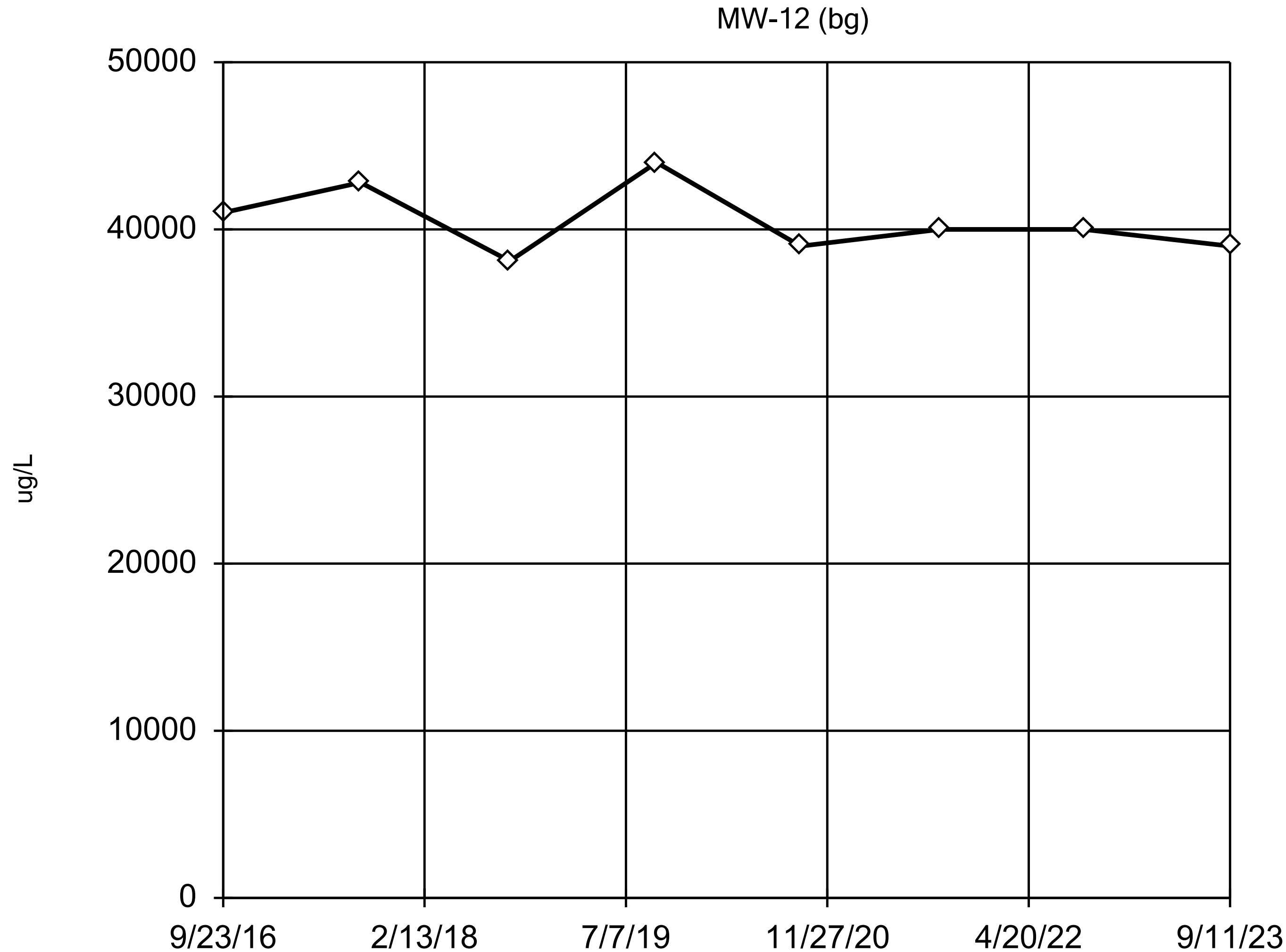
Constituent: Lead (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	<0.19
9/5/2017	0.038 (J)
9/17/2018	<0.12
9/23/2019	<0.27
9/21/2020	0.17 (J)
9/8/2021	<0.21
9/6/2022	<0.24
9/11/2023	<0.24 (U)

ND substitution: RL or RL/2 if <15% NDs.

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 40488, std. dev. 2020, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9188
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Magnesium Analysis Run 10/23/2023 11:47 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Magnesium (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	41000
9/5/2017	42800
9/17/2018	38100
9/23/2019	44000
9/21/2020	39000
9/8/2021	40000
9/6/2022	40000
9/11/2023	39000

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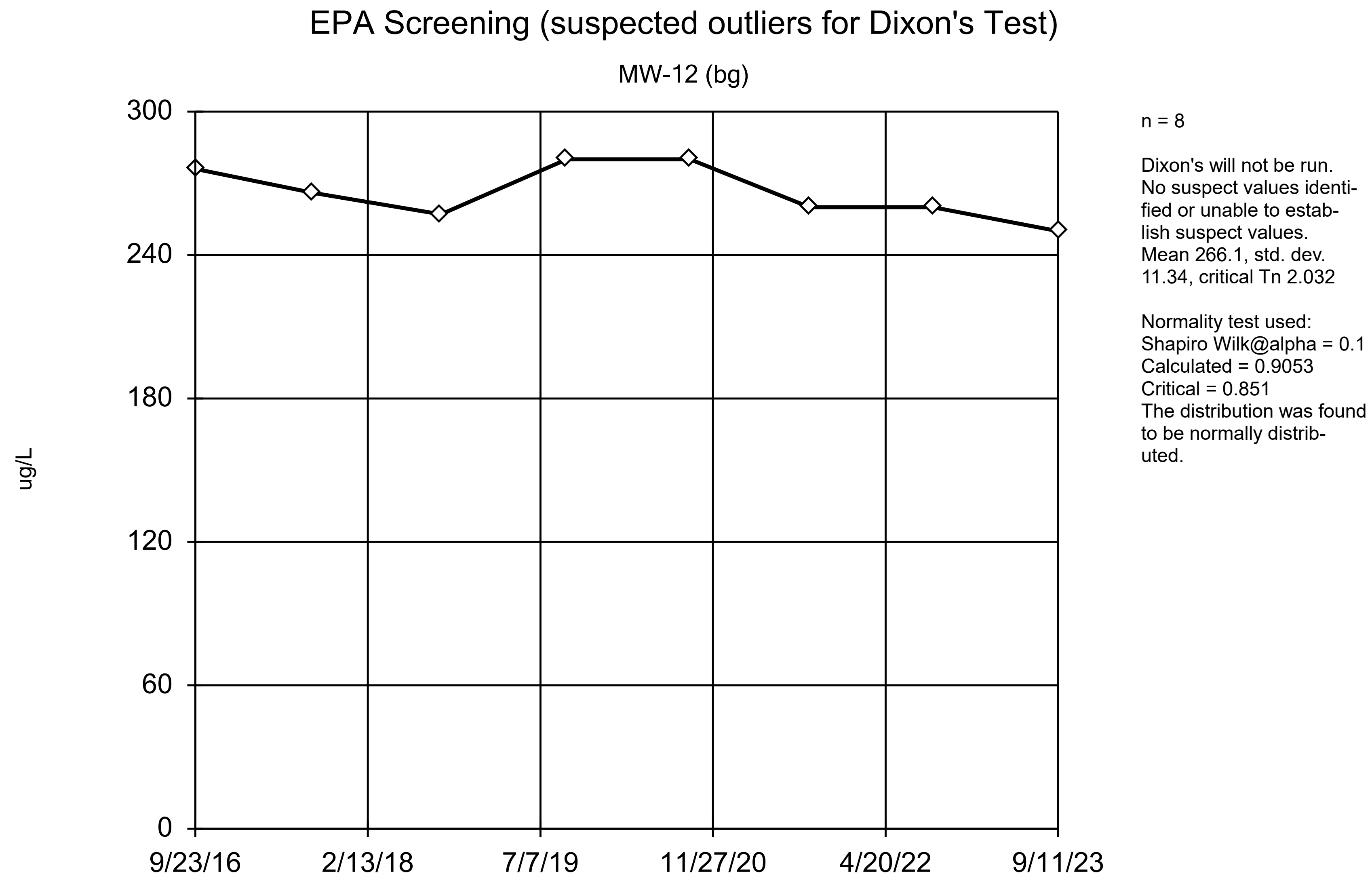


Constituent: Manganese Analysis Run 10/23/2023 11:47 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

EPA 1989 Outlier Screening

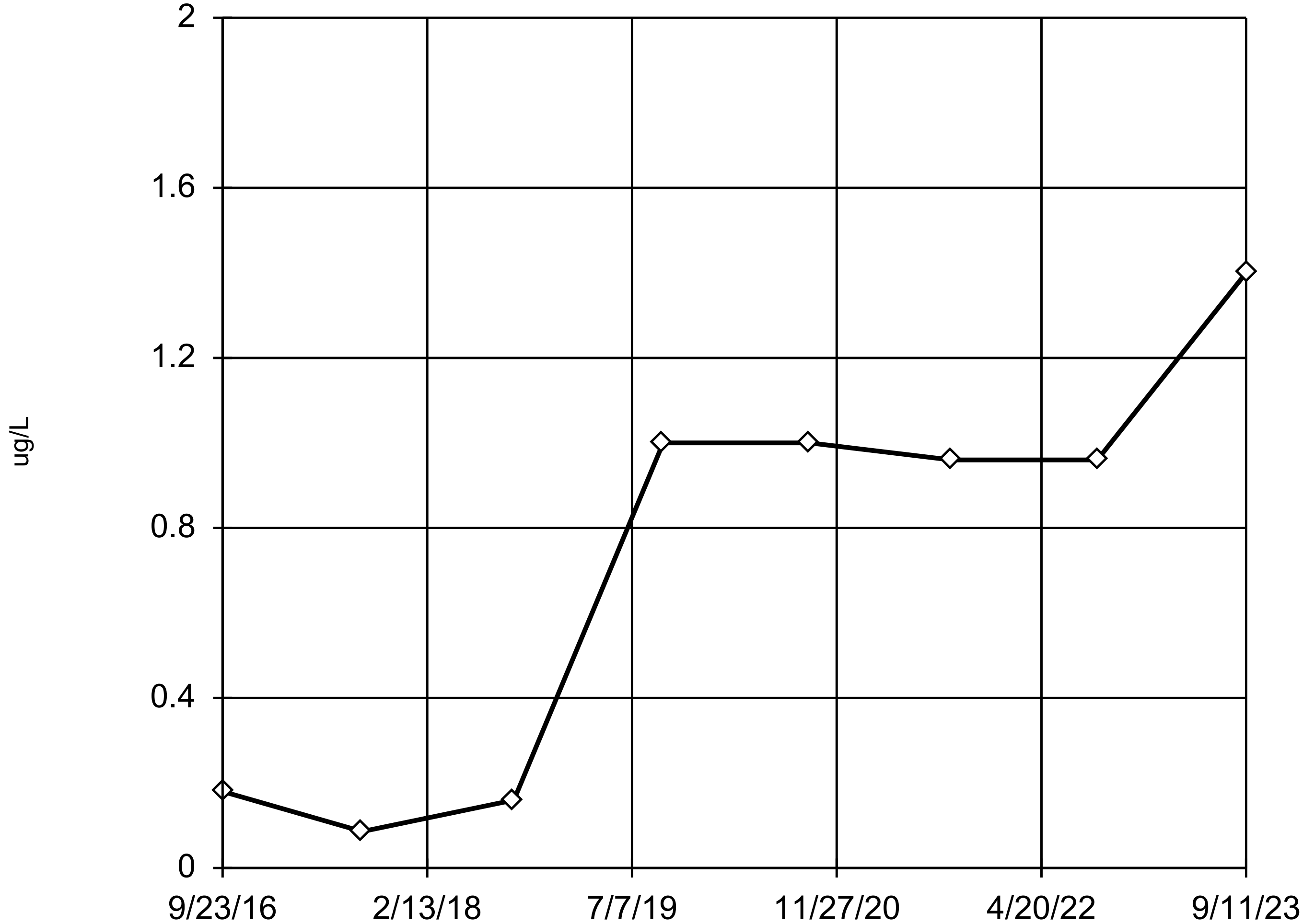
Constituent: Manganese (ug/L) Analysis Run 10/23/2023 11:51 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-12 (bg)
9/23/2016	276
9/5/2017	266
9/17/2018	257
9/23/2019	280
9/21/2020	280
9/8/2021	260
9/6/2022	260
9/11/2023	250

Tukey's Outlier Screening

MW-12 (bg)



n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.1 alpha level.

Data were square transformed to achieve best W statistic (graph shown in original units).

High cutoff = 1.978, low cutoff = -1.698, based on IQR multiplier of 3.

Constituent: Selenium Analysis Run 10/23/2023 11:47 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Tukey's Outlier Screening

Constituent: Selenium (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	<0.18
9/5/2017	<0.086
9/17/2018	<0.16
9/23/2019	<1
9/21/2020	<1
9/8/2021	<0.96
9/6/2022	<0.96
9/11/2023	<1.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

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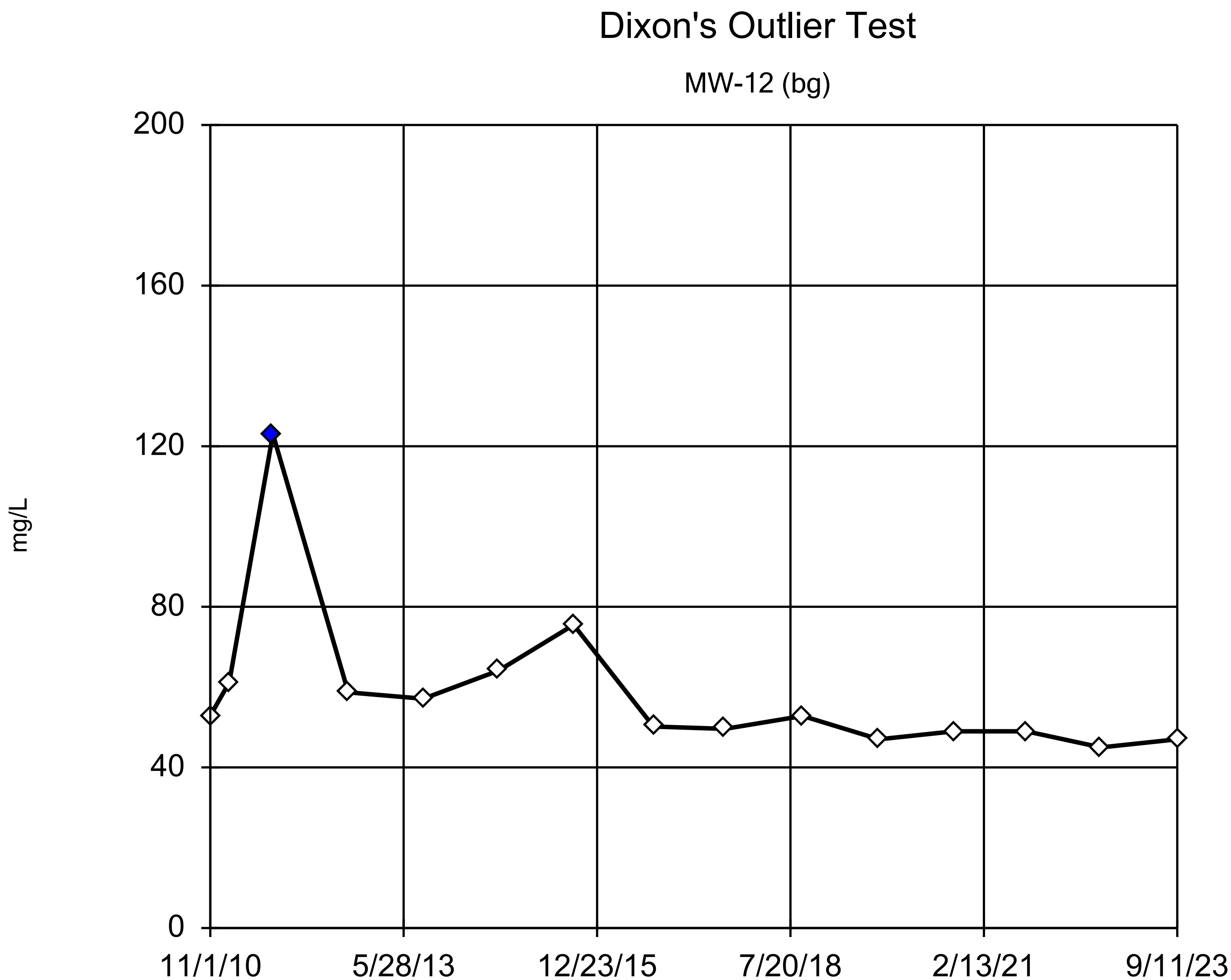


n = 15

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 58.81.
Std. Dev. = 19.51.
123: c = 0.6775
tabl = 0.525.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9112
Critical = 0.874 (after natural log transformation)
The distribution, after removal of suspect value, was found to be lognormal.

Constituent: Sulfate   Analysis Run 10/23/2023 11:47 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

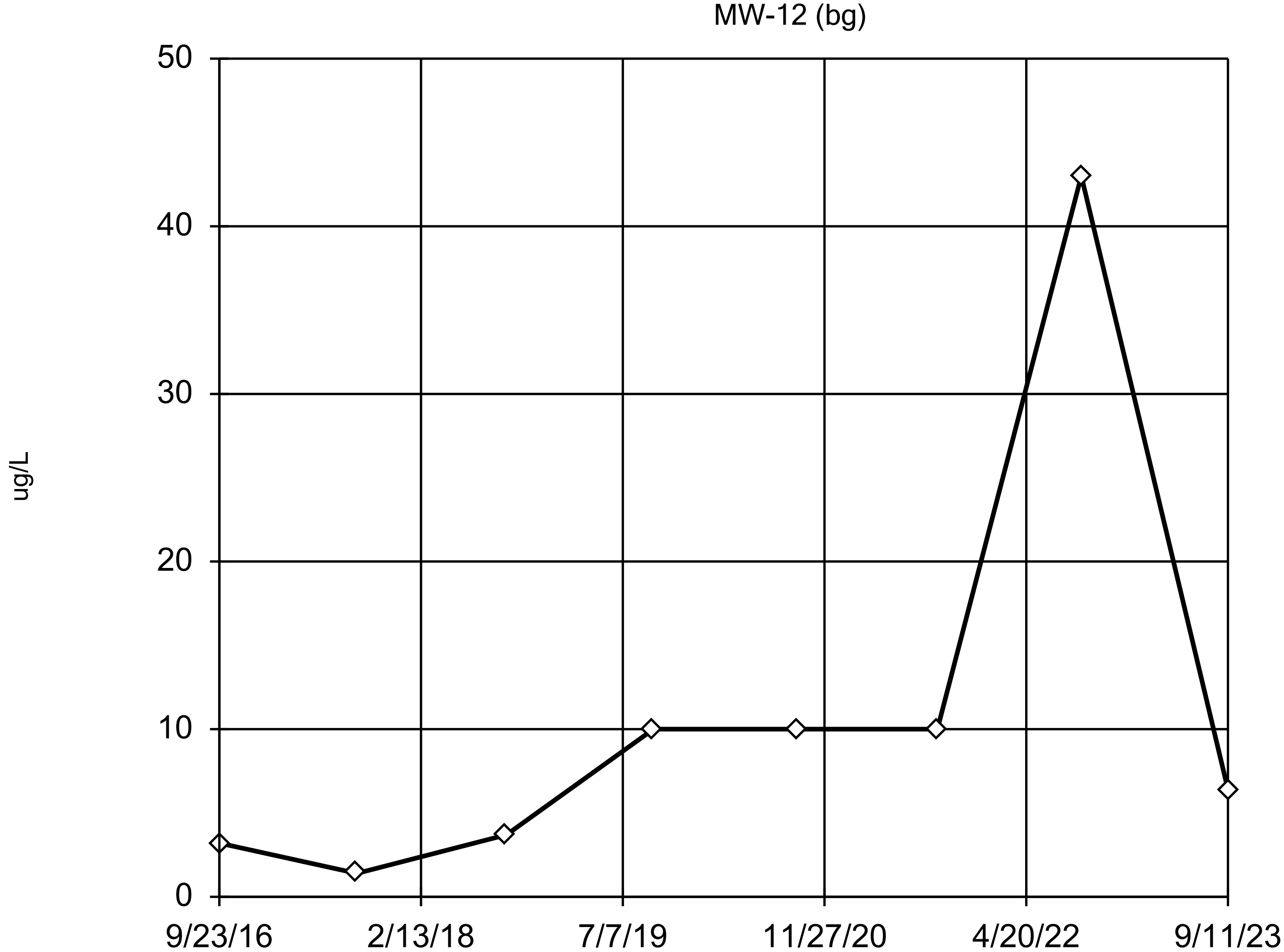
Dixon's Outlier Test

Constituent: Sulfate (mg/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
11/1/2010	52.9
2/1/2011	61.2
9/1/2011	123 (O)
9/1/2012	58.7
9/1/2013	57.1
9/1/2014	64.1
9/1/2015	75.5
9/23/2016	50.2
9/5/2017	49.6
9/17/2018	52.8
9/23/2019	47
9/21/2020	49
9/8/2021	49
9/6/2022	45
9/11/2023	47

EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 10.96, std. dev. 13.39, critical Tn 2.032

Normality test used: Shapiro Wilk@alpha = 0.1 Calculated = 0.9502 Critical = 0.851 (after natural log transformation) The distribution was found to be log-normal.

Constituent: Zinc   Analysis Run 10/23/2023 11:47 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

EPA 1989 Outlier Screening

Constituent: Zinc (ug/L)   Analysis Run 10/23/2023 11:51 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)
9/23/2016	3.2 (J)
9/5/2017	1.4 (J)
9/17/2018	<3.7
9/23/2019	<10
9/21/2020	<10
9/8/2021	<10
9/6/2022	43
9/11/2023	<6.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

Attachment E5

Interwell Prediction Limit Analysis Results – Shallow

Prediction Limit

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB   Printed 10/23/2023, 11:31 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Arsenic (ug/L)	MW-14	1.20	n/a	9/11/2023	0.79J	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-15AR	1.20	n/a	9/9/2022	0.75ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	**MW-2**	**1.20**	**n/a**	**9/12/2023**	**2.3**	**Yes**	**8**	**MW-21**	**n/a**	**n/a**	**50**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Arsenic (ug/L)	MW-20	1.20	n/a	9/12/2023	0.92J	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-25R	1.20	n/a	9/12/2023	0.53ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-5	1.20	n/a	9/13/2023	0.53ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-23/23R	1.20	n/a	9/14/2023	0.53ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Barium (ug/L)	MW-14	277	n/a	9/11/2023	52	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-15AR	277	n/a	9/9/2022	96	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-2	277	n/a	9/12/2023	82	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-20	277	n/a	9/12/2023	82	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-25R	277	n/a	9/12/2023	160	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-5	277	n/a	9/13/2023	130	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-23/23R	277	n/a	9/14/2023	120	No	8	MW-21	195.5	25.52	0	None	No	0.0005787	Param Inter 1 of 2
Beryllium (ug/L)	MW-14	0.330	n/a	9/11/2023	0.33ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-15AR	0.330	n/a	9/9/2022	0.27ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-2	0.330	n/a	9/12/2023	0.33ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-20	0.330	n/a	9/12/2023	0.33ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-25R	0.330	n/a	9/12/2023	0.33ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-5	0.330	n/a	9/13/2023	0.33ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-23/23R	0.330	n/a	9/14/2023	0.33ND	No	8	MW-21	n/a	n/a	87.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Boron (ug/L)	**MW-14**	**202**	**n/a**	**9/11/2023**	**1700**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-15AR**	**202**	**n/a**	**9/9/2022**	**3300**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-2**	**202**	**n/a**	**9/12/2023**	**1100**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-20**	**202**	**n/a**	**9/12/2023**	**1800**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-25R**	**202**	**n/a**	**9/12/2023**	**310**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-5**	**202**	**n/a**	**9/13/2023**	**880**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-23/23R**	**202**	**n/a**	**9/14/2023**	**400**	**Yes**	**8**	**MW-21**	**98.58**	**32.13**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Chloride (mg/L)	MW-14	123	n/a	9/11/2023	8.3	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-15AR	123	n/a	9/9/2022	17	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-2	123	n/a	9/12/2023	5.6	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-20	123	n/a	9/12/2023	12	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-25R	123	n/a	9/12/2023	25	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-5	123	n/a	9/13/2023	9.9	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Chloride (mg/L)	MW-23/23R	123	n/a	9/14/2023	12	No	8	MW-21	2.464	0.7312	0	None	ln(x)	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-14	0.750	n/a	9/11/2023	0.2J	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	MW-15AR	0.750	n/a	9/9/2022	0.19ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	**MW-2**	**0.750**	**n/a**	**9/12/2023**	**2.3**	**Yes**	**8**	**MW-21**	**n/a**	**n/a**	**50**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Cobalt (ug/L)	MW-20	0.750	n/a	9/12/2023	0.17ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	MW-25R	0.750	n/a	9/12/2023	0.17ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	MW-5	0.750	n/a	9/13/2023	0.17ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	MW-23/23R	0.750	n/a	9/14/2023	0.17ND	No	8	MW-21	n/a	n/a	50	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-14	2.80	n/a	9/11/2023	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-15AR	2.80	n/a	9/9/2022	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-2	2.80	n/a	9/12/2023	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-20	2.80	n/a	9/12/2023	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-25R	2.80	n/a	9/12/2023	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-5	2.80	n/a	9/13/2023	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-23/23R	2.80	n/a	9/14/2023	1.8ND	No	8	MW-21	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Iron (ug/L)	MW-14	7470	n/a	9/11/2023	54J	No	8	MW-21	4.883	1.258	25	None	ln(x)	0.0005787	Param Inter 1 of 2

Prediction Limit

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB Printed 10/23/2023, 11:31 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Iron (ug/L)	MW-15AR	7470	n/a	9/9/2022	36ND	No	8	MW-21	4.883	1.258	25	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	**MW-2**	**7470**	**n/a**	**9/12/2023**	**12000**	**Yes**	**8**	**MW-21**	**4.883**	**1.258**	**25**	**None**	**ln(x)**	**0.0005787**	**Param Inter 1 of 2**
Iron (ug/L)	MW-20	7470	n/a	9/12/2023	60J	No	8	MW-21	4.883	1.258	25	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-25R	7470	n/a	9/12/2023	36ND	No	8	MW-21	4.883	1.258	25	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-5	7470	n/a	9/13/2023	140	No	8	MW-21	4.883	1.258	25	None	ln(x)	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-23/23R	7470	n/a	9/14/2023	36ND	No	8	MW-21	4.883	1.258	25	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-14	5.6	n/a	9/11/2023	0.24ND	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-15AR	5.6	n/a	9/9/2022	0.24ND	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-2	5.6	n/a	9/12/2023	0.36J	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-20	5.6	n/a	9/12/2023	0.24ND	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-25R	5.6	n/a	9/12/2023	0.24ND	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-5	5.6	n/a	9/13/2023	0.38J	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-23/23R	5.6	n/a	9/14/2023	0.24ND	No	8	MW-21	-0.8059	0.7878	37.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-14	53000	n/a	9/11/2023	16000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-15AR	53000	n/a	9/9/2022	49000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-2	53000	n/a	9/12/2023	24000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-20	53000	n/a	9/12/2023	21000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-25R	53000	n/a	9/12/2023	40000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-5	53000	n/a	9/13/2023	38000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-23/23R	53000	n/a	9/14/2023	31000	No	8	MW-21	30963	6856	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-14	661	n/a	9/11/2023	72	No	8	MW-21	2.737	1.171	12.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-15AR	661	n/a	9/9/2022	1.8ND	No	8	MW-21	2.737	1.171	12.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	**MW-2**	**661**	**n/a**	**9/12/2023**	**1400**	**Yes**	**8**	**MW-21**	**2.737**	**1.171**	**12.5**	**None**	**ln(x)**	**0.0005787**	**Param Inter 1 of 2**
Manganese (ug/L)	MW-20	661	n/a	9/12/2023	1.8ND	No	8	MW-21	2.737	1.171	12.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-25R	661	n/a	9/12/2023	1.8ND	No	8	MW-21	2.737	1.171	12.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-5	661	n/a	9/13/2023	29	No	8	MW-21	2.737	1.171	12.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-23/23R	661	n/a	9/14/2023	1.8ND	No	8	MW-21	2.737	1.171	12.5	None	ln(x)	0.0005787	Param Inter 1 of 2
Selenium (ug/L)	**MW-14**	**2.76**	**n/a**	**9/11/2023**	**11**	**Yes**	**8**	**MW-21**	**1.287**	**0.4581**	**12.5**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Selenium (ug/L)	**MW-15AR**	**2.76**	**n/a**	**9/9/2022**	**19**	**Yes**	**8**	**MW-21**	**1.287**	**0.4581**	**12.5**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Selenium (ug/L)	MW-2	2.76	n/a	9/12/2023	0.7ND	No	8	MW-21	1.287	0.4581	12.5	None	No	0.0005787	Param Inter 1 of 2
Selenium (ug/L)	**MW-20**	**2.76**	**n/a**	**9/12/2023**	**21**	**Yes**	**8**	**MW-21**	**1.287**	**0.4581**	**12.5**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Selenium (ug/L)	MW-25R	2.76	n/a	9/12/2023	2.6J	No	8	MW-21	1.287	0.4581	12.5	None	No	0.0005787	Param Inter 1 of 2
Selenium (ug/L)	**MW-5**	**2.76**	**n/a**	**9/13/2023**	**5.9**	**Yes**	**8**	**MW-21**	**1.287**	**0.4581**	**12.5**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Selenium (ug/L)	MW-23/23R	2.76	n/a	9/14/2023	2.5J	No	8	MW-21	1.287	0.4581	12.5	None	No	0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-14	62.3	n/a	9/11/2023	38	No	24	MW-21	50.1	5.367	0	None	No	0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	**MW-15AR**	**62.3**	**n/a**	**9/9/2022**	**270**	**Yes**	**24**	**MW-21**	**50.1**	**5.367**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Sulfate (mg/L)	MW-2	62.3	n/a	9/12/2023	61	No	24	MW-21	50.1	5.367	0	None	No	0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-20	62.3	n/a	9/12/2023	48	No	24	MW-21	50.1	5.367	0	None	No	0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	MW-25R	62.3	n/a	9/12/2023	53	No	24	MW-21	50.1	5.367	0	None	No	0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	**MW-5**	**62.3**	**n/a**	**9/13/2023**	**97**	**Yes**	**24**	**MW-21**	**50.1**	**5.367**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Sulfate (mg/L)	MW-23/23R	62.3	n/a	9/14/2023	52	No	24	MW-21	50.1	5.367	0	None	No	0.0005787	Param Inter 1 of 2
Zinc (ug/L)	MW-14	14.2	n/a	9/11/2023	6.4ND	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-15AR	14.2	n/a	9/9/2022	10ND	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-2	14.2	n/a	9/12/2023	6.6J	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-20	14.2	n/a	9/12/2023	6.4ND	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-25R	14.2	n/a	9/12/2023	6.4ND	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-5	14.2	n/a	9/13/2023	6.4ND	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-23/23R	14.2	n/a	9/14/2023	6.4ND	No	7	MW-21	n/a	n/a	57.14	n/a	n/a	0.01959	NP Inter (NDs) 1 of 2

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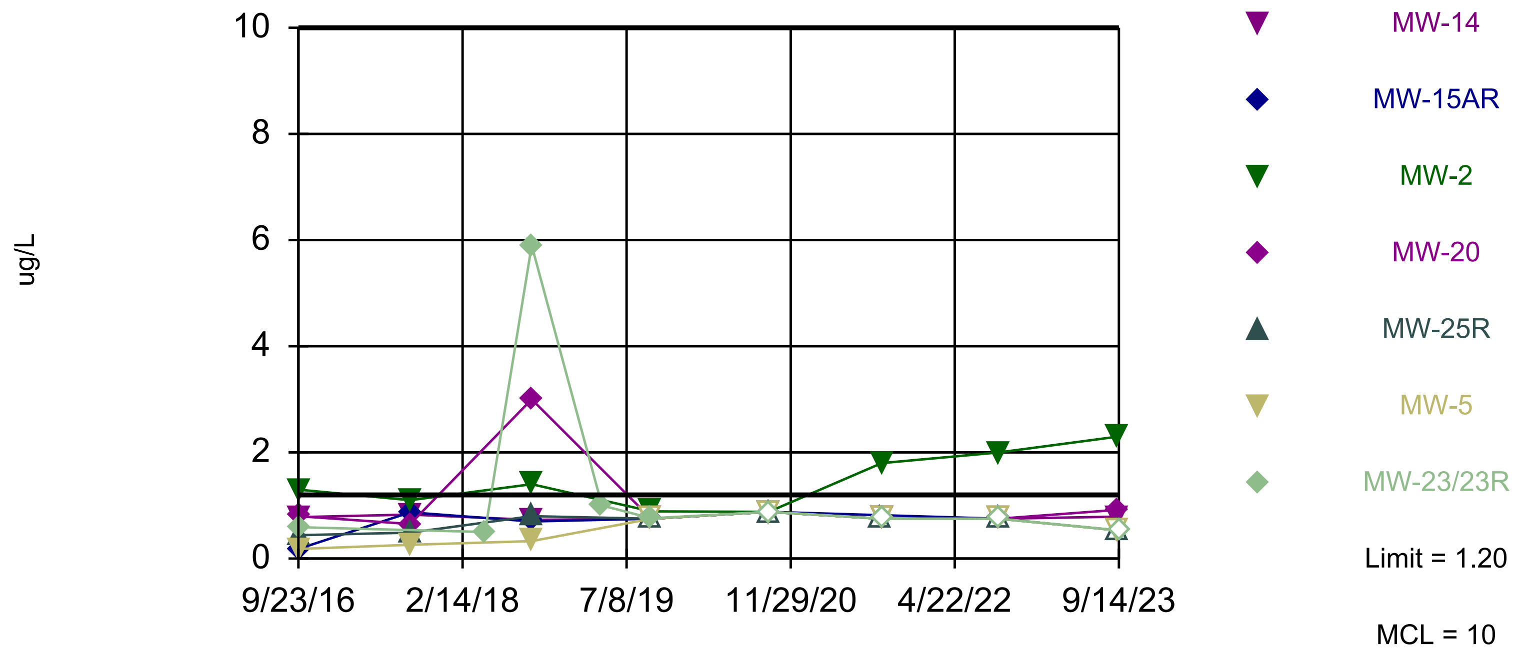
Hollow symbols indicate censored values.

Exceeds Limit: MW-2

Arsenic

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 50% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 7 points to limit. Assumes 6 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:26 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Arsenic (ug/L) Analysis Run 10/23/2023 11:31 AM View: shallow
Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-23/23R	MW-21 (bg)	MW-5	MW-25R	MW-15AR	MW-20	MW-2
9/23/2016	0.78 (J)	0.59 (J)	0.57 (J)	0.18 (J)	0.44 (J)	0.18 (J)	0.8 (J)	1.3
9/5/2017	0.83 (J)		0.73 (J)	0.26 (J)	0.49 (J)	0.87 (J)	0.65 (J)	1.1
4/25/2018		0.5 (J)						
9/17/2018	0.73 (J)	5.9	1.2	0.33 (J)	0.8 (J)	0.7 (J)	3	1.4
4/23/2019		1 (J)						
9/23/2019	<0.75	0.76 (J)	<0.75	<0.75	<0.75	<0.75	<0.75	0.89 (J)
9/21/2020					<0.88		<0.88	
9/22/2020	<0.88			<0.88				<0.88
9/23/2020			<0.88					
9/24/2020		<0.88				<0.88		
9/7/2021					<0.75			
9/8/2021	<0.75						0.75 (J)	1.8 (J)
9/9/2021		<0.75		<0.75				
9/10/2021			<0.75					
9/6/2022	0.75 (J)				<0.75		<0.75	
9/7/2022			<0.75	<0.75				2
9/8/2022		<0.75						
9/9/2022						<0.75		
9/11/2023	0.79 (J)							
9/12/2023					<0.53 (U)		0.92 (J)	2.3
9/13/2023				<0.53 (U)				
9/14/2023		<0.53 (U)	0.9 (J)					

ND substitution: RL or RL/2 if <15% NDs.

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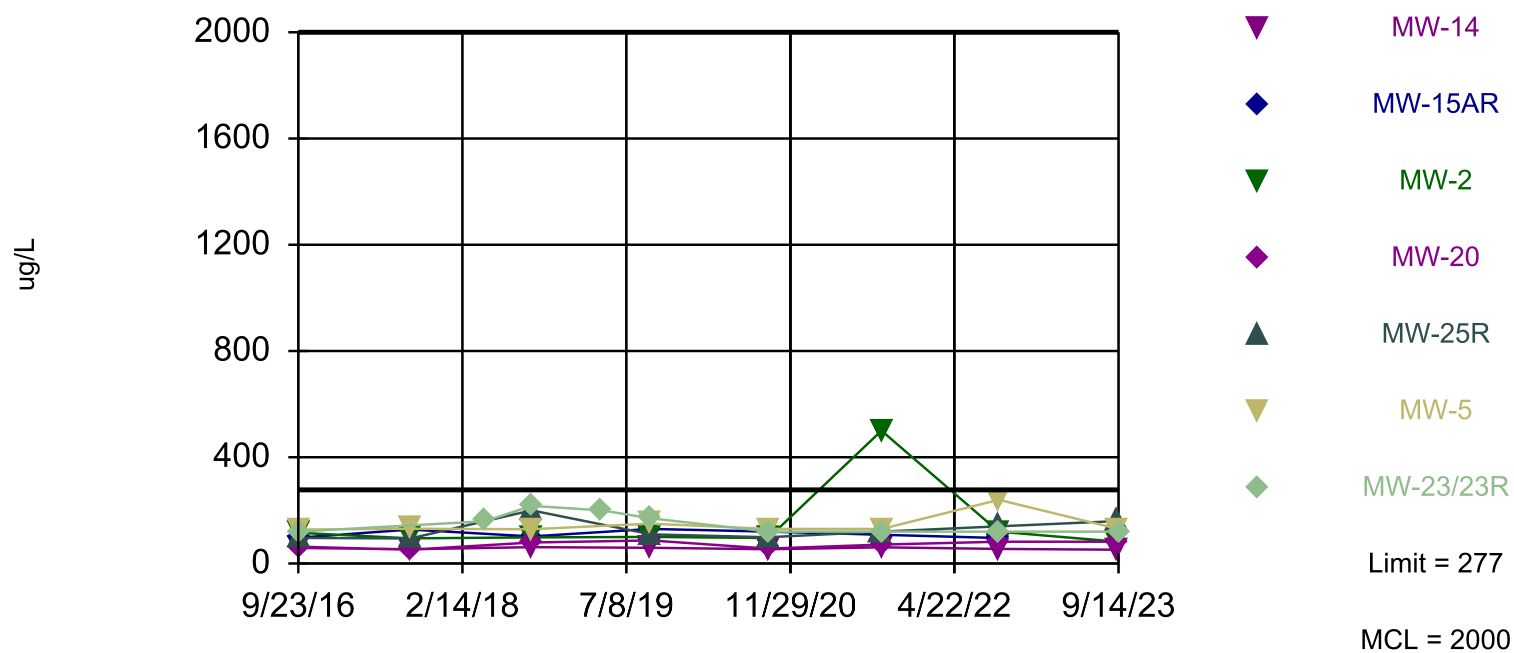
Within Limit

Barium

Interwell Parametric



Background Data Summary: Mean=195.5, Std. Dev.=25.52, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9356, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Barium (ug/L) Analysis Run 10/23/2023 11:31 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	58.5	97.2	116	63.1	96.5	128	178	120
9/5/2017	54	128	94.8	52.1	93.8	131	173	
4/25/2018								159
9/17/2018	61.7	102	98.3	78.8	200	129	203	217
4/23/2019								200
9/23/2019	59	130	100	87	110	150	160	170
9/21/2020				56	99			
9/22/2020	54		96			130		
9/23/2020							200	
9/24/2020		120						120
9/7/2021					120 (B)			
9/8/2021	61 (B)		500 (B)	71 (B)				
9/9/2021						130 (B)		120 (B)
9/10/2021							230 (B)	
9/6/2022	55			82	140			
9/7/2022			120			240	230	
9/8/2022								120
9/9/2022		96						
9/11/2023	52							
9/12/2023			82	82	160			
9/13/2023						130		
9/14/2023							190	120

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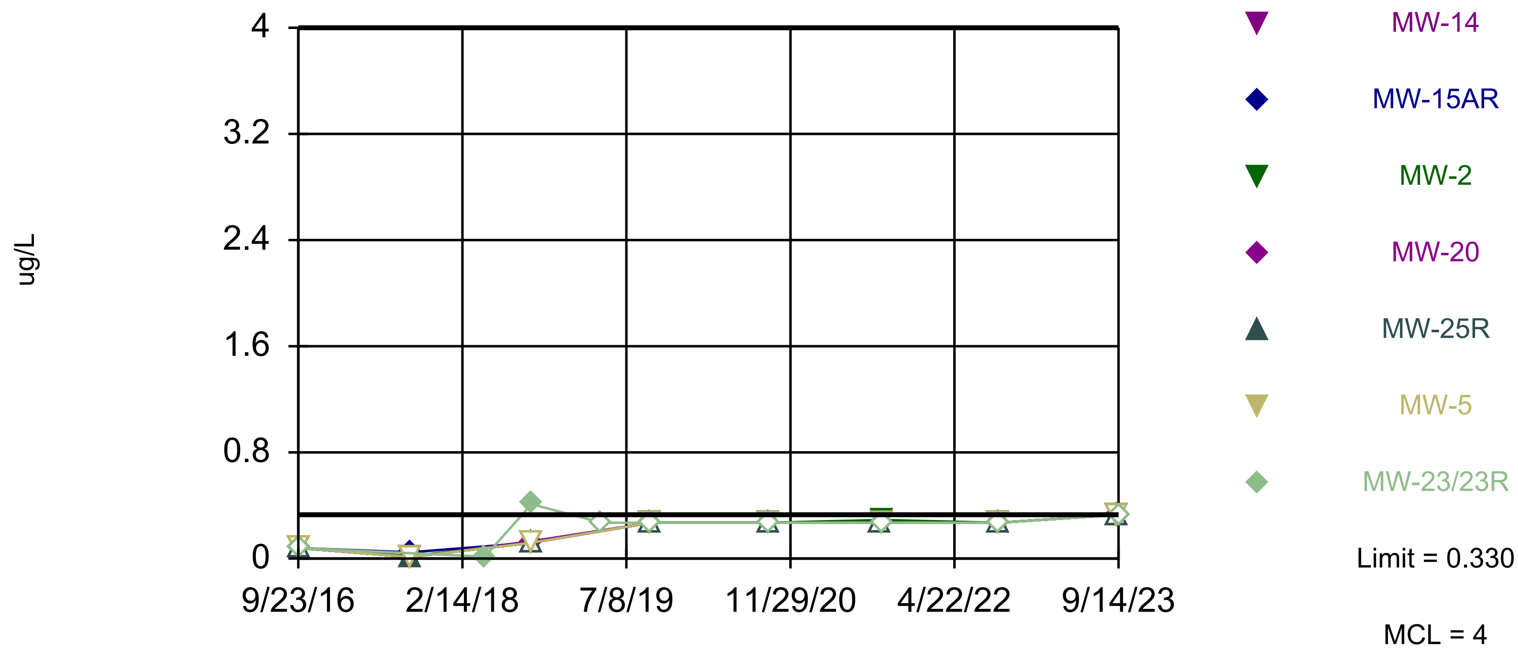
Hollow symbols indicate censored values.

Within Limit

Beryllium

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 87.5% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 7 points to limit. Assumes 6 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:26 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Beryllium (ug/L) Analysis Run 10/23/2023 11:31 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-23/23R	MW-21 (bg)	MW-5	MW-25R	MW-15AR	MW-20	MW-2
9/23/2016	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
9/5/2017	<0.012		0.03 (J)	<0.012	0.018 (J)	0.047 (J)	<0.012	<0.012
4/25/2018		0.015 (J)						
9/17/2018	<0.12	0.41 (J)	<0.12	<0.12	<0.12	<0.12	0.13 (J)	<0.12
4/23/2019		<0.27						
9/23/2019	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
9/21/2020					<0.27		<0.27	
9/22/2020	<0.27			<0.27				<0.27
9/23/2020			<0.27					
9/24/2020		<0.27				<0.27		
9/7/2021					<0.27			
9/8/2021	<0.27						<0.27	0.29 (J)
9/9/2021		<0.27		<0.27				
9/10/2021			<0.27					
9/6/2022	<0.27				<0.27		<0.27	
9/7/2022			<0.27	<0.27				<0.27
9/8/2022		<0.27						
9/9/2022						<0.27		
9/11/2023	<0.33 (U)							
9/12/2023					<0.33 (U)		<0.33 (U)	<0.33 (U)
9/13/2023				<0.33 (U)				
9/14/2023		<0.33 (U)	<0.33 (U)					

ND substitution: RL or RL/2 if <15% NDs.

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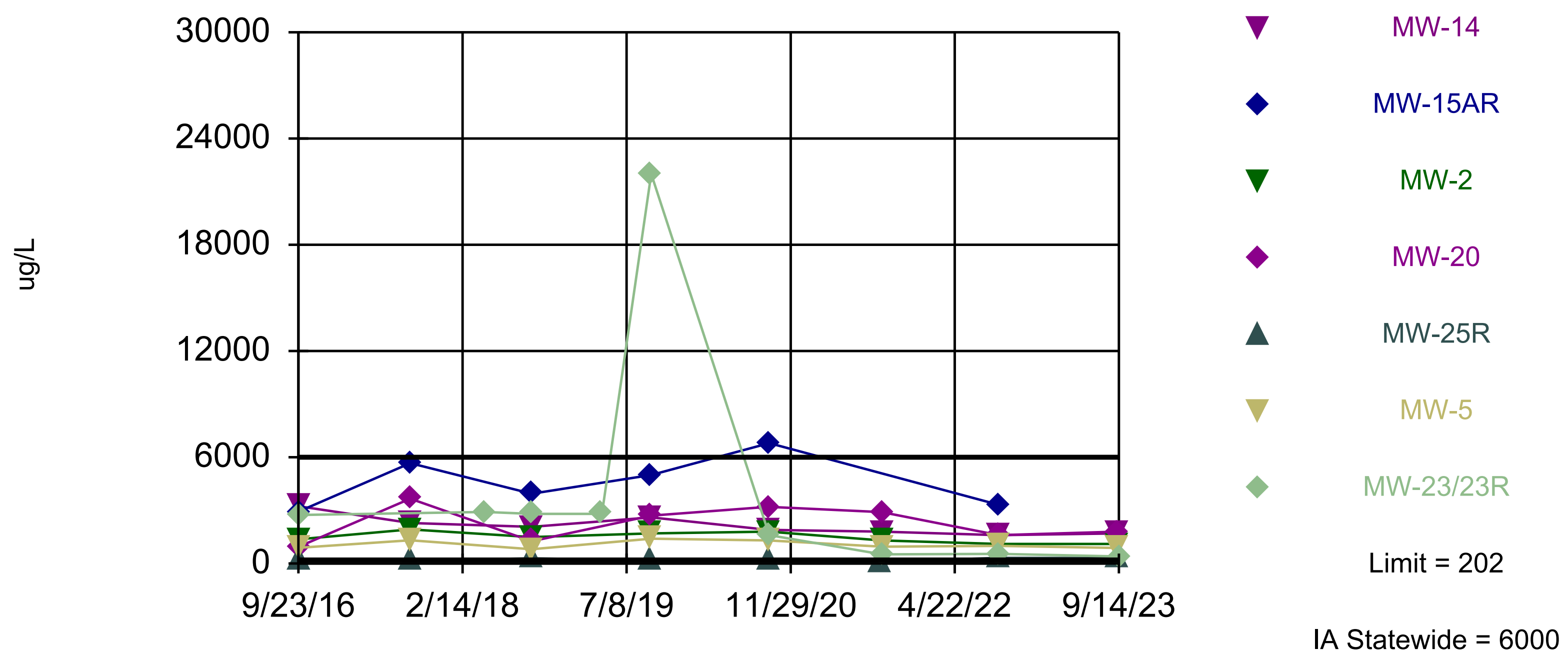
Exceeds Limit: MW-14, MW-15AR, MW-2, MW-20, MW-25R, MW-5, MW-23/23R

Boron

Interwell Parametric



Background Data Summary: Mean=98.58, Std. Dev.=32.13, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9306, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Boron (ug/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	3240	2930	1370	939	269	890	81 (J)	2740
9/5/2017	2290	5670	1930	3660	178	1310	110	
4/25/2018								2910
9/17/2018	2070	3940	1490	1260	290	809	97.6 (J)	2800
4/23/2019								2800
9/23/2019	2600	5000	1700	2700	190 (J)	1400	160 (J,B)	22000 (B)
9/21/2020				3200	170			
9/22/2020	1900		1800			1300		
9/23/2020							120	
9/24/2020		6800						1600
9/7/2021					110			
9/8/2021	1800		1300	2900				
9/9/2021						950		520
9/10/2021							63 (J)	
9/6/2022	1600			1600	320			
9/7/2022			1100			1000	63 (J)	
9/8/2022								540
9/9/2022		3300						
9/11/2023	1700							
9/12/2023			1100	1800	310			
9/13/2023						880		
9/14/2023							94 (J)	400

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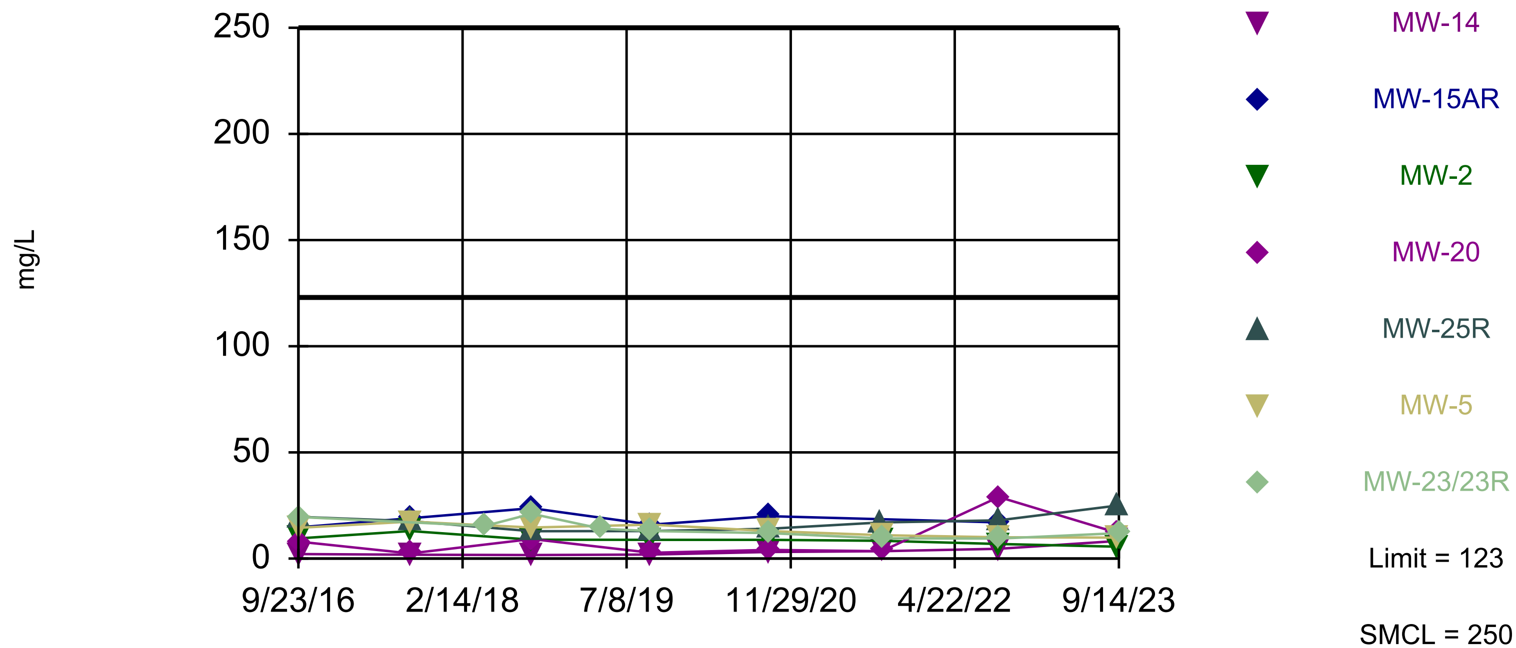
Within Limit

Chloride

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=2.464, Std. Dev.=0.7312, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9118, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Chloride (mg/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
11/1/2010							13.9	
2/1/2011							11.7	
9/1/2011							28.8	
9/1/2012							12.6	
9/1/2013							10.8	
9/1/2014							4.7	
9/1/2015							4	
9/23/2016	2.1	14.7	9.5	8	19.7	14.5	30.3	19.6
9/5/2017	1.8	19	13	2.4	17.6	17.4		
4/25/2018								15.4
9/17/2018	1.7	23.7	8.9	9.2	12.9	14.6		21.1
4/23/2019								14
9/23/2019	1.9 (J)	16	8.8	2.7 (J)	13	16		13
9/21/2020				4.1 (J)	14			
9/22/2020	3.1 (J)		8.8			13		
9/24/2020		20						12
9/7/2021					17			
9/8/2021	3.5 (J)		8.4	3.5 (J)				
9/9/2021						11		9.5
9/6/2022	4.6 (J)			29	18			
9/7/2022			6.9			10		
9/8/2022								9.4
9/9/2022		17						
9/11/2023	8.3							
9/12/2023			5.6	12	25			
9/13/2023						9.9		
9/14/2023								12

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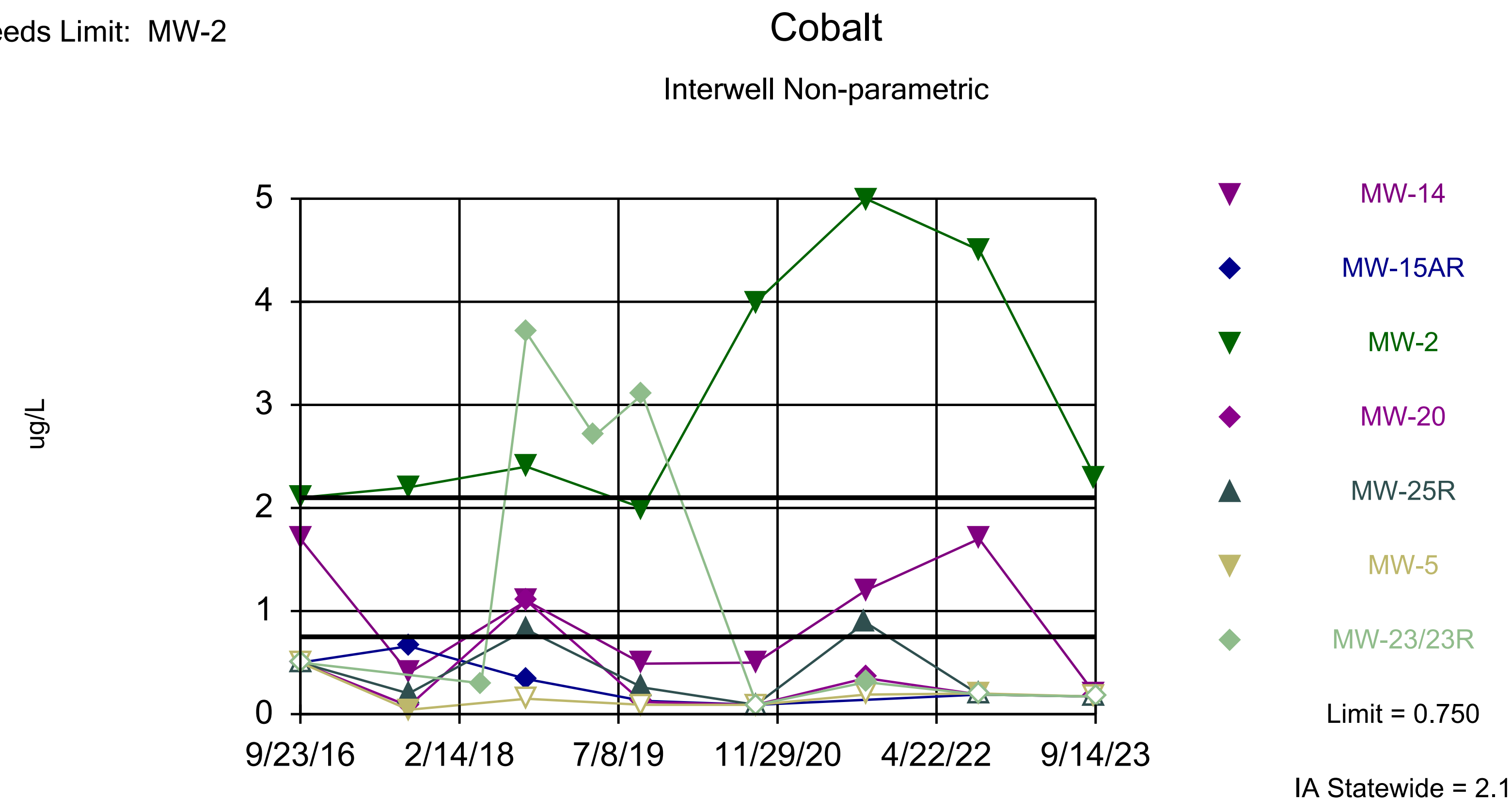
Hollow symbols indicate censored values.

Exceeds Limit: MW-2



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 50% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 7 points to limit. Assumes 6 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Cobalt (ug/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-23/23R	MW-21 (bg)	MW-5	MW-25R	MW-15AR	MW-20	MW-2
9/23/2016	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1
9/5/2017	0.4 (J)		0.52 (J)	0.043 (J)	0.2 (J)	0.66 (J)	0.078 (J)	2.2
4/25/2018		0.3 (J)						
9/17/2018	1.1	3.7	0.75 (J)	<0.15	0.82 (J)	0.34 (J)	1.1	2.4
4/23/2019		2.7						
9/23/2019	0.49 (J)	3.1	0.23 (J)	<0.091	0.26 (J)	0.13 (J)	0.12 (J)	2
9/21/2020					<0.091		<0.091	
9/22/2020	0.5			<0.091				4
9/23/2020			0.18 (J)					
9/24/2020		<0.091				<0.091		
9/7/2021					0.89			
9/8/2021	1.2						0.35 (J)	5
9/9/2021		0.31 (J)		<0.19				
9/10/2021			<0.19					
9/6/2022	1.7				<0.19		<0.19	
9/7/2022			<0.19	0.2 (J)				4.5 (D)
9/8/2022		<0.19						
9/9/2022						<0.19		
9/11/2023	0.2 (J)							
9/12/2023					<0.17 (U)		<0.17 (U)	2.3
9/13/2023				<0.17 (U)				
9/14/2023		<0.17 (U)	<0.17 (U)					

ND substitution: RL or RL/2 if <15% NDs.

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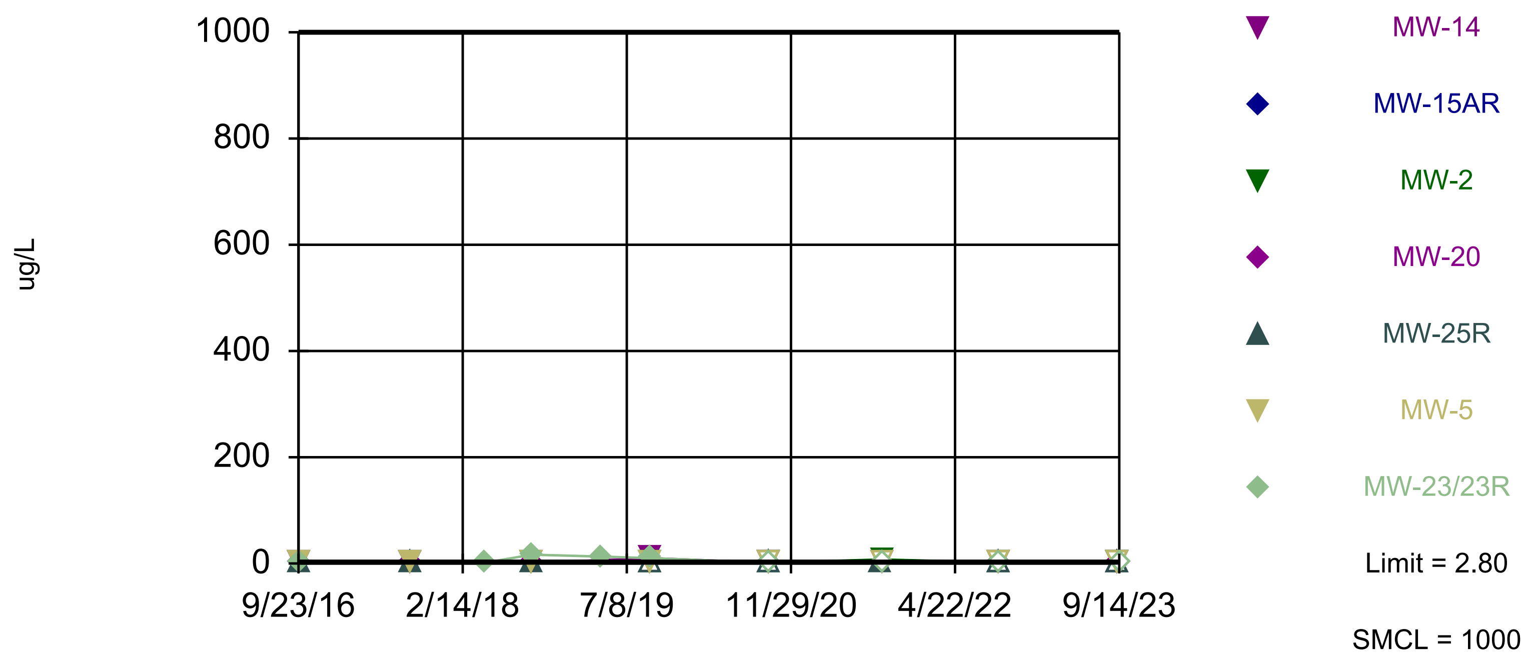
Hollow symbols indicate censored values.

Within Limit

Copper

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 62.5% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 7 points to limit. Assumes 6 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:26 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Copper (ug/L) Analysis Run 10/23/2023 11:31 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-23/23R	MW-21 (bg)	MW-5	MW-25R	MW-15AR	MW-20	MW-2
9/23/2016	1.9	0.26 (J)	1.7	0.6 (J)	1.6	0.18 (J)	1.6	2.1
9/5/2017	1		1.9	0.43 (J)	1.8	1.6	0.67 (J)	0.8 (J)
4/25/2018		1.6						
9/17/2018	1.4	16.7	2.8	1.8	2.6	1.1	3.2	1.6
4/23/2019		13						
9/23/2019	9.9	10	<2	<2	<2	<2	<2	<2
9/21/2020					<1.5		<1.5	
9/22/2020	<1.5			<1.5				<1.5
9/23/2020			<1.5					
9/24/2020		<1.5				<1.5		
9/7/2021					1.5 (J)			
9/8/2021	1.5 (J)						1.5 (J)	7.5
9/9/2021		<1.4		<1.4				
9/10/2021			<1.4					
9/6/2022	3.5 (J)				<1.8		<1.8	
9/7/2022			<1.8	<1.8				<1.8
9/8/2022		<1.8						
9/9/2022						<1.8		
9/11/2023	<1.8 (U)							
9/12/2023					<1.8 (U)		<1.8 (U)	<1.8 (U)
9/13/2023				<1.8 (U)				
9/14/2023		<1.8 (U)	<1.8 (U)					

ND substitution: RL or RL/2 if <15% NDs.

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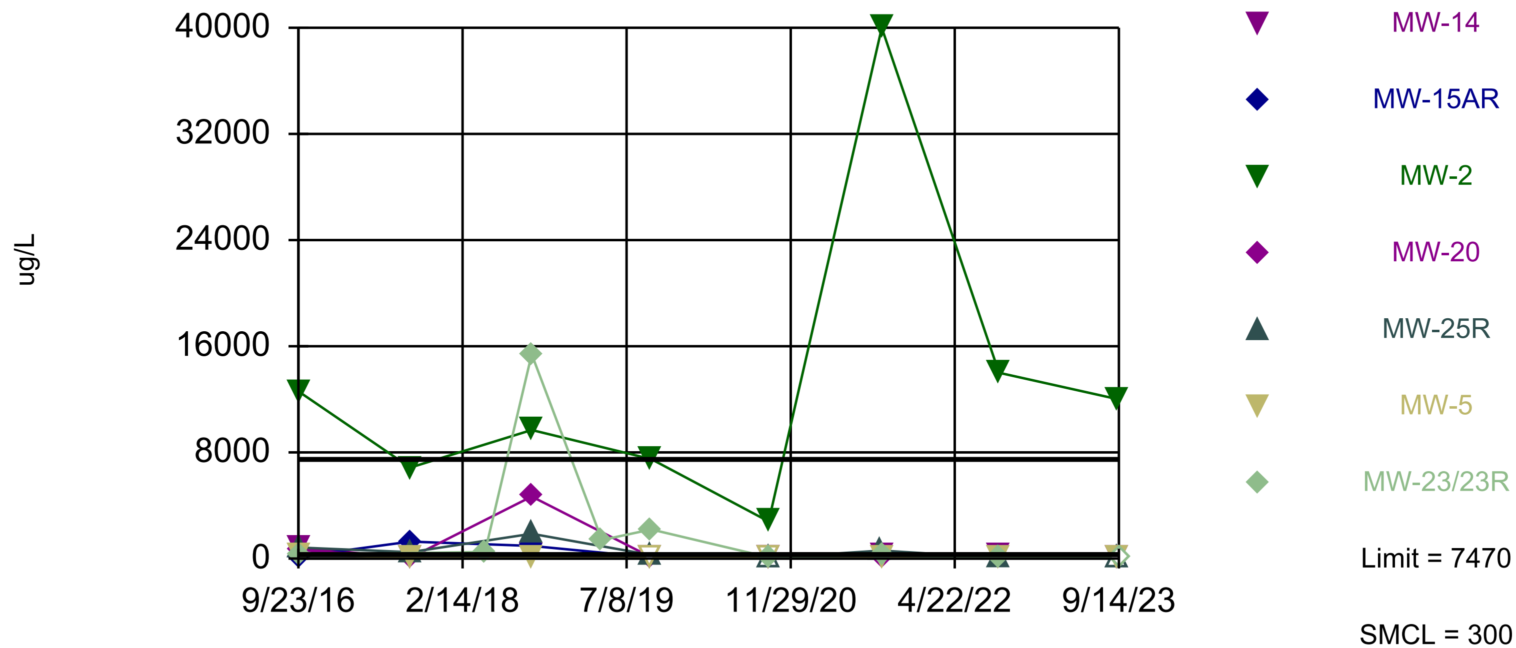
Hollow symbols indicate censored values.

Exceeds Limit: MW-2

Iron

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=4.883, Std. Dev.=1.258, n=8, 25% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.8596, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Iron (ug/L) Analysis Run 10/23/2023 11:31 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	838	145	12600	648	835	363	110	317
9/5/2017	34.3 (J)	1280	6860	60.7	479	48.8 (J)	644	
4/25/2018								493
9/17/2018	213	951	9690	4680	1870	139	1170	15400
4/23/2019								1400
9/23/2019	67 (J)	88 (J)	7500	93 (J)	270	<66	110	2200
9/21/2020				<50	<50			
9/22/2020	<50		2800			<50		
9/23/2020							78 (J)	
9/24/2020		<50						90 (J)
9/7/2021					610			
9/8/2021	200		40000	180				
9/9/2021						71 (J)		240
9/10/2021							<36	
9/6/2022	370			40 (J)	56 (J)			
9/7/2022			14000			70 (J)	<36	
9/8/2022								40 (J)
9/9/2022		<36						
9/11/2023	54 (J)							
9/12/2023			12000	60 (J)	<36 (U)			
9/13/2023						140		
9/14/2023							100	<36 (U)

ND substitution: RL or RL/2 if <15% NDs.

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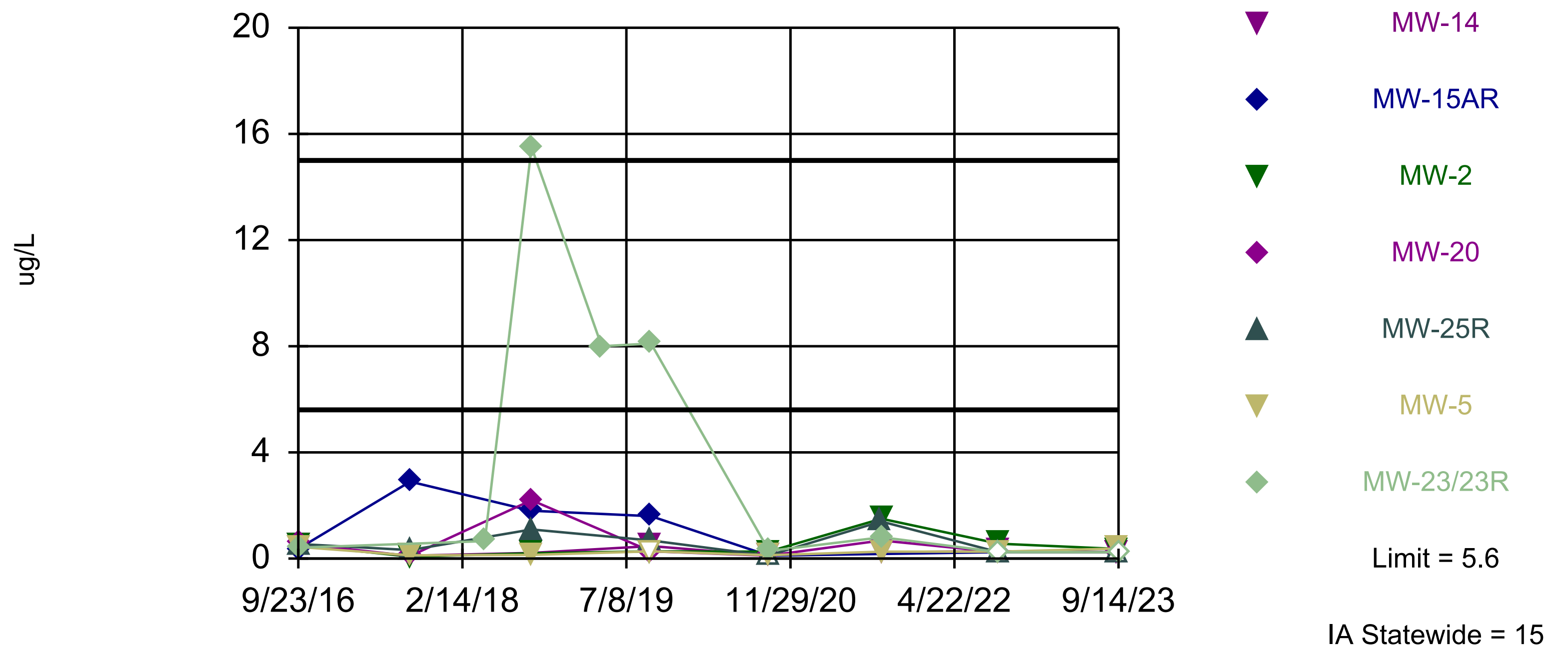
Hollow symbols indicate censored values.

Within Limit

Lead

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=-0.8059, Std. Dev.=0.7878, n=8, 37.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9181, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Lead (ug/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	0.48 (J)	0.37 (J)	0.52 (J)	0.57 (J)	0.55 (J)	0.44 (J)	<0.19	0.41 (J)
9/5/2017	0.11 (J)	2.9	0.075 (J)	0.099 (J)	0.32 (J)	0.12 (J)	1.1	
4/25/2018								0.66 (J)
9/17/2018	0.21 (J)	1.8	0.2 (J)	2.2	1.1	0.14 (J)	1.7	15.5
4/23/2019								8
9/23/2019	0.47 (J)	1.6	<0.27	<0.27	0.68	<0.27	0.52	8.1
9/21/2020				<0.11	<0.11			
9/22/2020	<0.11		0.26 (J)			0.13 (J)		
9/23/2020							0.46 (J)	
9/24/2020		<0.11						0.29 (J)
9/7/2021					1.4			
9/8/2021	0.24 (J)		1.5	0.68				
9/9/2021						0.26 (J)		0.8
9/10/2021							<0.21	
9/6/2022	0.28 (J)			<0.24	<0.24			
9/7/2022			0.56			0.26 (J)	<0.24	
9/8/2022								<0.24
9/9/2022		<0.24						
9/11/2023	<0.24 (U)							
9/12/2023			0.36 (J)	<0.24 (U)	<0.24 (U)			
9/13/2023						0.38 (J)		
9/14/2023							0.37 (J)	<0.24 (U)

ND substitution: RL or RL/2 if <15% NDs.

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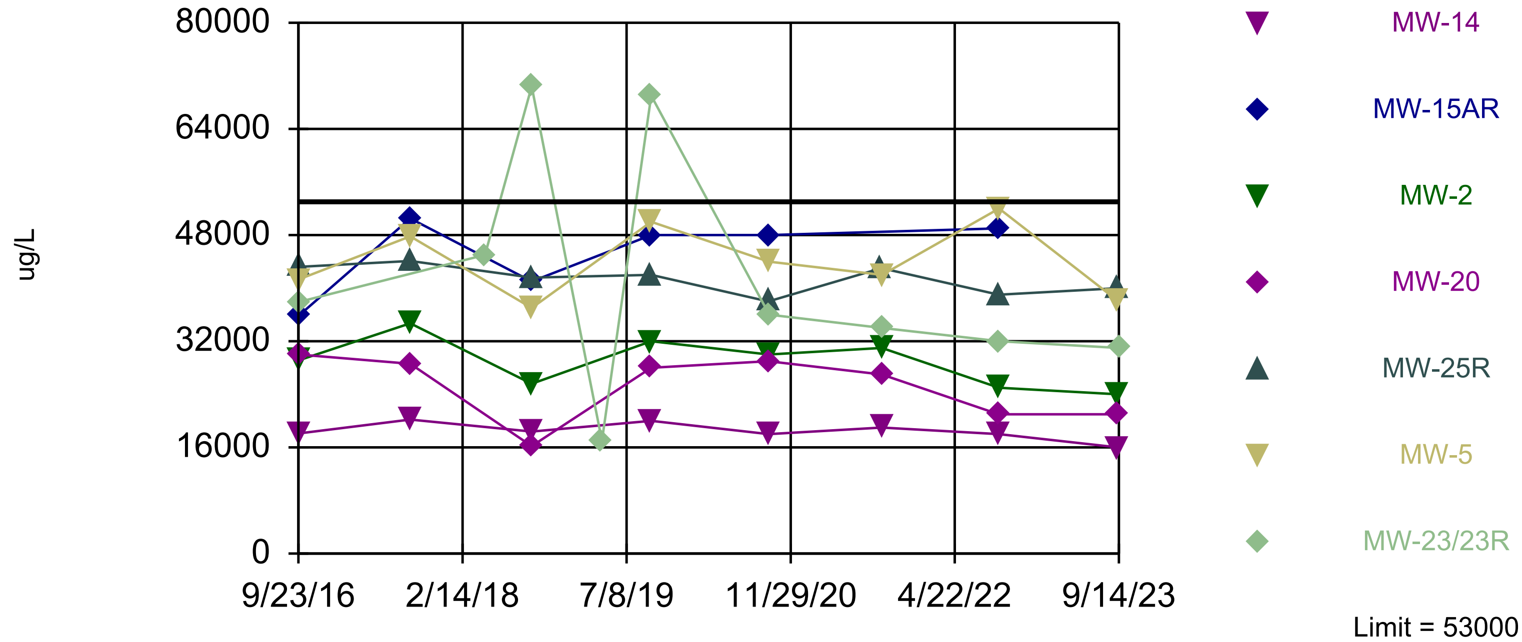
Within Limit

Magnesium

Interwell Parametric



Background Data Summary: Mean=30963, Std. Dev.=6856, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9448, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:26 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Magnesium (ug/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	18100	35800	29100	30000	43200	41300	22400	37900
9/5/2017	20200	50500	34700	28600	44100	47800	29000	
4/25/2018								45000
9/17/2018	18400	41000	25600	16200	41600	37000	26300	70400
4/23/2019								17000
9/23/2019	20000	48000	32000	28000	42000	50000	24000	69000
9/21/2020				29000	38000			
9/22/2020	18000		30000			44000		
9/23/2020							31000	
9/24/2020		48000						36000
9/7/2021					43000			
9/8/2021	19000		31000	27000				
9/9/2021						42000		34000
9/10/2021							35000	
9/6/2022	18000			21000	39000			
9/7/2022			25000			52000	39000	
9/8/2022								32000
9/9/2022		49000						
9/11/2023	16000							
9/12/2023			24000	21000	40000			
9/13/2023						38000		
9/14/2023							41000	31000

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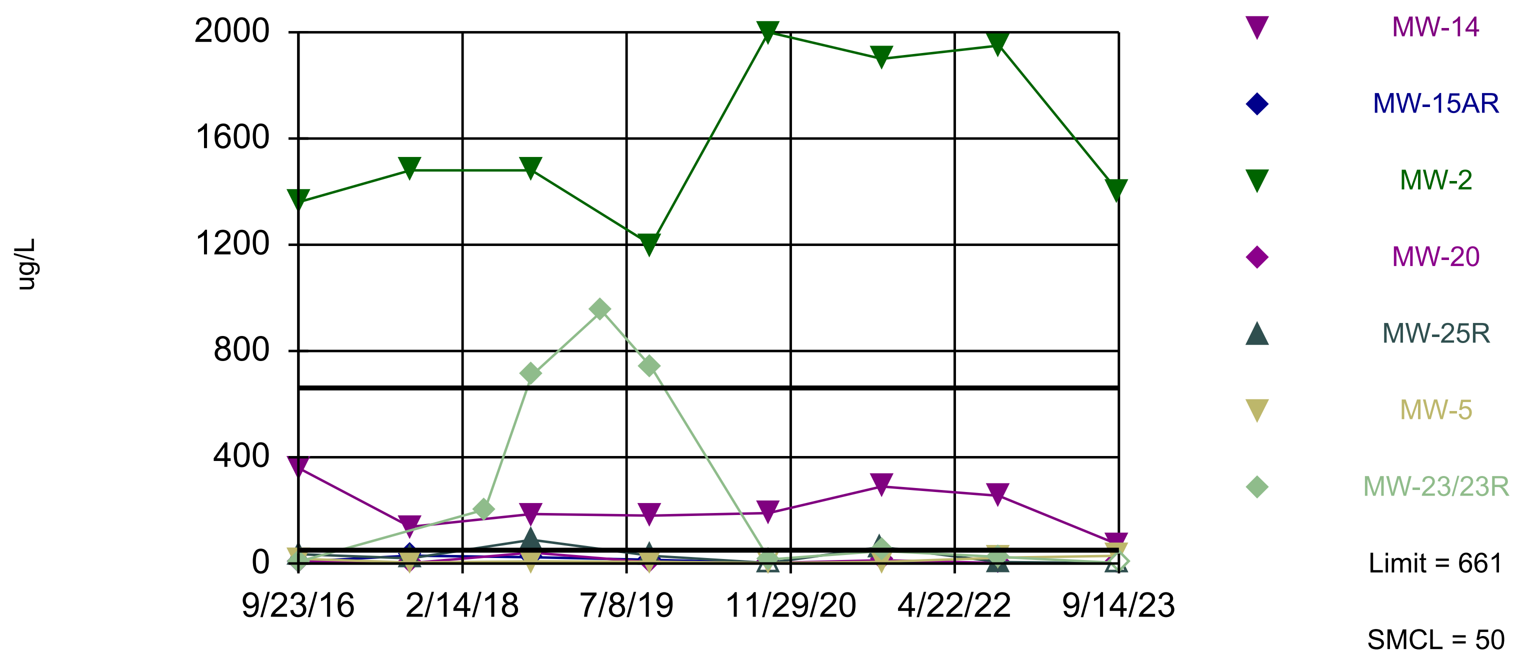
Hollow symbols indicate censored values.

Exceeds Limit: MW-2

Manganese

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=2.737, Std. Dev.=1.171, n=8, 12.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9485, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:27 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Manganese (ug/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	360	6.7	1360	9.2	35.2	17.4	5.2	7
9/5/2017	138	29.8	1480	1.6	19.7	4	59.3	
4/25/2018								203
9/17/2018	186	23.5	1480	40.8	89.1	8.2	59.2	708
4/23/2019								950
9/23/2019	180	14	1200	4.6 (J)	29	6.6 (J)	34	740
9/21/2020				<4	<4			
9/22/2020	190		2000			<4		
9/23/2020							20	
9/24/2020		<4						15
9/7/2021					62			
9/8/2021	290		1900	12				
9/9/2021						6 (J)		47
9/10/2021							<4.4	
9/6/2022	255 (D)			<3.6	5.7 (J)			
9/7/2022			1950 (D)			22	9.1 (J)	
9/8/2022								25
9/9/2022		<3.6						
9/11/2023	72							
9/12/2023			1400	<3.6 (U)	<3.6 (U)			
9/13/2023						29		
9/14/2023							13	<3.6 (U)

ND substitution: RL or RL/2 if <15% NDs.

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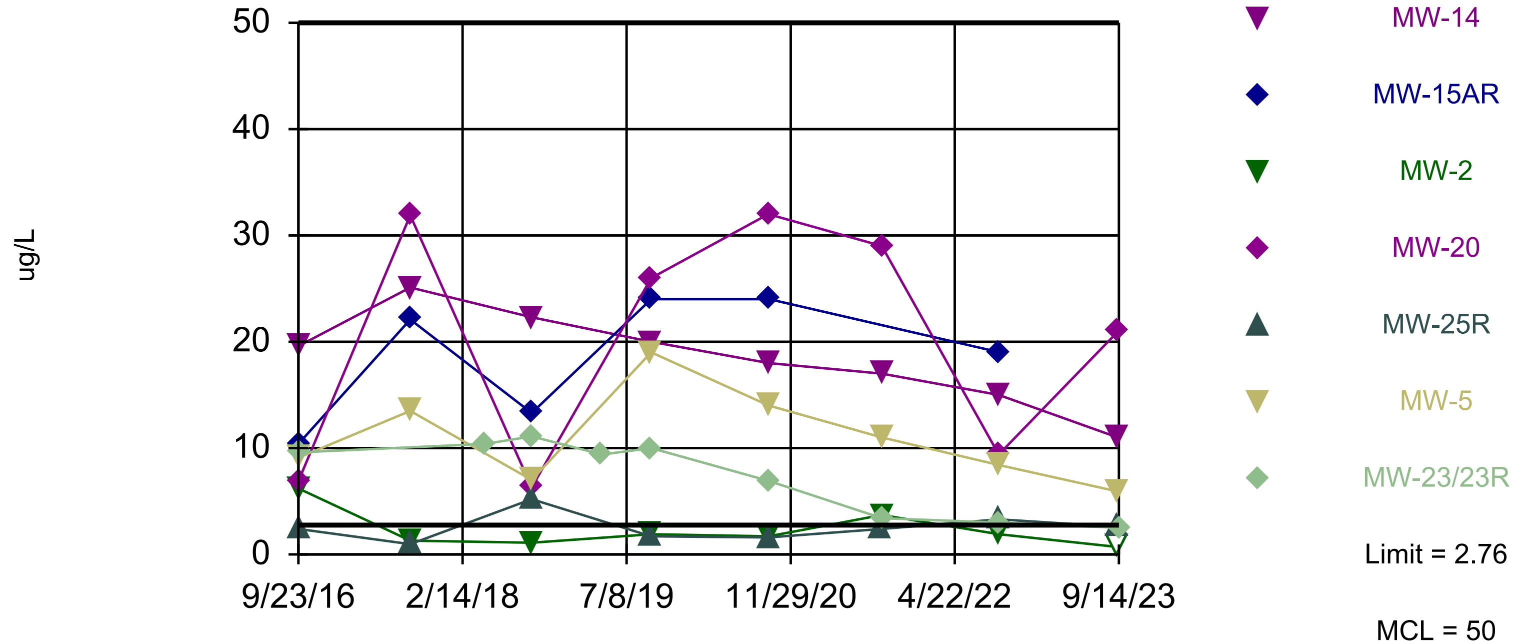
Hollow symbols indicate censored values.

Exceeds Limit: MW-14, MW-15AR, MW-20, MW-5

Selenium

Interwell Parametric



Background Data Summary: Mean=1.287, Std. Dev.=0.4581, n=8, 12.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9554, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:27 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Selenium (ug/L) Analysis Run 10/23/2023 11:31 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

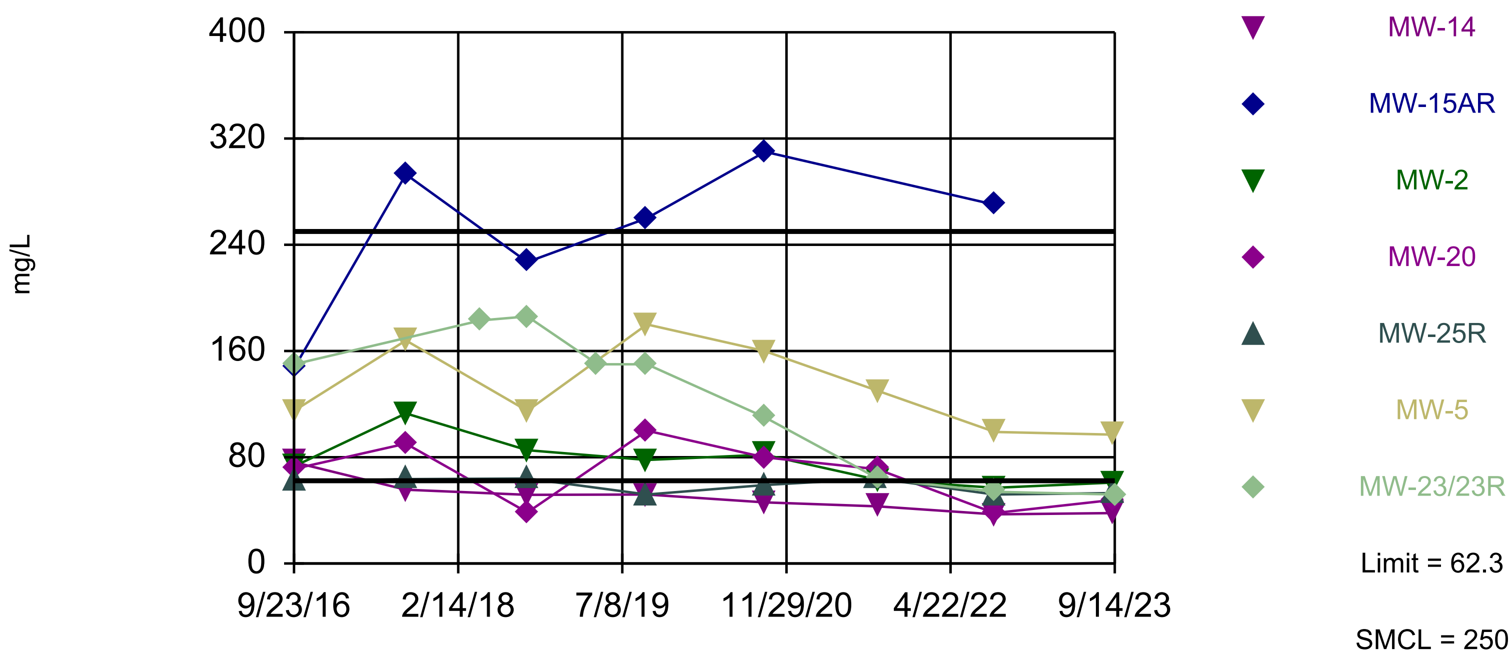
	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/23/2016	19.6	10.4	6.2	6.9	2.4	9.1	1	9.6
9/5/2017	25.1	22.1	1.3	31.9	0.97 (J)	13.5	0.9 (J)	
4/25/2018								10.4
9/17/2018	22.3	13.3	1.1	6.3	5.2	7	2.1	11.1
4/23/2019								9.4
9/23/2019	20	24	1.9 (J)	26	1.7 (J)	19	1.3 (J)	10
9/21/2020				32	1.6 (J)			
9/22/2020	18		1.7 (J)			14		
9/23/2020							1.6 (J)	
9/24/2020		24						6.9
9/7/2021					2.4 (J)			
9/8/2021	17		3.7 (J)	29				
9/9/2021						11		3.4 (J)
9/10/2021							1.6 (J)	
9/6/2022	15			9.4	3.3 (J)			
9/7/2022			1.9 (J)			8.4	1.1 (J)	
9/8/2022								3 (J)
9/9/2022		19						
9/11/2023	11							
9/12/2023			<1.4 (U)	21	2.6 (J)			
9/13/2023						5.9		
9/14/2023							<1.4 (U)	2.5 (J)

ND substitution: RL or RL/2 if <15% NDs.

Exceeds Limit: MW-15AR, MW-5

Sulfate

Interwell Parametric



Background Data Summary: Mean=50.1, Std. Dev.=5.367, n=24. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9548, critical = 0.884. Kappa = 2.28 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 7 points to limit. Assumes 6 future values.

Prediction Limit Analysis Run 10/23/2023 11:27 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Sulfate (mg/L) Analysis Run 10/23/2023 11:31 AM View: shallow

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-14	MW-15AR	MW-2	MW-20	MW-25R	MW-5	MW-21 (bg)	MW-23/23R
9/1/1999							40	
9/1/2000							56	
9/1/2001							48	
9/1/2002							49	
9/1/2003							51	
9/1/2004							51	
9/1/2005							55	
9/1/2007							61.8	
9/1/2008							47.5	
9/1/2009							48.9	
8/1/2010							47.9	
9/1/2011							46.9	
9/1/2012							52.3	
9/1/2013							49	
9/1/2014							49	
9/1/2015							48.1	
9/23/2016	76.3	147	73.2	71.2	61.6	115	37.5	150
9/5/2017	55.6	293	113	90.2	63.5	168	53.6	
4/25/2018								183
9/17/2018	51.7	227	85.3	38.4	64	115	56	186
4/23/2019								150
9/23/2019	52	260	78	100	52	180	42	150
9/21/2020				80	59			
9/22/2020	46		82			160		
9/23/2020							55	
9/24/2020		310						110
9/7/2021					64			
9/8/2021	43		63	71				
9/9/2021						130		64
9/10/2021							52	
9/6/2022	37			38	52			
9/7/2022			57			99	50	
9/8/2022								54
9/9/2022		270						
9/11/2023	38							
9/12/2023			61	48	53			
9/13/2023						97		
9/14/2023							55	52

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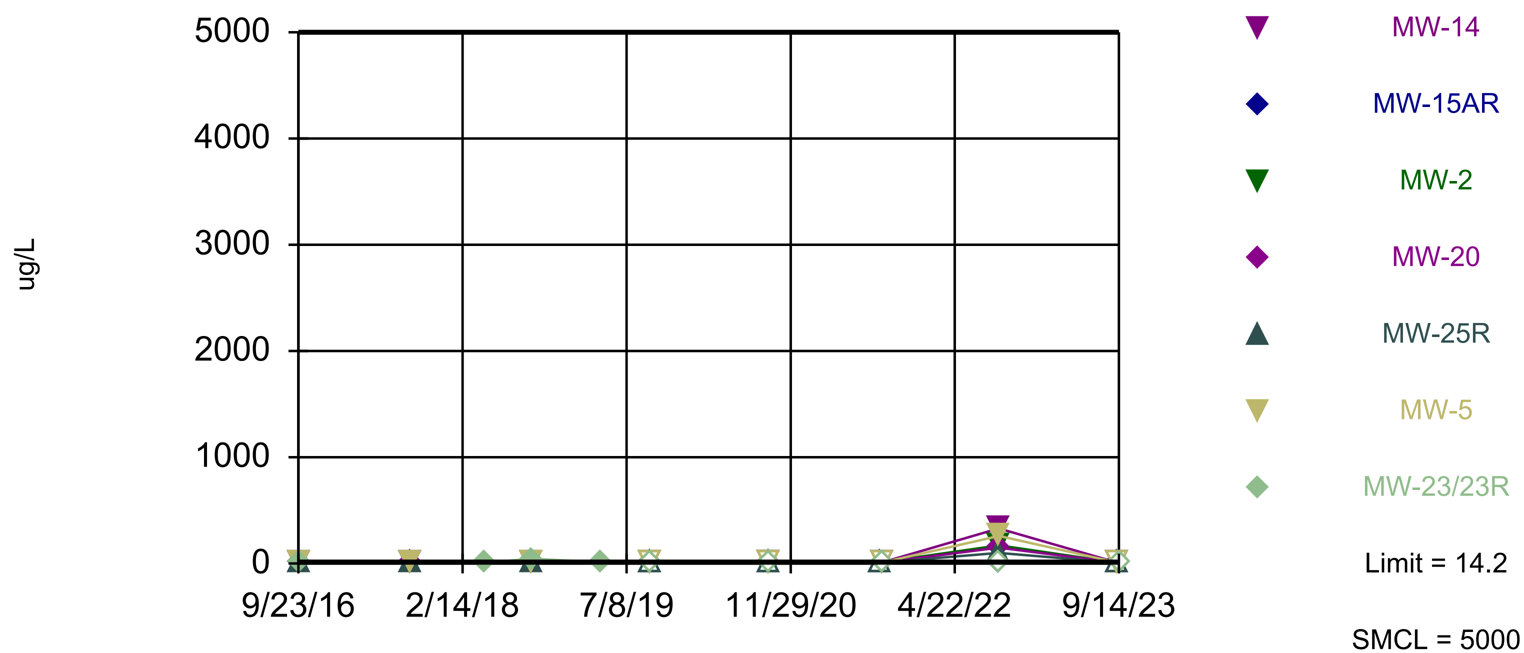
Hollow symbols indicate censored values.

Within Limit

Zinc

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 7 background values. 57.14% NDs. Annual per-constituent alpha = 0.2268. Individual comparison alpha = 0.01959 (1 of 2). Comparing 7 points to limit. Assumes 6 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:27 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Zinc (ug/L)   Analysis Run 10/23/2023 11:31 AM   View: shallow

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-14	MW-23/23R	MW-21 (bg)	MW-5	MW-20	MW-2	MW-15AR	MW-25R
9/23/2016	7.3 (J)	3.7 (J)	14.2	4 (J)	3.8 (J)	8.3 (J)	2.4 (J)	7.2 (J)
9/5/2017	3.4 (J)		4.7 (J)	2 (J)	1.8 (J)	2 (J)	7 (J)	4.7 (J)
4/25/2018		6.3 (J)						
9/17/2018	6 (J)	44.8	8 (J)	4.9 (J)	11.5	6.6 (J)	7.8 (J)	8.2 (J)
4/23/2019		11 (J)						
9/23/2019	15 (J)	<20	<10	<10	<10	<10	<10	<10
9/21/2020					<10			<10
9/22/2020	<10			<10		<10		
9/23/2020			<10					
9/24/2020		<10					<10	
9/7/2021								<10
9/8/2021	<10				<10	12 (J)		
9/9/2021		<10		<10				
9/10/2021			<10					
9/6/2022	330				150			100
9/7/2022				260		170		
9/8/2022		<10						
9/9/2022							<10	
9/11/2023	<6.4 (U)							
9/12/2023					<6.4 (U)	6.6 (J)		<6.4 (U)
9/13/2023				<6.4 (U)				
9/14/2023		<6.4 (U)	<6.4 (U)					

ND substitution: RL or RL/2 if <15% NDs.

Attachment E6

Interwell Prediction Limit Analysis Results - Deep

Prediction Limit

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB   Printed 10/23/2023, 11:58 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Arsenic (ug/L)	MW-10	1.71	n/a	9/13/2023	1.4J	No	8	MW-12	1.124	0.1828	0	None	No	0.0005787	Param Inter 1 of 2
Arsenic (ug/L)	MW-11	1.71	n/a	9/12/2023	1J	No	8	MW-12	1.124	0.1828	0	None	No	0.0005787	Param Inter 1 of 2
Arsenic (ug/L)	MW-16	1.71	n/a	9/14/2023	0.55J	No	8	MW-12	1.124	0.1828	0	None	No	0.0005787	Param Inter 1 of 2
Arsenic (ug/L)	MW-6	1.71	n/a	9/13/2023	0.79J	No	8	MW-12	1.124	0.1828	0	None	No	0.0005787	Param Inter 1 of 2
Arsenic (ug/L)	MW-7	1.71	n/a	9/13/2023	0.55J	No	8	MW-12	1.124	0.1828	0	None	No	0.0005787	Param Inter 1 of 2
Arsenic (ug/L)	**MW-24/24R**	**1.71**	**n/a**	**9/8/2022**	**2.6**	**Yes**	**8**	**MW-12**	**1.124**	**0.1828**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Barium (ug/L)	MW-10	223	n/a	9/13/2023	100	No	8	MW-12	189.8	10.35	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-11	223	n/a	9/12/2023	90	No	8	MW-12	189.8	10.35	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-16	223	n/a	9/14/2023	110	No	8	MW-12	189.8	10.35	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-6	223	n/a	9/13/2023	120	No	8	MW-12	189.8	10.35	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-7	223	n/a	9/13/2023	120	No	8	MW-12	189.8	10.35	0	None	No	0.0005787	Param Inter 1 of 2
Barium (ug/L)	MW-24/24R	223	n/a	9/8/2022	98	No	8	MW-12	189.8	10.35	0	None	No	0.0005787	Param Inter 1 of 2
Boron (ug/L)	**MW-10**	**110**	**n/a**	**9/13/2023**	**1400**	**Yes**	**8**	**MW-12**	**n/a**	**n/a**	**75**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Boron (ug/L)	**MW-11**	**110**	**n/a**	**9/12/2023**	**420**	**Yes**	**8**	**MW-12**	**n/a**	**n/a**	**75**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Boron (ug/L)	**MW-16**	**110**	**n/a**	**9/14/2023**	**520**	**Yes**	**8**	**MW-12**	**n/a**	**n/a**	**75**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Boron (ug/L)	**MW-6**	**110**	**n/a**	**9/13/2023**	**940**	**Yes**	**8**	**MW-12**	**n/a**	**n/a**	**75**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Boron (ug/L)	**MW-7**	**110**	**n/a**	**9/13/2023**	**210**	**Yes**	**8**	**MW-12**	**n/a**	**n/a**	**75**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**
Boron (ug/L)	MW-24/24R	110	n/a	9/8/2022	58ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Chloride (mg/L)	**MW-10**	**3.89**	**n/a**	**9/13/2023**	**11**	**Yes**	**11**	**MW-12**	**2.791**	**0.3961**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-11**	**3.89**	**n/a**	**9/12/2023**	**19**	**Yes**	**11**	**MW-12**	**2.791**	**0.3961**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-16**	**3.89**	**n/a**	**9/14/2023**	**8.8**	**Yes**	**11**	**MW-12**	**2.791**	**0.3961**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-6**	**3.89**	**n/a**	**9/13/2023**	**11**	**Yes**	**11**	**MW-12**	**2.791**	**0.3961**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-7**	**3.89**	**n/a**	**9/13/2023**	**6.8**	**Yes**	**11**	**MW-12**	**2.791**	**0.3961**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Chloride (mg/L)	MW-24/24R	3.89	n/a	9/8/2022	1.15ND	No	11	MW-12	2.791	0.3961	0	None	No	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-10	0.657	n/a	9/13/2023	0.085ND	No	8	MW-12	0.4425	0.06671	0	None	No	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-11	0.657	n/a	9/12/2023	0.4J	No	8	MW-12	0.4425	0.06671	0	None	No	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-16	0.657	n/a	9/14/2023	0.29J	No	8	MW-12	0.4425	0.06671	0	None	No	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-6	0.657	n/a	9/13/2023	0.34J	No	8	MW-12	0.4425	0.06671	0	None	No	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	MW-7	0.657	n/a	9/13/2023	0.085ND	No	8	MW-12	0.4425	0.06671	0	None	No	0.0005787	Param Inter 1 of 2
Cobalt (ug/L)	**MW-24/24R**	**0.657**	**n/a**	**9/8/2022**	**94.5**	**Yes**	**8**	**MW-12**	**0.4425**	**0.06671**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Copper (ug/L)	MW-10	2.00	n/a	9/13/2023	1.8ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-11	2.00	n/a	9/12/2023	1.8ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-16	2.00	n/a	9/14/2023	1.8ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-6	2.00	n/a	9/13/2023	1.8ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-7	2.00	n/a	9/13/2023	1.8ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-24/24R	2.00	n/a	9/8/2022	1.8ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Iron (ug/L)	MW-10	2040	n/a	9/13/2023	510	No	8	MW-12	1714	100.6	0	None	No	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-11	2040	n/a	9/12/2023	18ND	No	8	MW-12	1714	100.6	0	None	No	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-16	2040	n/a	9/14/2023	190	No	8	MW-12	1714	100.6	0	None	No	0.0005787	Param Inter 1 of 2
Iron (ug/L)	**MW-6**	**2040**	**n/a**	**9/13/2023**	**2100**	**Yes**	**8**	**MW-12**	**1714**	**100.6**	**0**	**None**	**No**	**0.0005787**	**Param Inter 1 of 2**
Iron (ug/L)	MW-7	2040	n/a	9/13/2023	18ND	No	8	MW-12	1714	100.6	0	None	No	0.0005787	Param Inter 1 of 2
Iron (ug/L)	MW-24/24R	2040	n/a	9/8/2022	310	No	8	MW-12	1714	100.6	0	None	No	0.0005787	Param Inter 1 of 2
Lead (ug/L)	MW-10	0.270	n/a	9/13/2023	0.37J	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-11	0.270	n/a	9/12/2023	0.24ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-16	0.270	n/a	9/14/2023	0.24ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-6	0.270	n/a	9/13/2023	0.37J	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-7	0.270	n/a	9/13/2023	0.24ND	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-24/24R	0.270	n/a	9/8/2022	0.34J	No	8	MW-12	n/a	n/a	75	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Magnesium (ug/L)	MW-10	47000	n/a	9/13/2023	39000	No	8	MW-12	40488	2020	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-11	47000	n/a	9/12/2023	36000	No	8	MW-12	40488	2020	0	None	No	0.0005787	Param Inter 1 of 2

Prediction Limit

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB Printed 10/23/2023, 11:58 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Magnesium (ug/L)	MW-16	47000	n/a	9/14/2023	31000	No	8	MW-12	40488	2020	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-6	47000	n/a	9/13/2023	37000	No	8	MW-12	40488	2020	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-7	47000	n/a	9/13/2023	32000	No	8	MW-12	40488	2020	0	None	No	0.0005787	Param Inter 1 of 2
Magnesium (ug/L)	MW-24/24R	47000	n/a	9/8/2022	28000	No	8	MW-12	40488	2020	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-10	303	n/a	9/13/2023	56	No	8	MW-12	266.1	11.34	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-11	303	n/a	9/12/2023	19	No	8	MW-12	266.1	11.34	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-16	303	n/a	9/14/2023	45	No	8	MW-12	266.1	11.34	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-6	303	n/a	9/13/2023	230	No	8	MW-12	266.1	11.34	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-7	303	n/a	9/13/2023	1.8ND	No	8	MW-12	266.1	11.34	0	None	No	0.0005787	Param Inter 1 of 2
Manganese (ug/L)	MW-24/24R	303	n/a	9/8/2022	120	No	8	MW-12	266.1	11.34	0	None	No	0.0005787	Param Inter 1 of 2
Sulfate (mg/L)	**MW-10**	**123**	**n/a**	**9/13/2023**	**130**	**Yes**	**15**	**MW-12**	**n/a**	**n/a**	**0**	**n/a**	**n/a**	**0.006529**	**NP Inter (normality) ...**
Sulfate (mg/L)	MW-11	123	n/a	9/12/2023	84	No	15	MW-12	n/a	n/a	0	n/a	n/a	0.006529	NP Inter (normality) ...
Sulfate (mg/L)	MW-16	123	n/a	9/14/2023	41	No	15	MW-12	n/a	n/a	0	n/a	n/a	0.006529	NP Inter (normality) ...
Sulfate (mg/L)	MW-6	123	n/a	9/13/2023	110	No	15	MW-12	n/a	n/a	0	n/a	n/a	0.006529	NP Inter (normality) ...
Sulfate (mg/L)	MW-7	123	n/a	9/13/2023	23	No	15	MW-12	n/a	n/a	0	n/a	n/a	0.006529	NP Inter (normality) ...
Sulfate (mg/L)	MW-24/24R	123	n/a	9/8/2022	18	No	15	MW-12	n/a	n/a	0	n/a	n/a	0.006529	NP Inter (normality) ...
Zinc (ug/L)	MW-10	43.0	n/a	9/13/2023	8.1J	No	8	MW-12	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-11	43.0	n/a	9/12/2023	6.4ND	No	8	MW-12	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-16	43.0	n/a	9/14/2023	6.4ND	No	8	MW-12	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-6	43.0	n/a	9/13/2023	9.9J	No	8	MW-12	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-7	43.0	n/a	9/13/2023	9.3J	No	8	MW-12	n/a	n/a	62.5	n/a	n/a	0.01611	NP Inter (NDs) 1 of 2
Zinc (ug/L)	**MW-24/24R**	**43.0**	**n/a**	**9/8/2022**	**71**	**Yes**	**8**	**MW-12**	**n/a**	**n/a**	**62.5**	**n/a**	**n/a**	**0.01611**	**NP Inter (NDs) 1 of 2**

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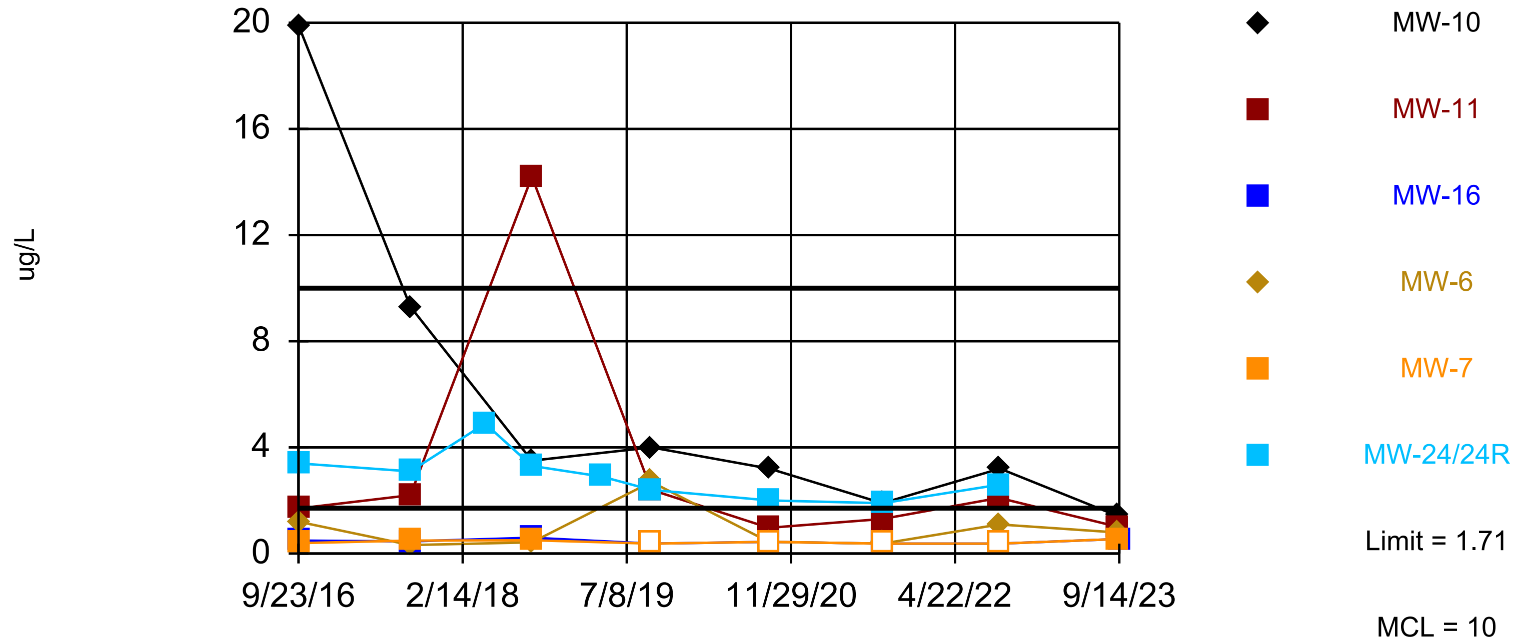
Hollow symbols indicate censored values.

Exceeds Limit: MW-24/24R

Arsenic

Interwell Parametric



Background Data Summary: Mean=1.124, Std. Dev.=0.1828, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9673, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/23/2023 11:53 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Arsenic (ug/L) Analysis Run 10/23/2023 11:58 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	19.9	1.7	0.81 (J)	0.49 (J)	1.2	0.39 (J)	3.4
9/5/2017	9.3	2.2	1.1	0.46 (J)	0.32 (J)	0.49 (J)	3.1
4/25/2018							4.9
9/17/2018	3.5	14.2	1.3	0.6 (J)	0.42 (J)	0.5 (J)	3.3
4/23/2019							2.9
9/23/2019	4	2.4	0.98 (J)	<0.75	2.7	<0.75	2.4
9/21/2020			1.1 (J)				
9/22/2020		0.97 (J)			<0.88		
9/23/2020				<0.88		<0.88	
9/24/2020	3.2						2
9/8/2021		1.3 (J)	1.1 (J)				
9/9/2021	1.9 (J)			<0.75	<0.75	<0.75	
9/10/2021							1.9 (J)
9/6/2022		2.1	1.4 (J)				
9/7/2022					1.1 (J)		
9/8/2022				<0.75		<0.75	2.6
9/9/2022	3.2						
9/11/2023			1.2 (J)				
9/12/2023		1 (J)					
9/13/2023	1.4 (J)				0.79 (J)	0.55 (J)	
9/14/2023				0.55 (J)			

ND substitution: RL or RL/2 if <15% NDs.

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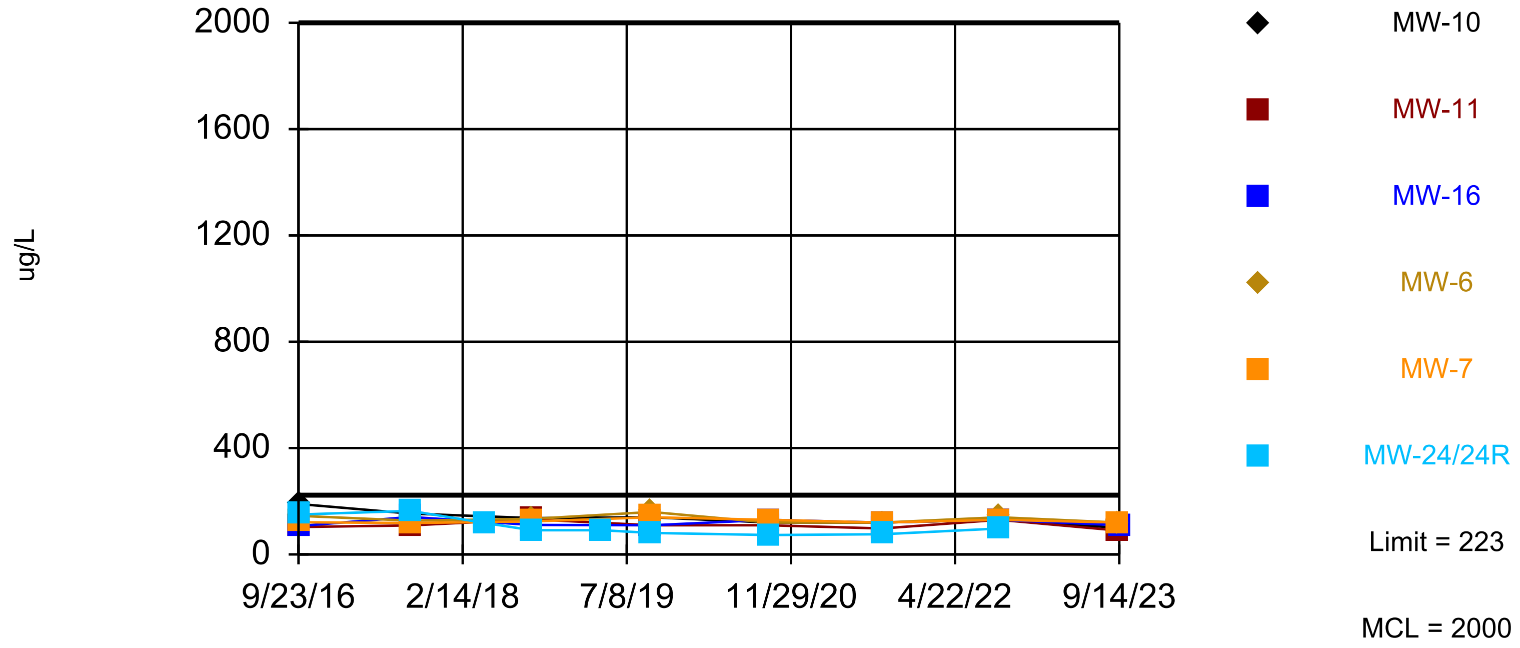
Within Limit

Barium

Interwell Parametric



Background Data Summary: Mean=189.8, Std. Dev.=10.35, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.8854, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/23/2023 11:53 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Barium (ug/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	190	103	191	107	145	121	150
9/5/2017	154	109	190	141	127	118	164
4/25/2018							118
9/17/2018	137	132	197	111	134	124	91.1
4/23/2019							91
9/23/2019	140	110	200	110	160	140	81
9/21/2020			190				
9/22/2020		110			120		
9/23/2020				130		130	
9/24/2020	120						73
9/8/2021		98 (B)	180 (B)				
9/9/2021	120 (B)			120 (B)	120 (B)	120 (B)	
9/10/2021							76 (B)
9/6/2022		130	200				
9/7/2022					140		
9/8/2022				130		130	98
9/9/2022	130						
9/11/2023			170				
9/12/2023		90					
9/13/2023	100				120	120	
9/14/2023				110			

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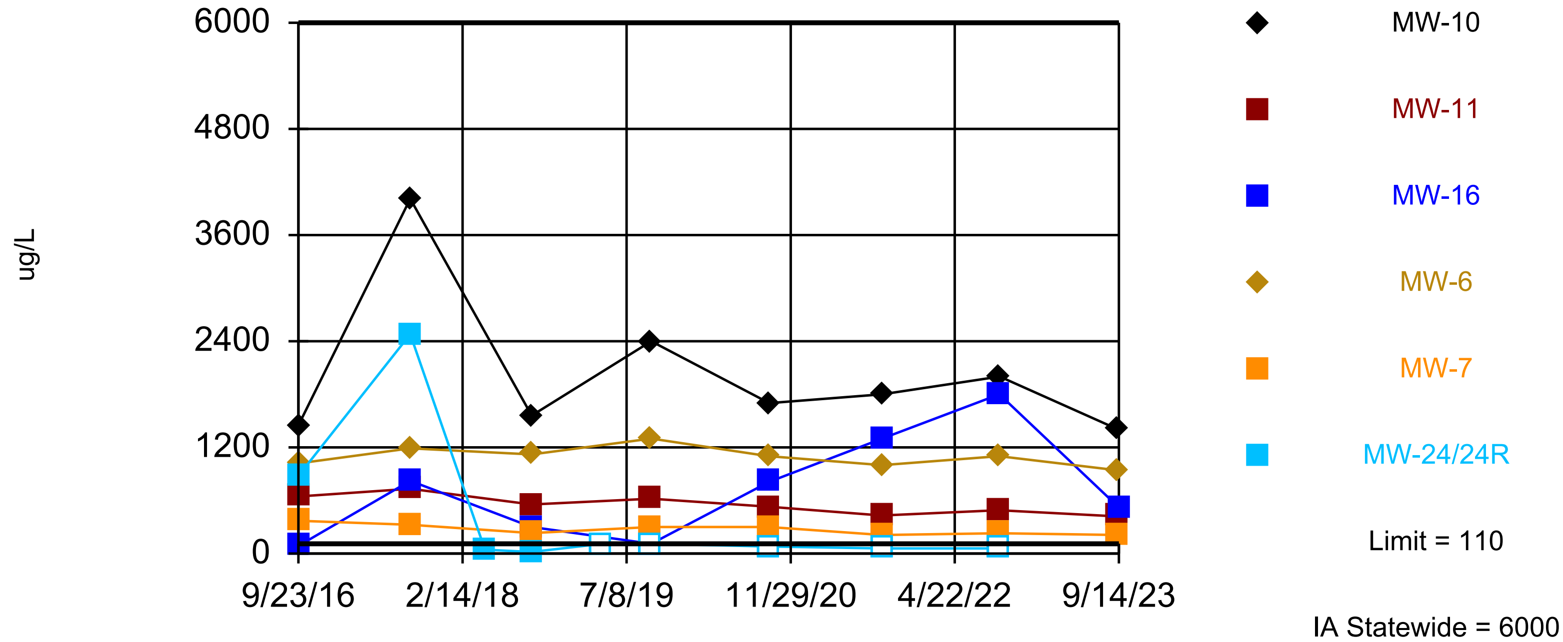
Hollow symbols indicate censored values.

Exceeds Limit: MW-10, MW-11, MW-16, MW-6, MW-7

Boron

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 75% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/23/2023 11:53 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Boron (ug/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-7	MW-16	MW-6	MW-24/24R	MW-11	MW-12 (bg)
9/23/2016	1450	371	87.1 (J)	1020	879	645	<50
9/5/2017	4010	325	823	1190	2480	733	83.4 (J)
4/25/2018					44.3 (J)		
9/17/2018	1560	232	300	1120	18.3 (J)	556	30.4 (J)
4/23/2019					<110		
9/23/2019	2400	300	110 (J)	1300	<110	620	<110
9/21/2020							<80
9/22/2020				1100		530	
9/23/2020		300	810				
9/24/2020	1700				<80		
9/8/2021						430	<58
9/9/2021	1800	210	1300	1000			
9/10/2021					<58		
9/6/2022						490	<58
9/7/2022				1100			
9/8/2022		230	1800		<58		
9/9/2022	2000						
9/11/2023							<76 (U)
9/12/2023						420	
9/13/2023	1400	210		940			
9/14/2023			520				

ND substitution: RL or RL/2 if <15% NDs.

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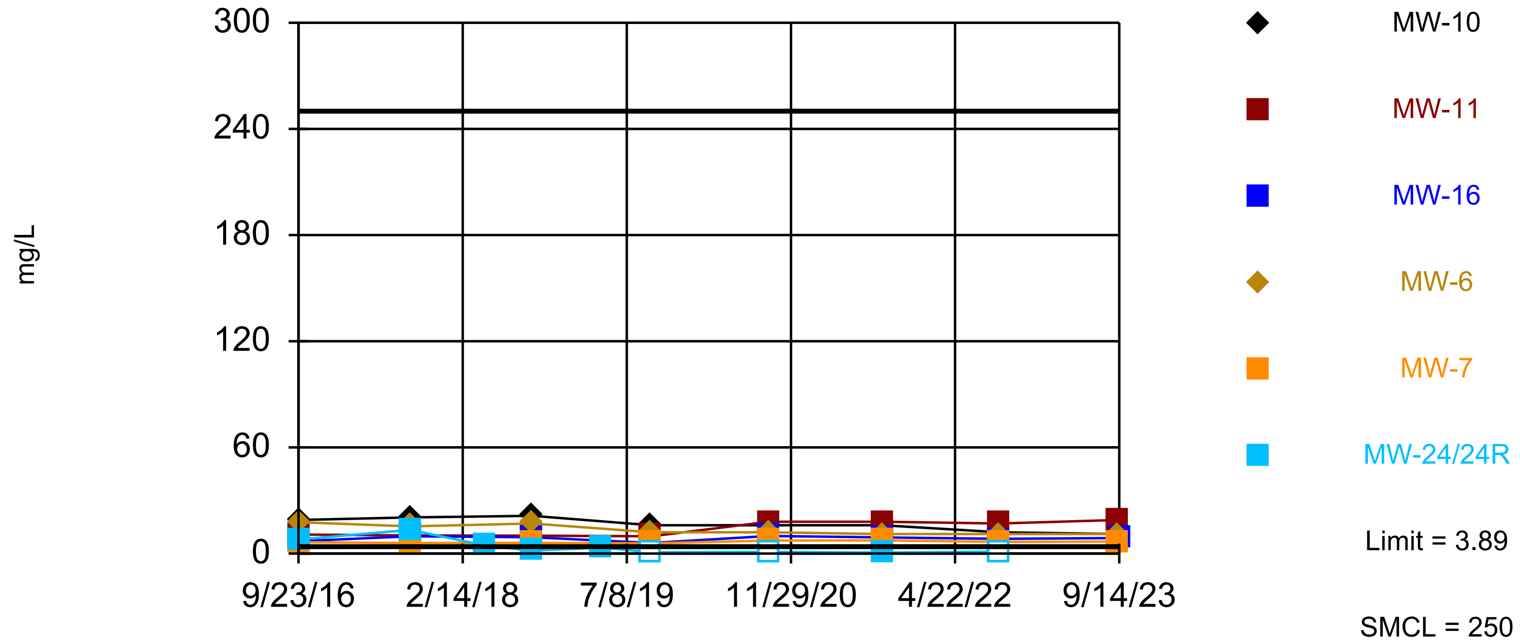
Hollow symbols indicate censored values.

Exceeds Limit: MW-10, MW-11, MW-16, MW-6, MW-7

Chloride

Interwell Parametric



Background Data Summary: Mean=2.791, Std. Dev.=0.3961, n=11. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9641, critical = 0.85. Kappa = 2.78 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/23/2023 11:53 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Chloride (mg/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/1/2013			2.7				
9/1/2014			2.4				
9/1/2015			2.6				
9/23/2016	19	10.8	2.7	7	17.7	6.4	8
9/5/2017	20.4	10.2	2.8	9.8	15.4	6	13.4
4/25/2018							4.5
9/17/2018	21.3	10.1	2.4	9.2	17	6.1	1.6
4/23/2019							3.4 (J)
9/23/2019	16	9.8	2.2 (J)	6	12	5.8	<1.5
9/21/2020			3.2 (J)				
9/22/2020		18			12		
9/23/2020				10		7.3	
9/24/2020	16						<2
9/8/2021		18	3.5 (J)				
9/9/2021	16			9.1	11	7.4	
9/10/2021							0.59 (J)
9/6/2022		17	3.1 (J)				
9/7/2022					11		
9/8/2022				8.3		6.6	<2.3
9/9/2022	12						
9/11/2023			3.1 (J)				
9/12/2023		19					
9/13/2023	11				11	6.8	
9/14/2023				8.8			

ND substitution: RL or RL/2 if <15% NDs.

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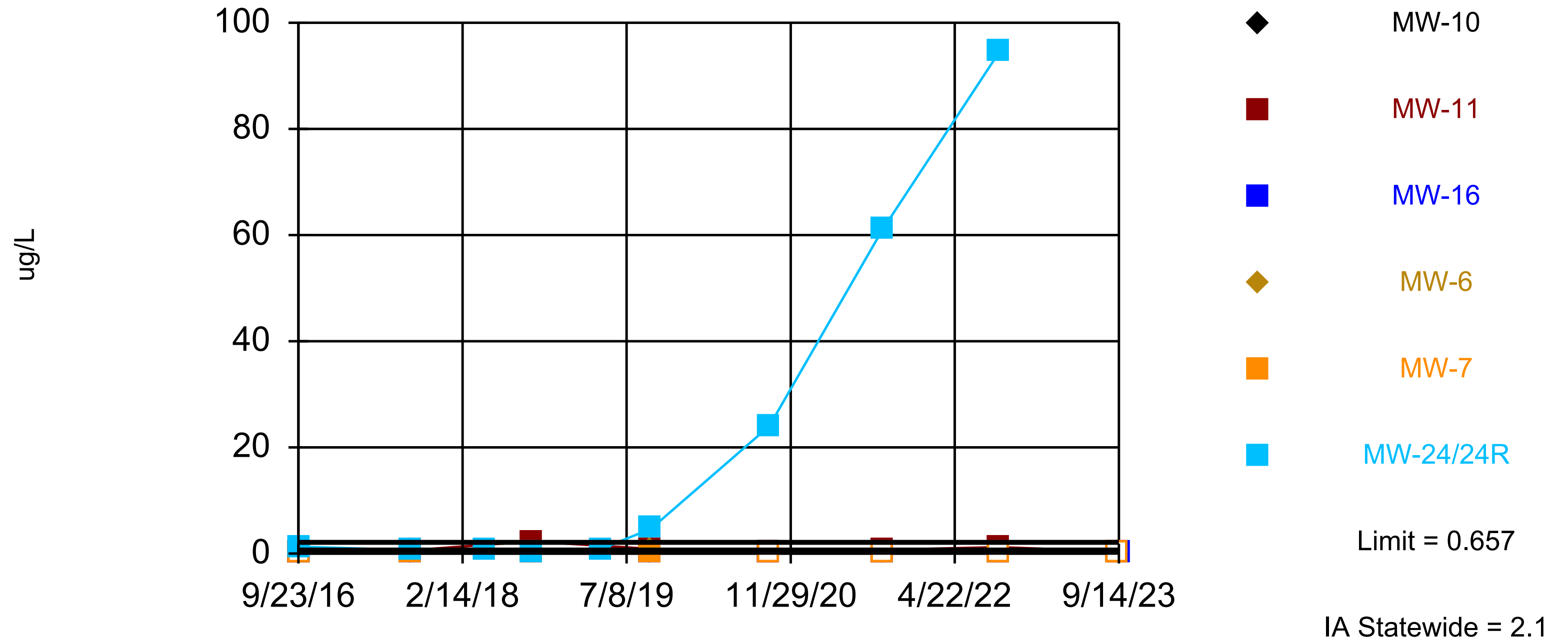
Hollow symbols indicate censored values.

Exceeds Limit: MW-24/24R

Cobalt

Interwell Parametric



Background Data Summary: Mean=0.4425, Std. Dev.=0.06671, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9568, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/23/2023 11:53 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Cobalt (ug/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	0.68 (J)	<0.5	0.57 (J)	<0.5	<0.5	<0.5	1.3
9/5/2017	0.31 (J)	0.61 (J)	0.46 (J)	0.12 (J)	0.8 (J)	0.024 (J)	0.67 (J)
4/25/2018							0.72 (J)
9/17/2018	0.22 (J)	2.3	0.44 (J)	0.22 (J)	0.2 (J)	<0.15	0.37 (J)
4/23/2019							0.9
9/23/2019	0.2 (J)	0.89	0.4 (J)	0.16 (J)	0.71	0.25 (J)	4.7
9/21/2020			0.4 (J)				
9/22/2020		0.37 (J)			0.13 (J)		
9/23/2020				<0.091		<0.091	
9/24/2020	0.14 (J)						24
9/8/2021		0.69	0.49 (J)				
9/9/2021	<0.19			<0.19	0.23 (J)	<0.19	
9/10/2021							61
9/6/2022		1.2	0.43 (J)				
9/7/2022					0.44 (J)		
9/8/2022				<0.19		<0.19	94.5 (D)
9/9/2022	0.19 (J)						
9/11/2023			0.35 (J)				
9/12/2023		0.4 (J)					
9/13/2023	<0.17 (U)				0.34 (J)	<0.17 (U)	
9/14/2023				0.29 (J)			

ND substitution: RL or RL/2 if <15% NDs.

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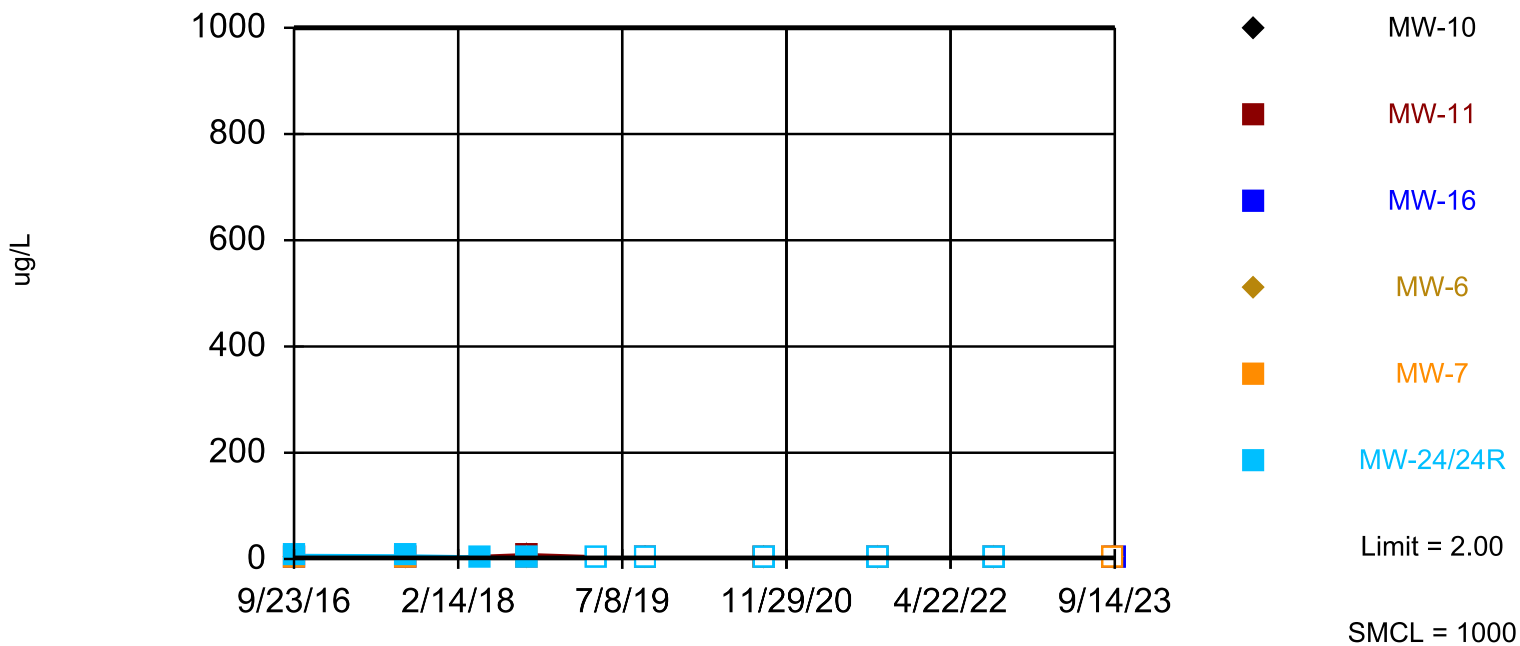
Hollow symbols indicate censored values.

Within Limit

Copper

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 75% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:54 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Copper (ug/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-7	MW-16	MW-6	MW-24/24R	MW-11	MW-12 (bg)
9/23/2016	2.5	0.95 (J)	0.21 (J)	1.3	7.7	1.6	0.57 (J)
9/5/2017	1	0.36 (J)	0.31 (J)	0.2 (J)	6.8	0.35 (J)	0.24 (J)
4/25/2018					4.6		
9/17/2018	5.7	1.7	2.5	2.4	1.2	9	<0.48
4/23/2019					<2		
9/23/2019	<2	<2	<2	2.4 (J)	<2	<2	<2
9/21/2020							<1.5
9/22/2020				1.6 (J)		<1.5	
9/23/2020		<1.5	1.5 (J)				
9/24/2020	<1.5				<1.5		
9/8/2021						<1.4	<1.4
9/9/2021	<1.4	<1.4	<1.4	<1.4			
9/10/2021					<1.4		
9/6/2022						<1.8	<1.8
9/7/2022				<1.8			
9/8/2022		<1.8	<1.8		<1.8		
9/9/2022	<1.8						
9/11/2023							<1.8 (U)
9/12/2023						<1.8 (U)	
9/13/2023	<1.8 (U)	<1.8 (U)		<1.8 (U)			
9/14/2023			<1.8 (U)				

ND substitution: RL or RL/2 if <15% NDs.

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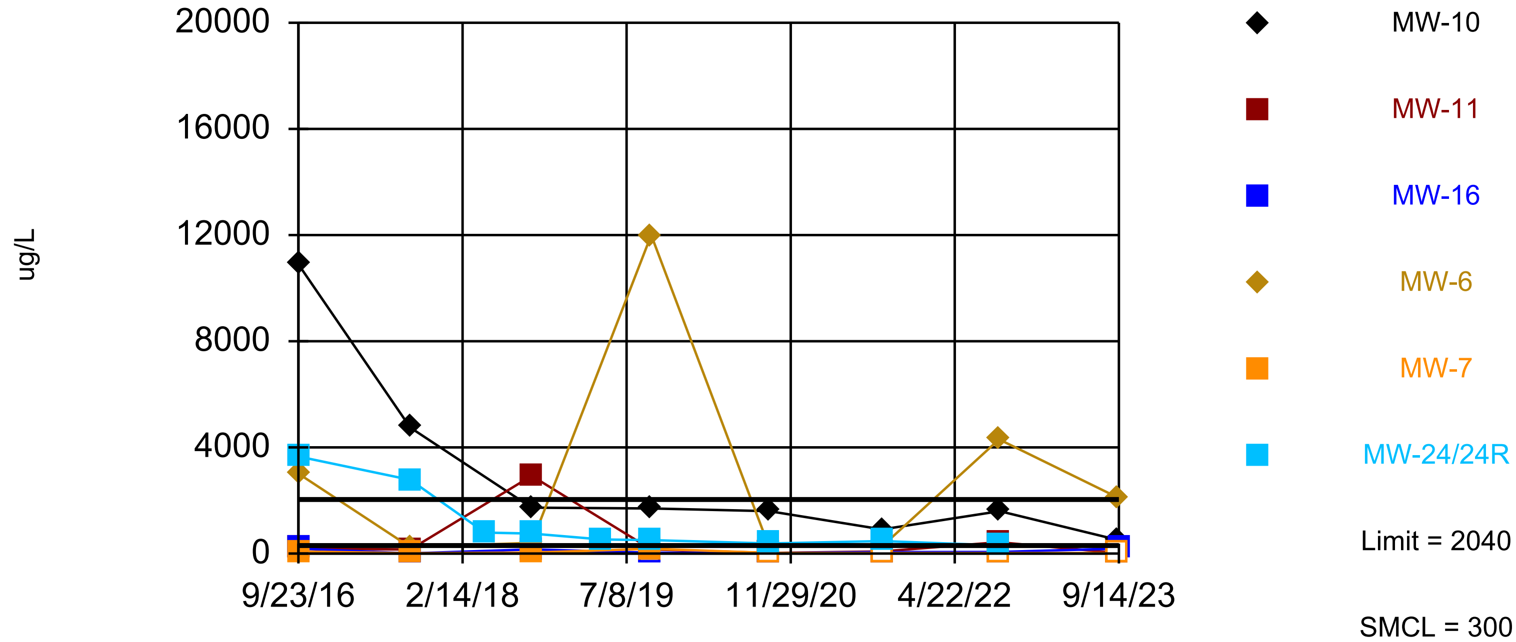
Hollow symbols indicate censored values.

Exceeds Limit: MW-6

Iron

Interwell Parametric



Background Data Summary: Mean=1714, Std. Dev.=100.6, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9056, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit   Analysis Run 10/23/2023 11:54 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Iron (ug/L) Analysis Run 10/23/2023 11:58 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	10900	193	1590	187	3010	77.8	3660
9/5/2017	4750	154	1710	<9.6	240	11.4 (J)	2780
4/25/2018							793
9/17/2018	1730	2930	1710	157	403	35.6 (J)	755
4/23/2019							530
9/23/2019	1700	160	1600	<66	12000	180	510
9/21/2020			1800				
9/22/2020		<50			290		
9/23/2020				<50		<50	
9/24/2020	1600						380
9/8/2021		82 (J)	1700				
9/9/2021	910			53 (J)	270	<36	
9/10/2021							470
9/6/2022		430	1900				
9/7/2022					4300		
9/8/2022				59 (J)		<36	310
9/9/2022	1600						
9/11/2023			1700				
9/12/2023		<36 (U)					
9/13/2023	510				2100	<36 (U)	
9/14/2023				190			

ND substitution: RL or RL/2 if <15% NDs.

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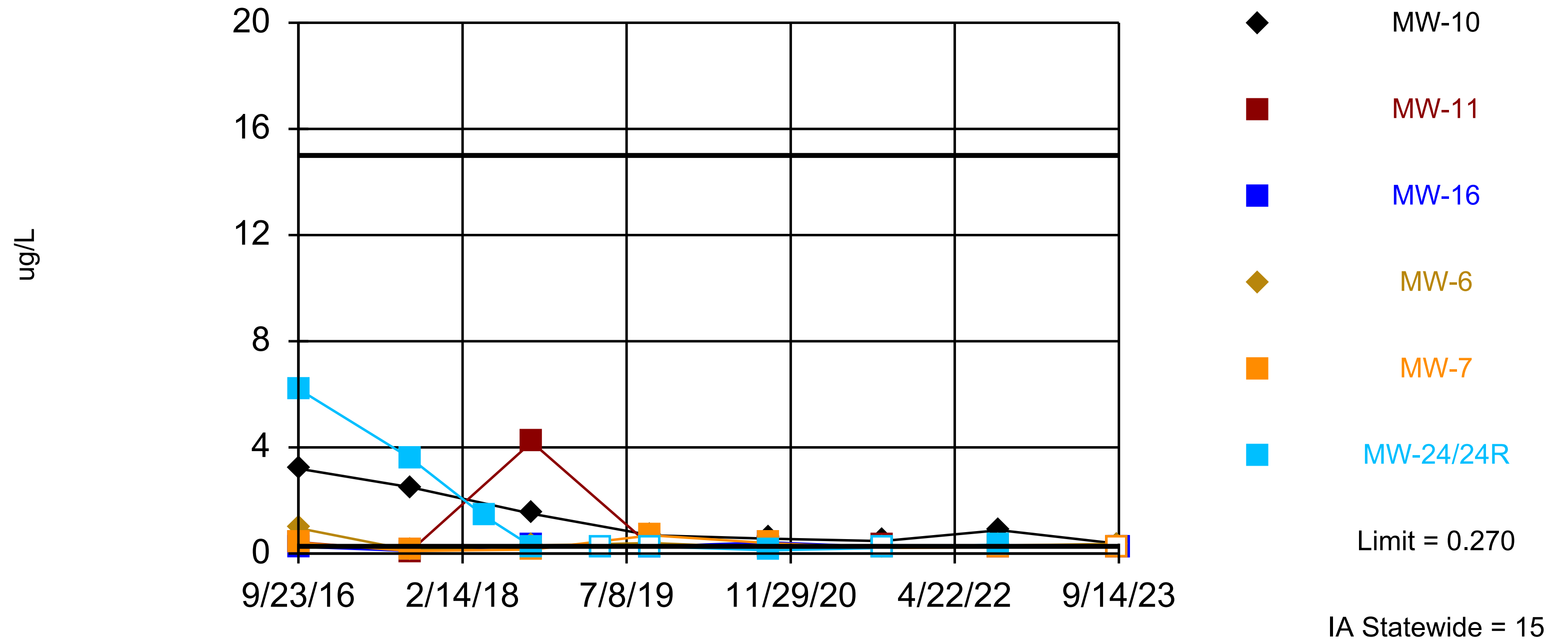
Hollow symbols indicate censored values.

Within Limit

Lead

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 75% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:54 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Lead (ug/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-7	MW-16	MW-6	MW-24/24R	MW-11	MW-12 (bg)
9/23/2016	3.2	0.41 (J)	0.26 (J)	0.96 (J)	6.2	0.43 (J)	<0.19
9/5/2017	2.5	0.1 (J)	0.1 (J)	0.13 (J)	3.6	0.089 (J)	0.038 (J)
4/25/2018					1.4		
9/17/2018	1.5	0.15 (J)	0.3 (J)	0.3 (J)	0.27 (J)	4.2	<0.12
4/23/2019					<0.27		
9/23/2019	0.69	0.69	<0.27	0.4 (J)	<0.27	<0.27	<0.27
9/21/2020							0.17 (J)
9/22/2020				0.22 (J)		0.26 (J)	
9/23/2020		0.39 (J)	0.42 (J)				
9/24/2020	0.56				0.12 (J)		
9/8/2021						0.29 (J)	<0.21
9/9/2021	0.47 (J)	<0.21	0.25 (J)	0.21 (J)			
9/10/2021					<0.21		
9/6/2022						0.25 (J)	<0.24
9/7/2022				0.3 (J)			
9/8/2022		<0.24	<0.24		0.34 (J)		
9/9/2022	0.88						
9/11/2023							<0.24 (U)
9/12/2023						<0.24 (U)	
9/13/2023	0.37 (J)	<0.24 (U)		0.37 (J)			
9/14/2023			<0.24 (U)				

ND substitution: RL or RL/2 if <15% NDs.

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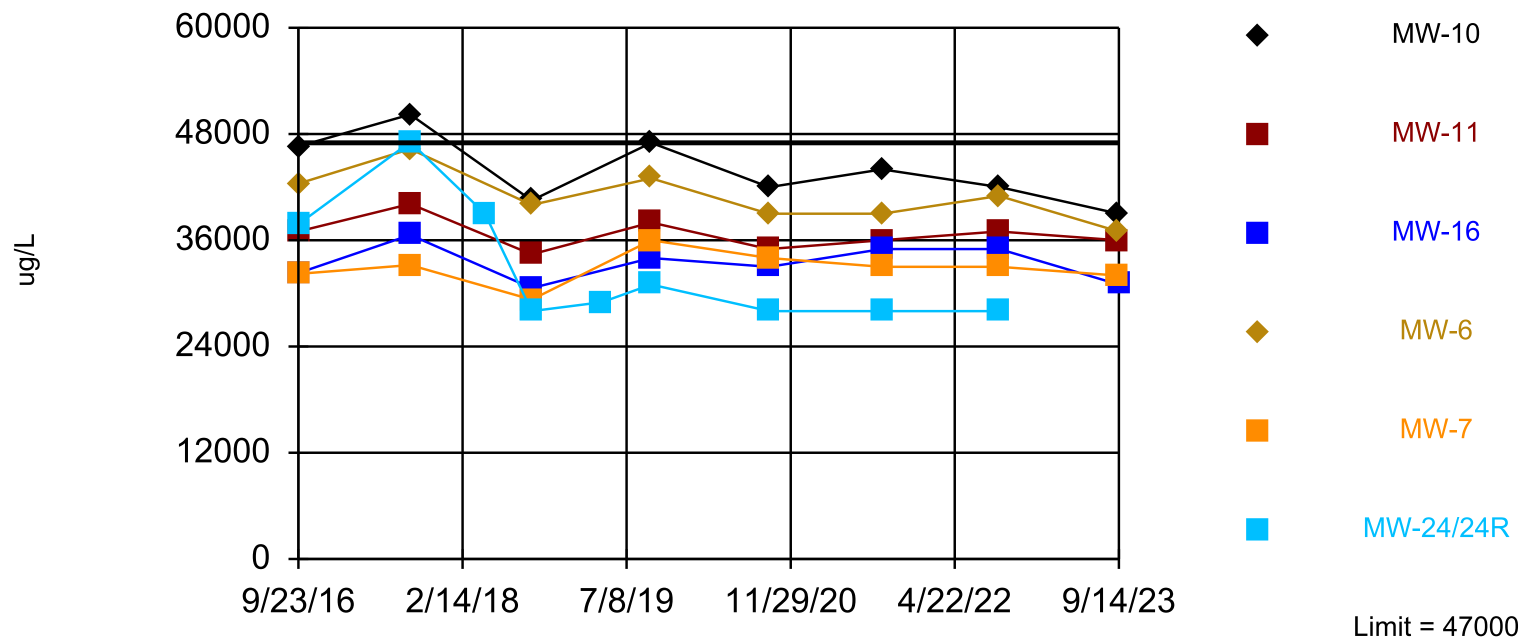
Within Limit

Magnesium

Interwell Parametric



Background Data Summary: Mean=40488, Std. Dev.=2020, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9188, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit   Analysis Run 10/23/2023 11:54 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Magnesium (ug/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	46600	37000	41000	32300	42400	32200	37800
9/5/2017	50200	40100	42800	36600	46300	33200	47100
4/25/2018							39000
9/17/2018	40500	34400	38100	30600	40000	29300	28000
4/23/2019							29000
9/23/2019	47000	38000	44000	34000	43000	36000	31000
9/21/2020			39000				
9/22/2020		35000			39000		
9/23/2020				33000		34000	
9/24/2020	42000						28000
9/8/2021		36000	40000				
9/9/2021	44000			35000	39000	33000	
9/10/2021							28000
9/6/2022		37000	40000				
9/7/2022					41000		
9/8/2022				35000		33000	28000
9/9/2022	42000						
9/11/2023			39000				
9/12/2023		36000					
9/13/2023	39000				37000	32000	
9/14/2023				31000			

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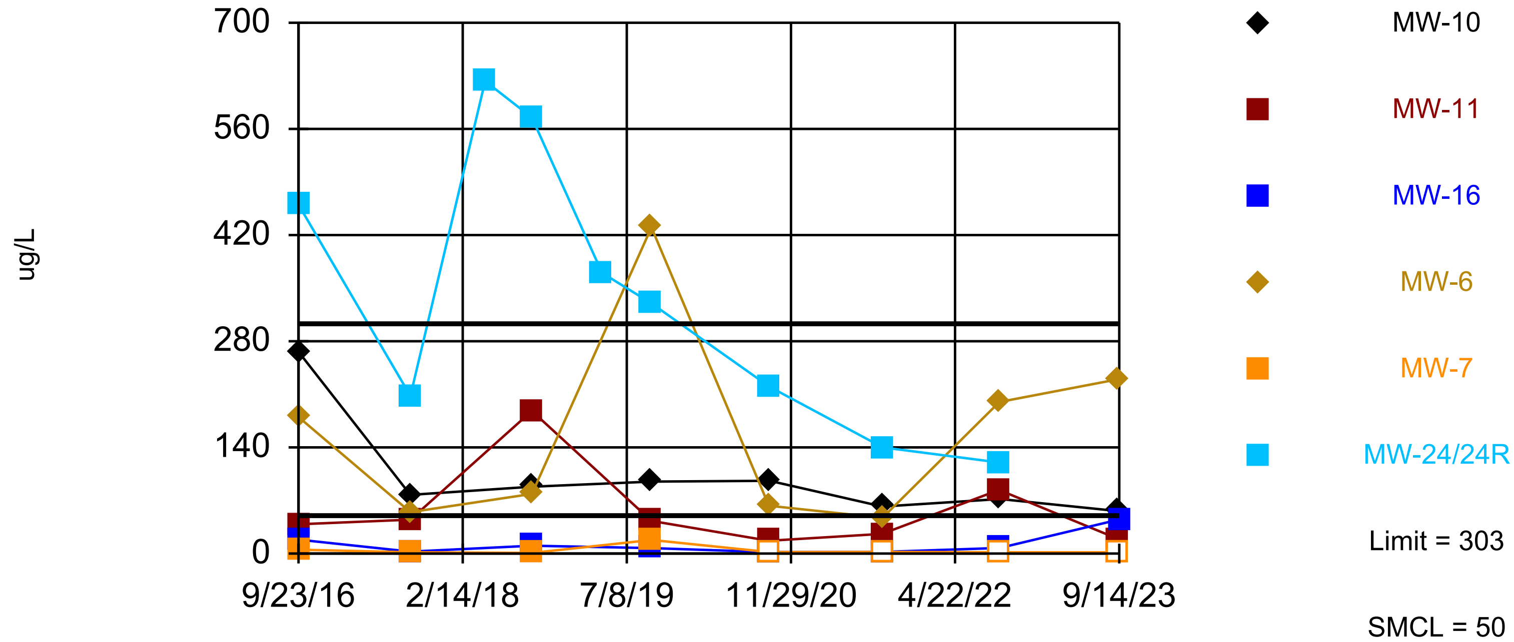
Hollow symbols indicate censored values.

Within Limit

Manganese

Interwell Parametric



Background Data Summary: Mean=266.1, Std. Dev.=11.34, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9053, critical = 0.851. Kappa = 3.209 (c=14, w=13, 1 of 2, event alpha = 0.1). Report alpha = 0.007498. Individual comparison alpha = 0.0005787. Comparing 6 points to limit. Assumes 7 future values.

Prediction Limit Analysis Run 10/23/2023 11:54 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Manganese (ug/L) Analysis Run 10/23/2023 11:58 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

	MW-10	MW-11	MW-12 (bg)	MW-16	MW-6	MW-7	MW-24/24R
9/23/2016	266	38.6	276	18.4	180	5	460
9/5/2017	77.4	44.8	266	2.5	54.6	1.7	208
4/25/2018							623
9/17/2018	88.2	188	257	10.3	78.7	0.81 (J)	575
4/23/2019							370
9/23/2019	95	43	280	7.3 (J)	430	18	330
9/21/2020			280				
9/22/2020		17			63		
9/23/2020				<4		<4	
9/24/2020	96						220
9/8/2021		26	260				
9/9/2021	62			<4.4	47	<4.4	
9/10/2021							140
9/6/2022		84	260				
9/7/2022					200		
9/8/2022				7.5 (J)		<3.6	120
9/9/2022	72						
9/11/2023			250				
9/12/2023		19					
9/13/2023	56				230	<3.6 (U)	
9/14/2023				45			

ND substitution: RL or RL/2 if <15% NDs.

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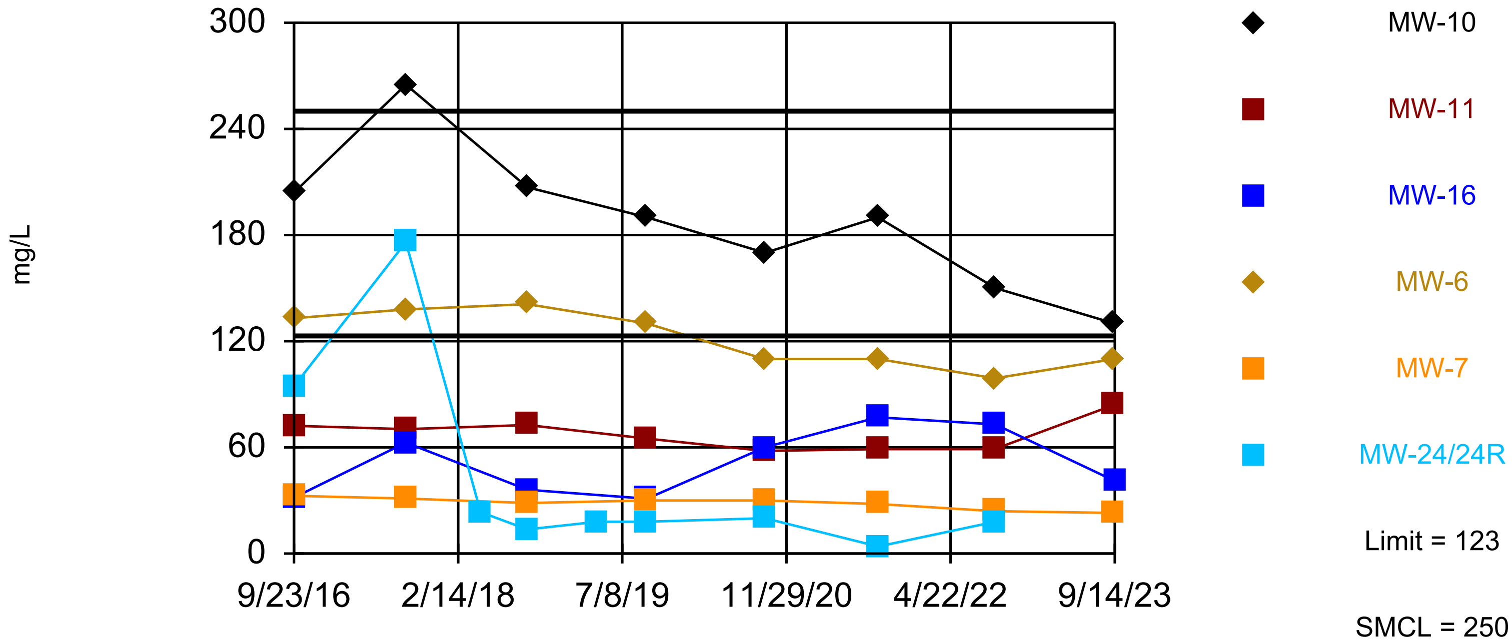
Exceeds Limit: MW-10

Sulfate

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 15 background values. Annual per-constituent alpha = 0.08163. Individual comparison alpha = 0.006529 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/23/2023 11:54 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

Prediction Limit

Constituent: Sulfate (mg/L)   Analysis Run 10/23/2023 11:58 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

	MW-12 (bg)	MW-10	MW-24/24R	MW-7	MW-6	MW-16	MW-11
11/1/2010	52.9						
2/1/2011	61.2						
9/1/2011	123						
9/1/2012	58.7						
9/1/2013	57.1						
9/1/2014	64.1						
9/1/2015	75.5						
9/23/2016	50.2	204	94.5	32.6	133	31.6	72.2
9/5/2017	49.6	265	176	31.1	138	62.7	70.3
4/25/2018			23.4				
9/17/2018	52.8	207	13.7	28.6	141	36.1	72.7
4/23/2019			18				
9/23/2019	47	190	18	30	130	31	65
9/21/2020	49						
9/22/2020					110		58
9/23/2020				30		60	
9/24/2020		170	20				
9/8/2021	49						59
9/9/2021		190		28	110	77	
9/10/2021			4				
9/6/2022	45						59
9/7/2022					99		
9/8/2022			18	24		73	
9/9/2022		150					
9/11/2023	47						
9/12/2023							84
9/13/2023		130		23	110		
9/14/2023						41	

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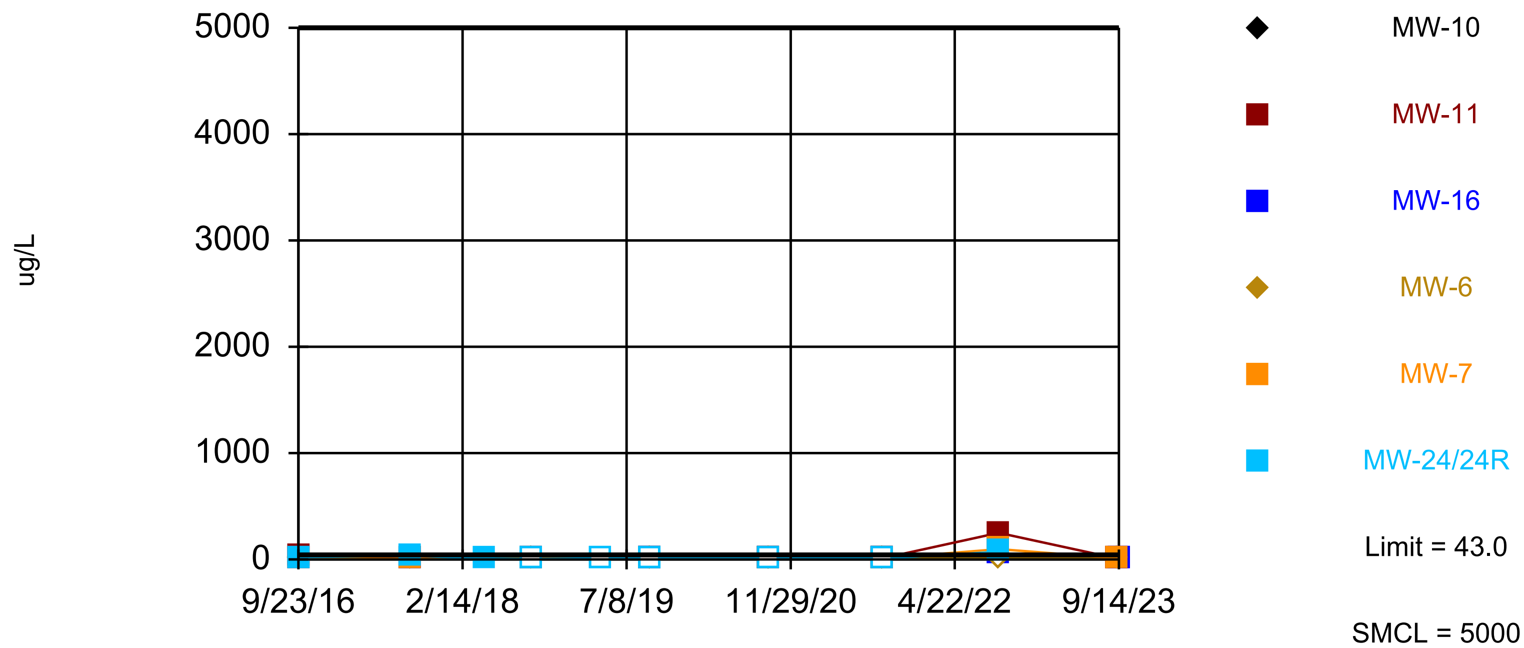
Hollow symbols indicate censored values.

Exceeds Limit: MW-24/24R

Zinc

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 49%. Limit is highest of 8 background values. 62.5% NDs. Annual per-constituent alpha = 0.1903. Individual comparison alpha = 0.01611 (1 of 2). Comparing 6 points to limit. Assumes 7 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/23/2023 11:54 AM   View: Deep

Big Bend Closed Landfill   Client: SCS Engineers   Data: Input_File_BB

Prediction Limit

Constituent: Zinc (ug/L) Analysis Run 10/23/2023 11:58 AM View: Deep

Big Bend Closed Landfill Client: SCS Engineers Data: Input_File_BB

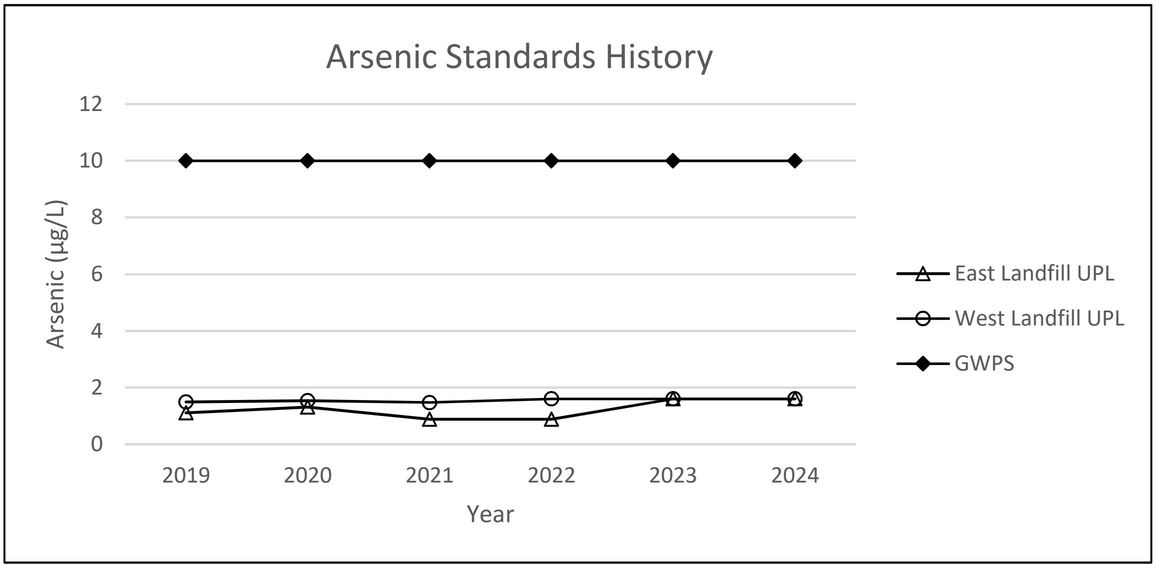
	MW-10	MW-7	MW-16	MW-6	MW-24/24R	MW-11	MW-12 (bg)
9/23/2016	12.7	8.1 (J)	2.5 (J)	8.1 (J)	22	28.3	3.2 (J)
9/5/2017	3.6 (J)	5.5 (J)	2.2 (J)	1.5 (J)	36.4	2.4 (J)	1.4 (J)
4/25/2018					7.7 (J)		
9/17/2018	12.7	8.4 (J)	6.4 (J)	6 (J)	<3.7	20.3	<3.7
4/23/2019					<10		
9/23/2019	<10	14 (J)	<10	<10	<10	<10	<10
9/21/2020							<10
9/22/2020				<10		<10	
9/23/2020		<10	<10				
9/24/2020	<10				<10		
9/8/2021						<10	<10
9/9/2021	<10	<10	<10	<10			
9/10/2021					<10		
9/6/2022						250	43
9/7/2022				<10			
9/8/2022		96	51		71		
9/9/2022	46						
9/11/2023							<6.4 (U)
9/12/2023						<6.4 (U)	
9/13/2023	8.1 (J)	9.3 (J)		9.9 (J)			
9/14/2023			<6.4 (U)				

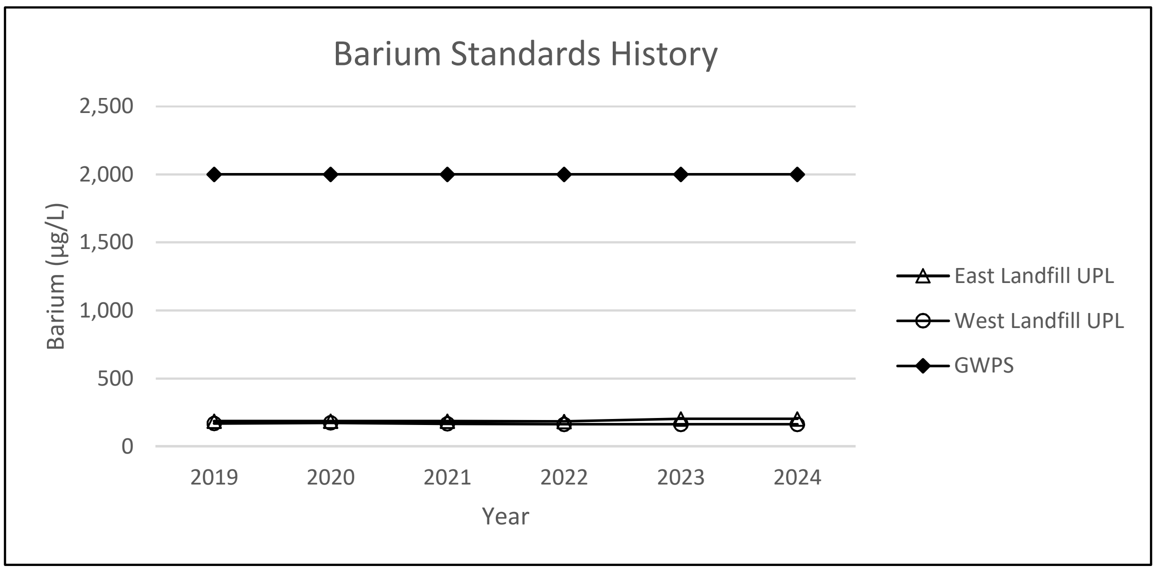
ND substitution: RL or RL/2 if <15% NDs.

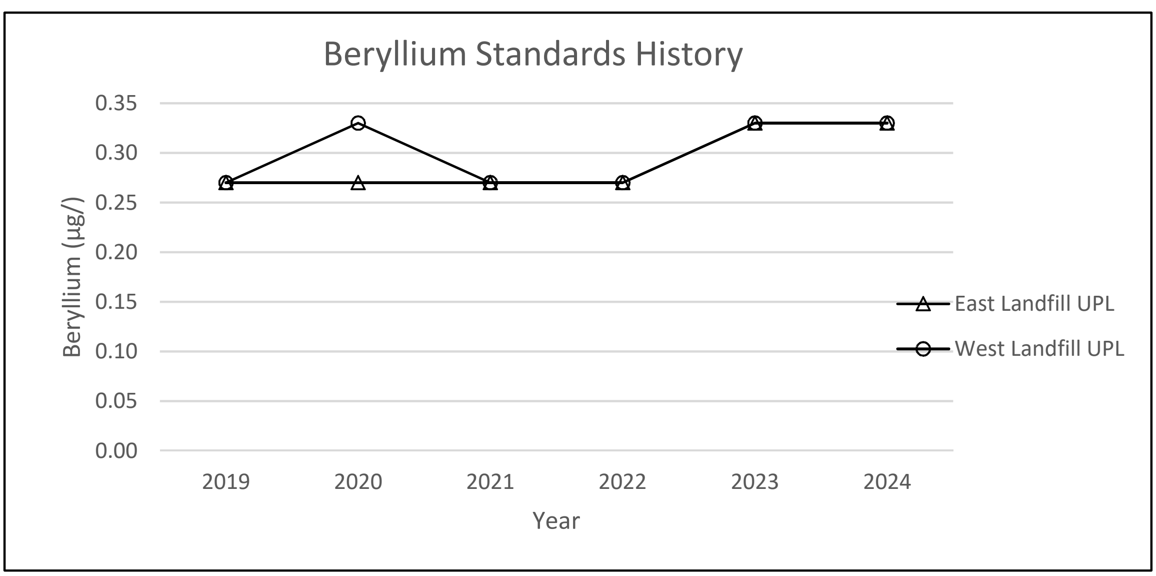
Appendix F

Standards History Graphs

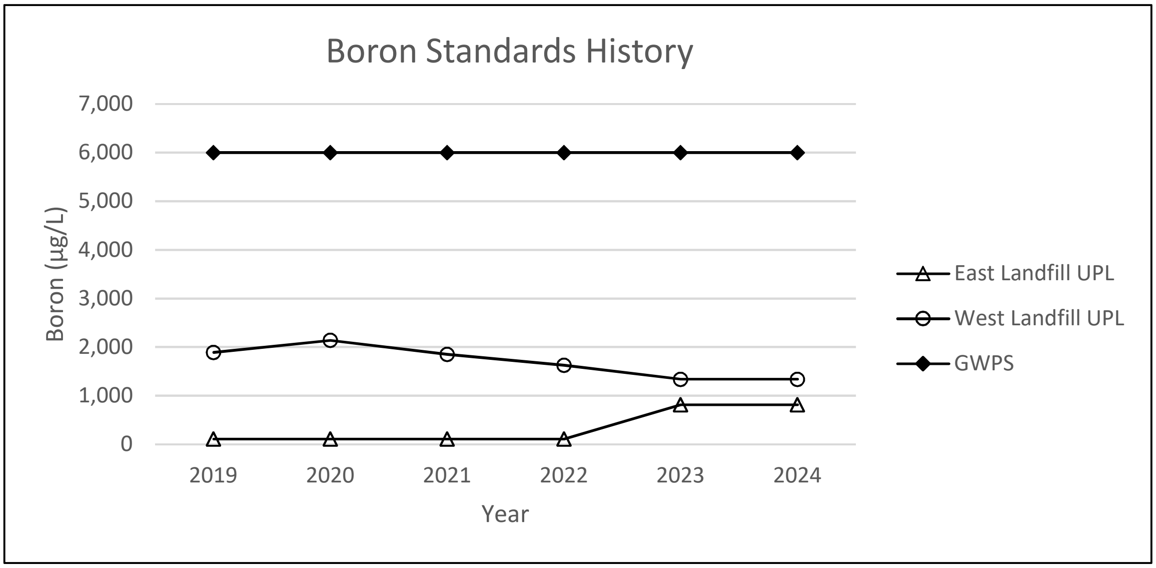
Marshalltown East and West Closed Landfills, Permit #64-SDP-5-91C and #64-SDP-3-90C
Standards History Graphs

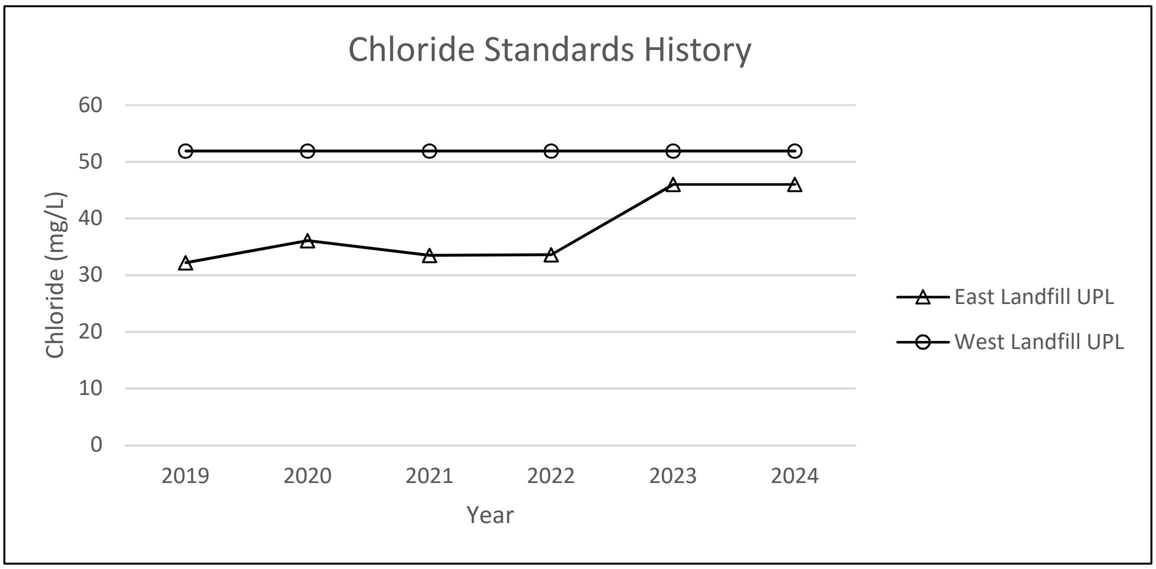


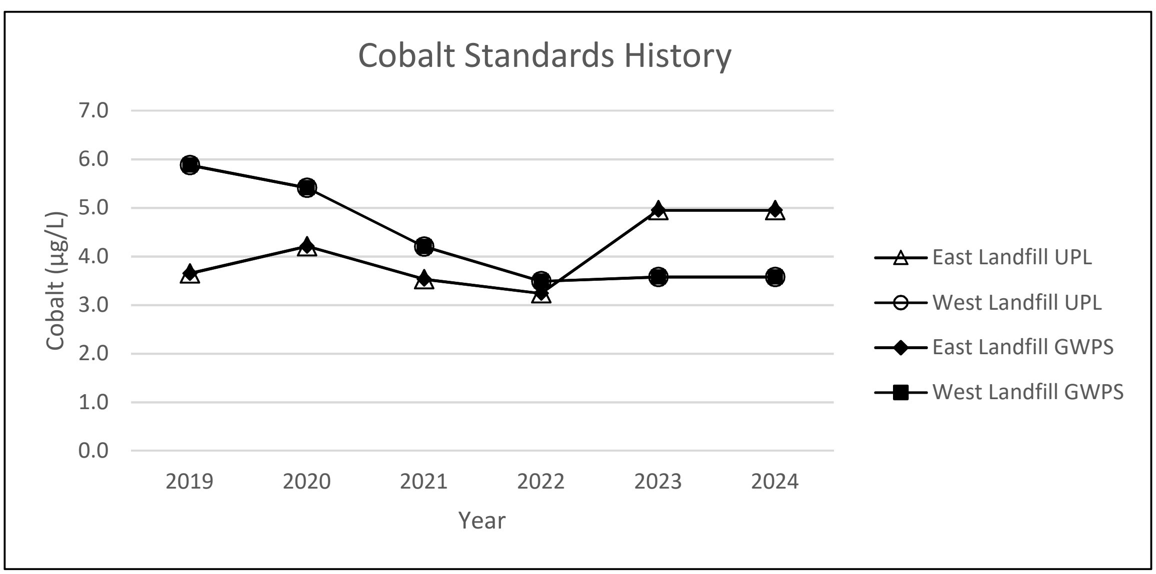




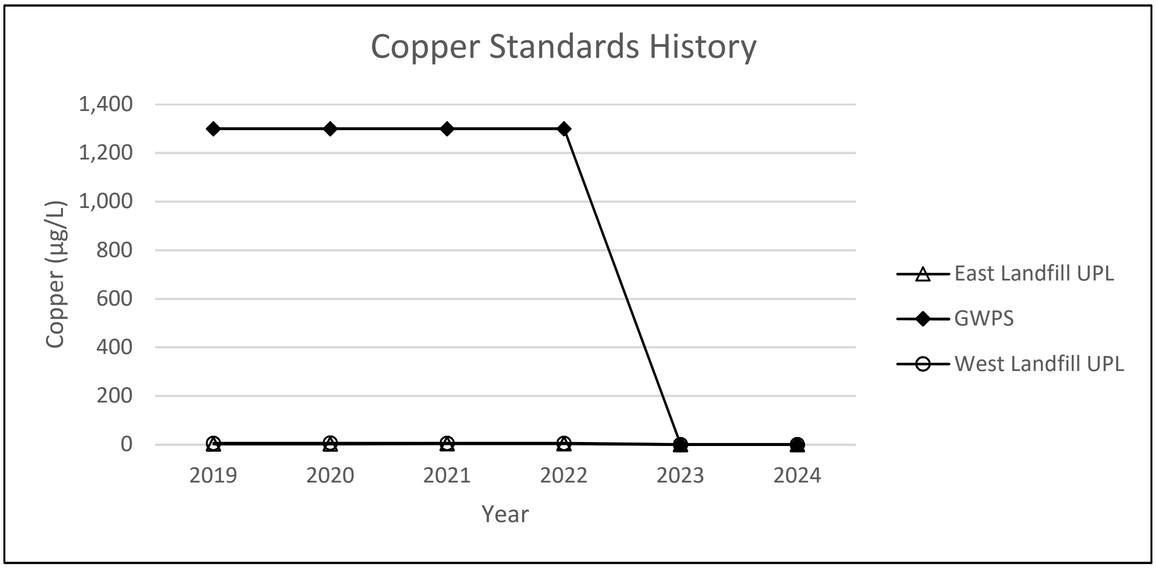
Marshalltown East and West Closed Landfills, Permit #64-SDP-5-91C and #64-SDP-3-90C
Standards History Graphs

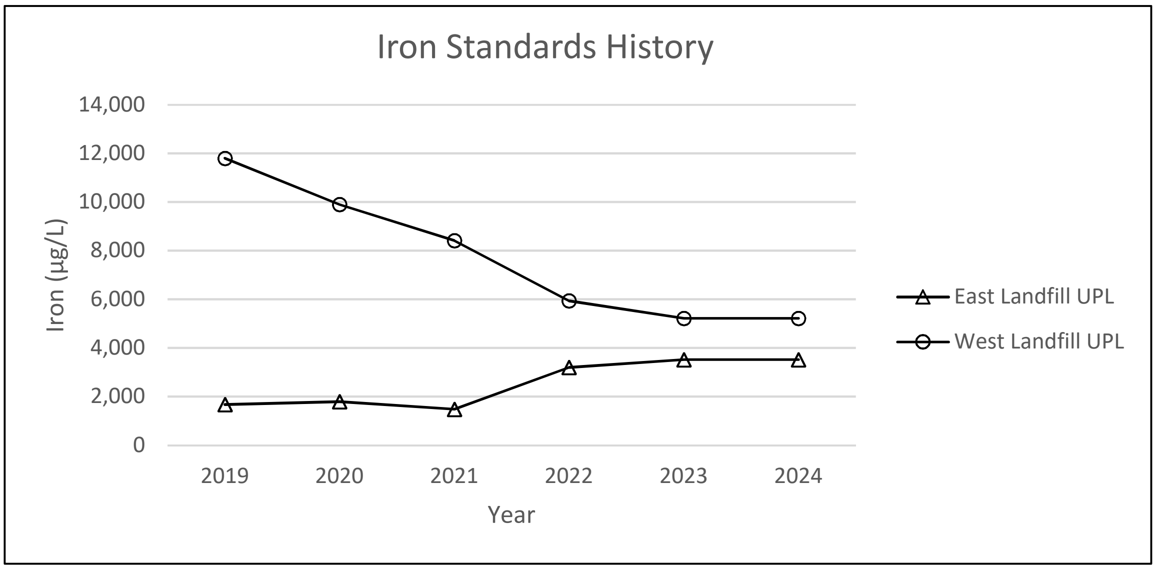


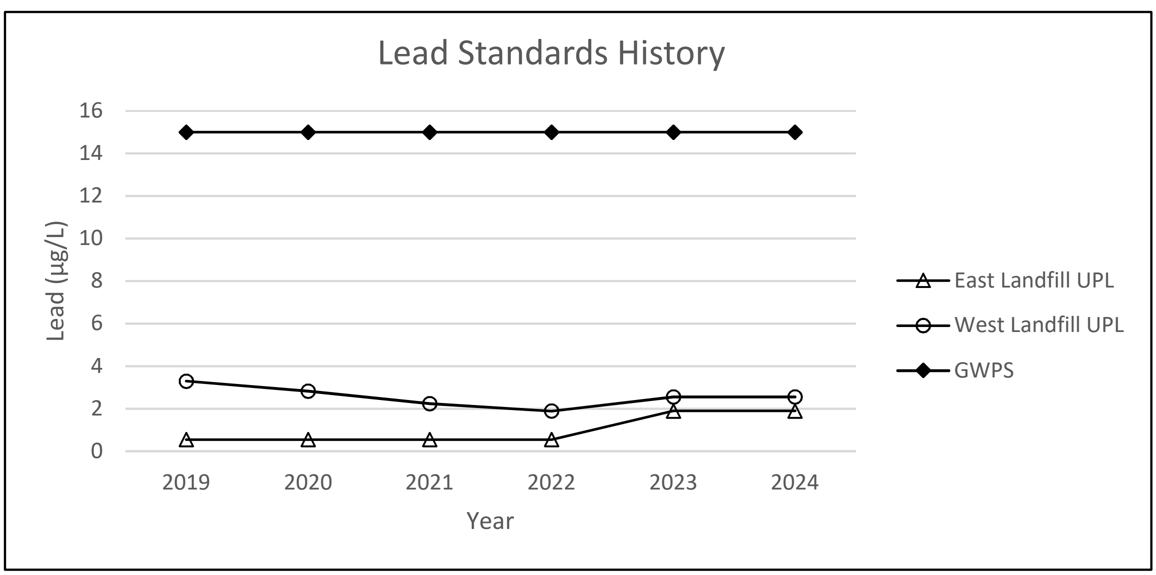




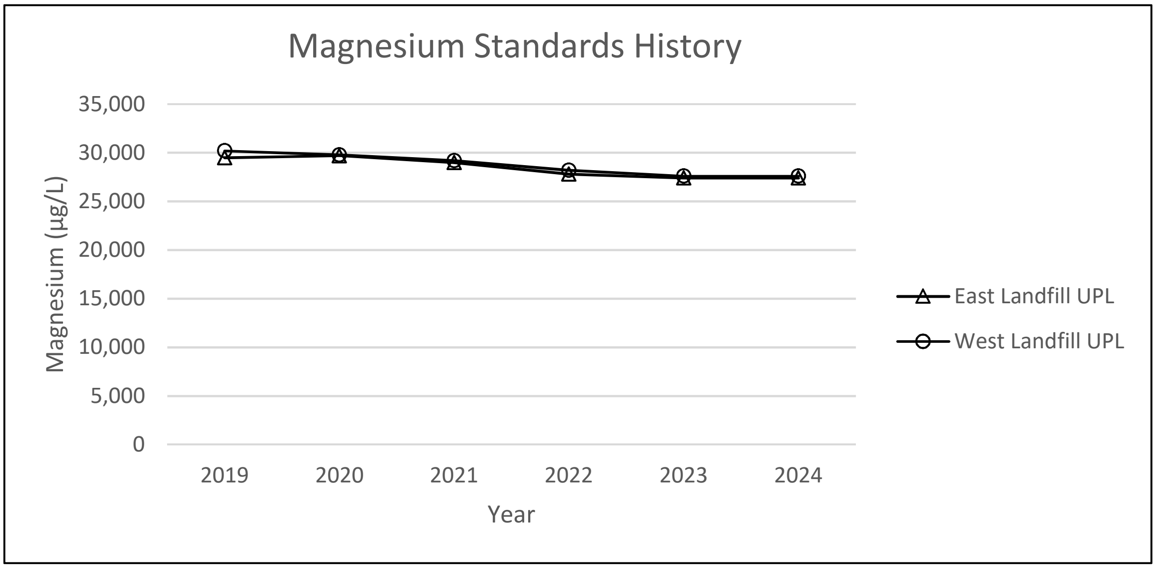
Marshalltown East and West Closed Landfills, Permit #64-SDP-5-91C and #64-SDP-3-90C
Standards History Graphs

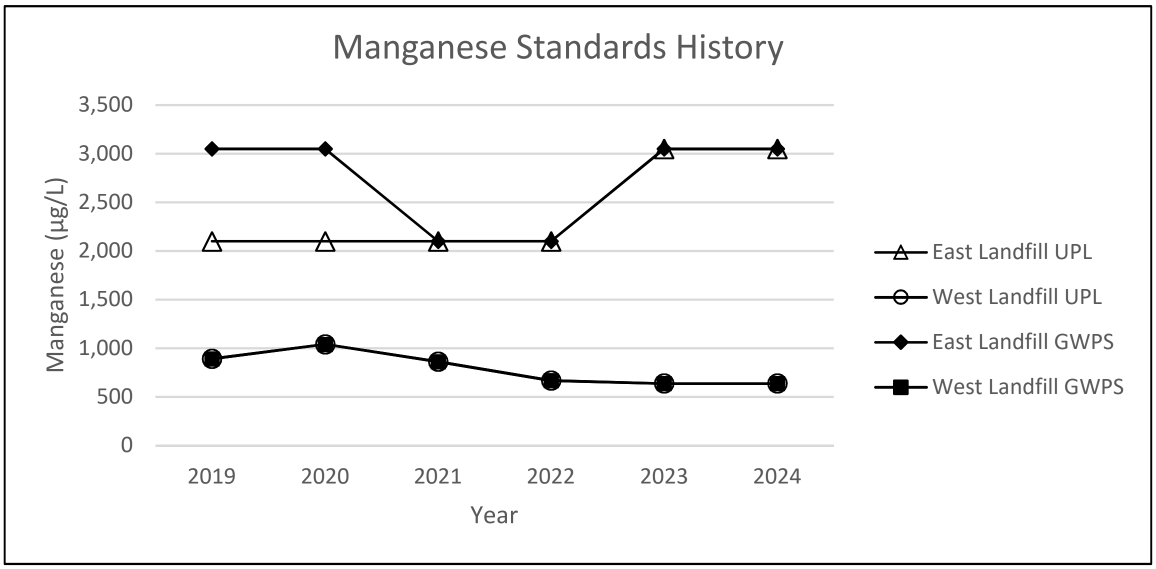


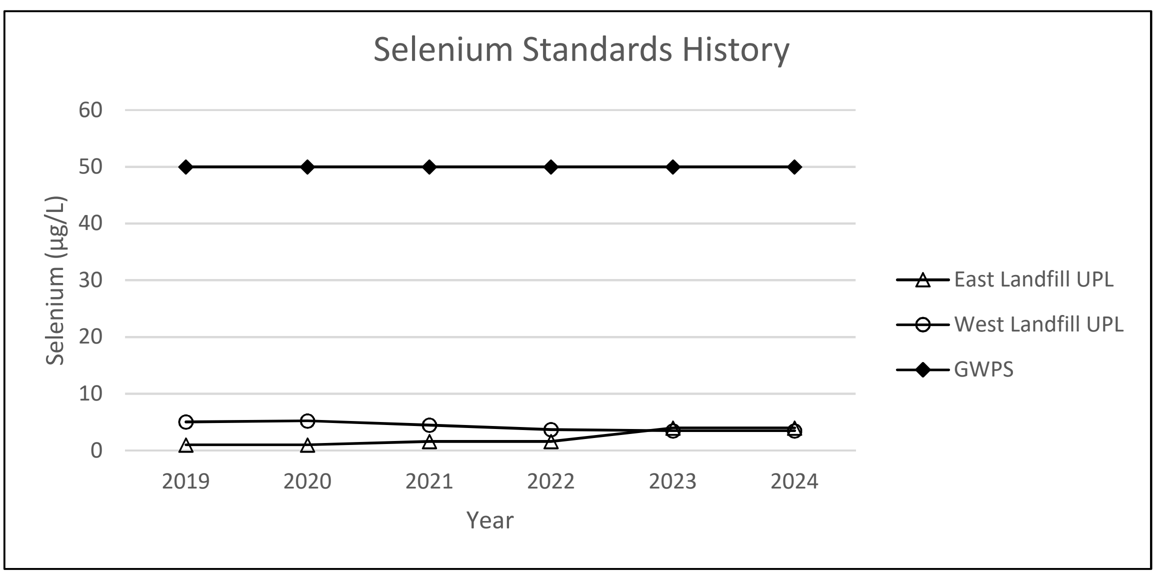




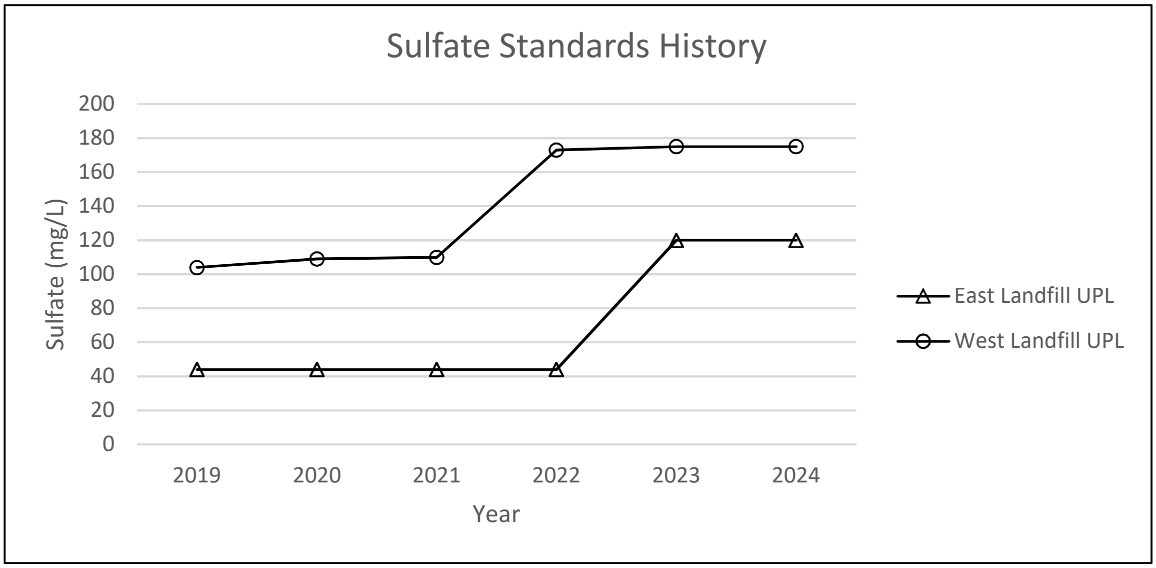
Marshalltown East and West Closed Landfills, Permit #64-SDP-5-91C and #64-SDP-3-90C
Standards History Graphs

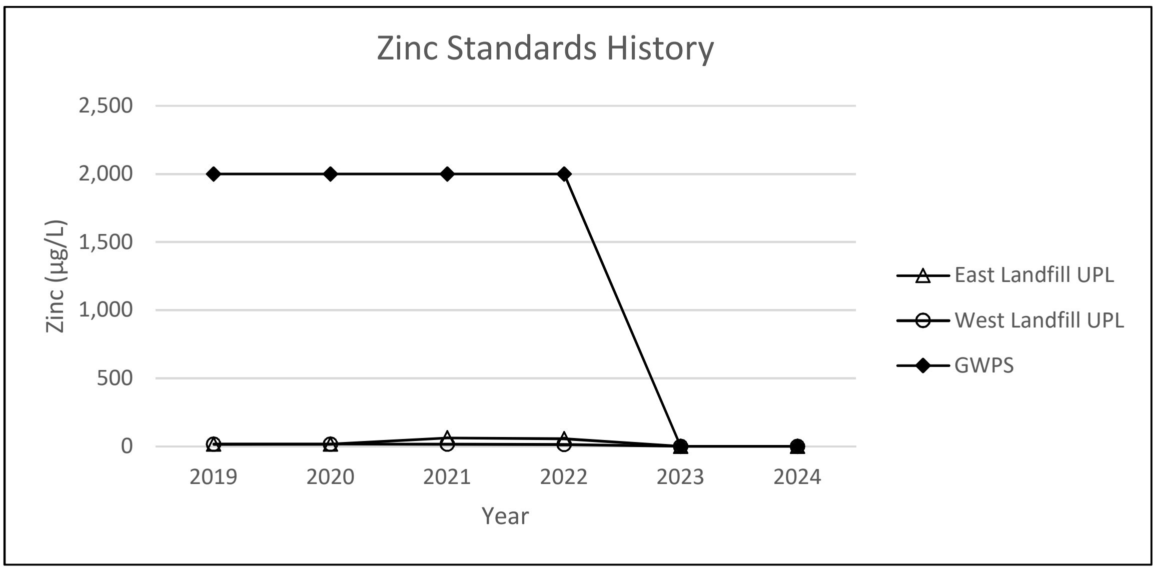






Marshalltown East and West Closed Landfills, Permit #64-SDP-5-91C and #64-SDP-3-90C
Standards History Graphs





Appendix G

Receptor Survey

GeoSAM Search Results, Wells Within 1 Mile of Marshalltown Closed Landfill, October 2024

wnumber	3521	20901	30897	80726	80727	80736	81172	86090
FID	3487	18131	28485	77548	77550	77569	77818	80819
owner_name	Jenkins, Ralph	Reece, Floyd	Thurston, George	Hilsabeck, Bob	Huff, Van	Buffington, Richard	Hansen, Harry	Peterson, I.A.
alt_name	ROHWEDER, A. (T)							
pwts_id	0	0	0	0	0	0	0	0
project	Unknown	Unknown	Unknown	Geologic Data Preservation	Geologic Data Preservation	Geologic Data Preservation	Geologic Data Preservation	
operator	Unknown	Unknown	Unknown					
county	Marshall	Marshall	Marshall	Marshall	Marshall	Marshall	Marshall	Marshall
quad	Le Grand, Iowa	Le Grand, Iowa	Le Grand, Iowa	Le Grand, Iowa	Le Grand, Iowa	Le Grand, Iowa	Le Grand, Iowa	Le Grand, Iowa
township	T84N	T84N	T84N	T84N	T84N	T84N	T84N	T84N
range	R17W	R17W	R17W	R17W	R17W	R17W	R17W	R17W
section	21	28	28	16	21	20	22	20
quarter	NE SE SE		NE NW SE	SW SE	SW SW	SW NE	SW SW NW SW	SE SW SE
latitude	42.072025	42.056551	42.061107	42.079012	42.067327	42.070563	42.067532	42.065423
longitude	-92.826153	-92.83444	-92.830902	-92.83348	-92.842994	-92.854114	-92.823771	-92.851466
ll_acc	Calc. +/- 470 ft.	Calc. +/- 3730 ft.	Calc. +/- 470 ft.	Calc. +/- 930 ft.	Calc. +/- 930 ft.	Calc. +/- 930 ft.	Calc. +/- 930 ft.	Calc. +/- 470 ft.
utm_x	514381	513699	513991	513774	512989	512069	514579	512289
utm_y	4657788	4656068	4656575	4658562	4657263	4657621	4657289	4657051
elevation	960	862	902	946	924	972	961	1011
elev_acc	Unknown	Digital Elevation Model Accurate to 5 ft	Altimeter Accurate to 5 ft	Digital Elevation Model Accurate to 10 ft	Digital Elevation Model Accurate to 10 ft	Digital Elevation Model Accurate to 10 ft	Digital Elevation Model Accurate to 10 ft	Topo Map Accurate to 2 ft
field_loca	0	0	0	0	0	0	0	0
site_type	Drilled hole	Drilled hole	Drilled hole	Drilled hole	Drilled hole	Drilled hole	Drilled hole	Drilled hole
position	Unknown	Unknown	Unknown	Unknown	Unknown	Upland	Unknown	Unknown
dpth_br	0	23	220	55	60	0	125	291
dpth_well	645	35	436	215	85	300	233	310
dpth_tot	645	35	436	215	85	300	233	310
drill_comp	Hoeg & Ames (H.M. White)	Verwers Well Co.	Shilhanek Well Drilling	Hoeg & Ames (H.M. White)	Hoeg & Ames (H.M. White)	Hoeg & Ames (H.M. White)	Hoeg & Ames (H.M. White)	Shilhanek Well Drilling
icon	3	3	3	1	1	1	1	1
drl_date	31-Aug-48	8-Feb-68	10-Feb-41	20-Oct-80	13-Mar-78	2-Aug-79	4-May-70	13-Aug-41
aquifer								
well_type	Private	Private	Private	Private	Private	Private		
smpl_type	Chips	Chips						
log_drlr	1	1	1	1	1	1	1	1
log_strp	1	1	1	0	0	0	0	0
log_geop	0	0	0	0	0	0	0	0
log_other	0	0	0	0	0	0	0	0
HLINK	https://www.iihr.uiowa.edu/igs/geosam/well/3521/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/20901/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/30897/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/80726/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/80727/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/80736/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/81172/general-information	https://www.iihr.uiowa.edu/igs/geosam/well/86090/general-information
x	-10333360.08	-10334282.59	-10333888.74	-10334175.72	-10335234.82	-10336472.69	-10333094.92	-10336177.91
y	5171774.553095772	5169454.277317928	5170137.375906627	5172822.416299341	5171070.044	5171555.3067758465	5171100.784150807	5170784.535582815

GeoSAM Search Results, Wells Within 1 Mile of Marshalltown Closed Landfill, October 2024

PWTS ID	Permit #	Owner Name	Other Name	Drill Date	Well Depth (ft)	PLSS	Latitude	Longitude	Well Status
2227681		roger schroeder		6/6/1972	175	T84N R17 W S21	42.0704	-92.82992	Active
2166283	38595	rand pitkin		1/28/2013	196	T84N R17 W S22	42.06375	-92.81929	Active

Marshalltown Closed Landfill 2024 Receptor Survey

GeoSAM and PWTS Wells Within 1 Mile of Site, Excluding Plugged Wells