Alliant Energy
4902 North Biltmore Lane
P.O. Box 77007
Madison, WI 53707-1007

1-800-ALLIANT (800-255-4268)
alliantenergy.com

November 30, 2023

Mr. Brian Rath
Land Quality Bureau
Iowa Department of Natural Resources
502 East 9th Street
Des Moines, IA 50319-0034

Subject: 2023 Annual Water Quality Report
Interstate Power and Light Company – Ottumwa Midland Landfill
Permit #90-SDP-8-92P

Dear Mr. Rath:

On behalf of Interstate Power and Light Company (IPL), Alliant Energy is providing the enclosed 2023 Annual Water Quality Report for the Ottumwa Midland Landfill, as required by Permit #90-SDP-8-92P 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 #6
Rob Saunders – IPL
Meghan Blodgett, Thomas Karwoski – SCS Engineers

2023 Annual Water Quality Report

Interstate Power and Light Company
Ottumwa-Midland Landfill
Permit #90-SDP-8-92P

Alliant Energy
4902 North Biltmore Lane
Madison, Wisconsin 53718

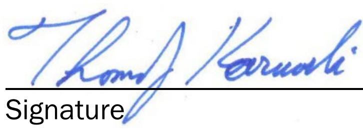
SCS ENGINEERS

25223073.00 | November 30, 2023

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 IAC SS 113.10(1)d.



Signature

November 30, 2023

Date

Pages or Sheets Covered by this Certification:

2023 Annual Water Quality Report, Interstate Power and Light Company Ottumwa-Midland Landfill, Permit #90-SDP-8-92P

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EXECUTIVE SUMMARY

Period of Report Coverage

The period of coverage for this report is from November 2022 through October 2023. The report includes the April 2023 water level measurement event and the August 2023 groundwater sampling event conducted at the Ottumwa-Midland Landfill (OML, also referred to as Site). OML is a coal combustion residual (CCR) landfill located near Ottumwa, Iowa (**Figure 1**).

Report Priority

Comparison of the 2023 results to the Groundwater Protection Standards (GWPSs) indicated no new GWPS exceedances for parameters that were previously part of the sampling program. GWPS exceedances for these parameters in 2023 were:

- Shallow wells:
  - Cobalt above the Statewide Standard (SWS) at MW-15R and MW-108
  - Manganese above the SWS at wells MW-15R and MW-108

- Mid-depth Pennsylvanian wells:
  - None

Lithium concentrations at all sampled monitoring wells in August 2023 exceeded the GWPS (14 micrograms per liter [μg/L]). Because this was the first sampling event in which lithium was included, background concentrations have not yet been calculated. However, the widespread nature of lithium GWPS exceedances and the fact that the highest detected lithium concentrations was at background Pennsylvanian well MW-102P indicate that elevated lithium concentrations occur naturally at the Site.

The two shallow wells with cobalt and manganese exceedances are screened within the Pennsylvanian shale and are upgradient of the landfill. The cobalt and manganese GWPS exceedances may reflect natural variation within the shale and/or impacts related to the presence of coal and historic coal mining activities.

Upper Prediction Limit (UPL) exceedances noted for 2023 in the shallow hydrogeologic unit were generally similar to the UPL exceedances in 2020 through 2022.

SCS Engineers (SCS) recommends that the current monitoring program be continued during 2024, with updates to the analytical parameter list as described in **Section 8.0**.

Site Status and Applicable Rules

The following summarizes the Site status and applicable rules associated with groundwater sampling at the OML site:

- **Landfill Status:** Active

- **Types of Wastes Accepted:** CCR

- **Applicable Iowa Administrative Code (IAC) Rules:** 567-103 current version, 567-115.26(6) (certain provisions), 567-115.21 (referenced for monitoring well maintenance and evaluation requirements, in place of the rescinded 567-110.9). The monitoring and reporting were also performed in accordance with the provisions of the variance to 567-103.1(2)f granted on July 20, 2017, and the conditions of the landfill permit renewal dated July 21, 2017.

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ACRONYMS/ABBREVIATIONS

CCR = Coal Combustion Residual
COC = Chain of Custody
EPA = Environmental Protection Agency
GWPS = Groundwater Protection Standard
IAC = Iowa Administrative Code
IDNR = Iowa Department of Natural Resources
LCS = Laboratory Control Sample
LCSD = Laboratory Control Sample Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
MCL = EPA Maximum Contaminant Level
OML or Site = Ottumwa-Midland Landfill
QA/QC = Quality Assurance/Quality Control
RCRA = Resource Conservation and Recovery Act
SCS = SCS Engineers
SMCLs = Secondary Maximum Contaminant Levels
SWS = IDNR Statewide Standard for a protected groundwater source
SSI = Statistically Significant Increase above background
UPL = Upper Prediction Limits
U.S. EPA = U.S. Environmental Protection Agency

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1.0 SITE BACKGROUND

1.1 SITE HISTORY

The OML is an active CCR landfill located near Ottumwa, Iowa (**Figure 1**). OML accepted waste during the 2022 to 2023 period covered by this report. The amount of CCR accepted during this period is provided in the Annual Facility Inspection Summary (**Appendix F**). A site plan is shown on **Figure 2**.

The southern portion of the landfill was developed in a former clay mine pit. Mining operations included the excavation of the unconsolidated clay material and approximately 40 feet of shale from the pit. Spoils from the mining operation, including both unconsolidated material and shale, were stockpiled to the east, west, and south of the existing CCR landfill. Collapsed underground coal mines appear to exist in the southeastern and northwestern portions of the property, outside the active filling area. More details regarding the Site geology can be obtained in the Hydrogeological Investigation Reports prepared by Montgomery Watson in May 1994 (Montgomery Watson, 1994) and by SCS in August 2013 (SCS, 2013).

Expansion construction began at the Site in March 2014, following the issuance of Amendment #6 to Permit #90-SDP-08-92P, issued February 28, 2014. The Phase 1 Liner Construction Documentation Report was approved by the Iowa Department of Natural Resources (IDNR) on January 12, 2016, and CCR disposal in Phase 1 of the expansion began in October 2016. Monitoring wells associated with Phase 1 of the landfill expansion were added to the groundwater sampling program in September 2015. The sampling program is summarized in **Table 1**. Additional parameters were included in the August 2023 monitoring event as outlined in communications with IDNR prior to the sampling event, including the Recommended Assessment Steps document submitted to IDNR on June 30, 2023.

1.2 SITE HYDROGEOLOGY

1.2.1 Geology

The Site geology consists of unconsolidated deposits of loess and till (generally silt and clay), which overlie the Pennsylvanian shale. The unconsolidated material and up to 40 feet of shale were removed from the original landfill area during historic clay mining operations at the Site. The base of the landfill is within the Pennsylvanian shale. Mississippian limestone and sandstone underlie the Pennsylvanian shale. Coal beds are present within the Pennsylvanian shale, and evidence of historical underground mining of these coal beds has been observed at the OML site. The Pennsylvanian shale is considered to be a confining unit, and the Mississippian limestone and sandstone unit is considered to be the uppermost aquifer in the area.

More detailed descriptions of the regional and local geology are provided by the Hydrogeological Investigation Reports prepared by Montgomery Watson in May 1994 (Montgomery Watson, 1994) and SCS in August 2013 (SCS, 2013).

1.2.2 Hydrogeology/Groundwater Flow Conditions

Groundwater and surface water levels were measured during April and August 2023, as shown in **Table 2**. The groundwater levels during the August event were measured prior to purging the wells for sampling. The groundwater and surface water elevation data are included in **Table 4A**. The April and

August 2023 water level data were used to create water table and potentiometric surface maps (**Figure 3** through **Figure 6**). Flow directions were consistent with historical data.

The shallow groundwater flow direction within the landfill area in April and August 2023 was generally inward toward the southern portion of the Existing Landfill. Shallow groundwater flow in the area of the Existing Landfill and Expansion Phase 1 is influenced by the landfill's underdrain system. In the northwestern portion of the Site, which has not been developed, the shallow groundwater flow direction is strongly influenced by topography. The Site appears to be located on a groundwater divide in the Pennsylvanian unit, with flow on the western portion of the Site generally to the west and flow on the eastern portion of the Site generally to the southeast.

Vertical groundwater flow gradients were calculated for the several well nests at the Site. The calculated gradients are shown in **Table 4B**. The calculated vertical gradients for April and August 2023 are consistent with historical gradients.

- Vertical gradients at most well pairs were downward in April and August 2023.
- The vertical gradient at MW-116P/MW-116M was weakly upward in April and August 2023.

2.0 SAMPLING STATUS SUMMARY

The IDNR 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** depicts the monitoring network for OML.

Field sheets from the August 2023 sampling event are included in **Appendix A.** Sampling completed in 2018 through 2023 and anticipated sampling for 2024 are summarized in **Table 2.** The laboratory analytical report for the August 2023 sampling event is included in **Appendix B.** Groundwater chemistry summary tables for sampling performed before 2020 are included in **Appendix C.** Summary tables of groundwater chemistry data for sampling performed since transitioning to unfiltered sampling in 2017 are included with the statistical analysis in **Appendix D.**

2023 was the first year in which parameters calcium, lithium, molybdenum, and total suspended solids (TSS) were reported for all monitoring wells, surface water monitoring points, and leachate sampling points in the AWQR, as requested by IDNR. Additionally, field parameters dissolved oxygen (DO) and oxidation-reduction potential (ORP) are included in the tables of this AWQR for the first 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. 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.

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

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.*

Water levels are measured twice annually at the Site, in April and August. The screens of several shallow monitoring wells were submerged in April and/or August 2023 as shown in Table 4A. Vertical gradients at well nests are presented in Table 4B. The locations and depths of the wells continue to be acceptable for monitoring the Site.

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.*

As described in Section 1.2.2, comparison of the 2023 groundwater contour maps and calculated vertical gradients to previous data indicates that the April and August 2023 groundwater flow conditions are consistent with historical conditions. Shallow groundwater flow at the Site is strongly influenced by the landfill's underdrain system and the Site's topography.

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

Well depths measured during April and August 2023 in all wells that do not contain dedicated pumps are summarized in Table 4A. The maximum discrepancy between the measured total depth and as-installed total depth was less than 1 foot in all wells except MW-6, MW-110P, MW-116M, MW-117, and MW-122P. At MW-117, the April and August 2023 measurements were more than 1 foot shallower than the as-installed depth. At MW-6, MW-110P, MW-116M, and MW-117, one total depth measurement collected in 2023 was over 1 foot deeper than the as-installed depth, and the other measurement in 2023 was within 1 foot of the as-installed depth. At MW-122P, both the April and August 2023 measurements were over 1 foot deeper than the as-installed depth. It appears that discrepancies between measured depths and as-installed depths are due to measurement error and/or the difficulty of accurately measuring total depth of deep wells with a flexible water level tape, and siltation is not 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 IDNR in a letter dated April 1, 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.

3.1 WELL MAINTENANCE RECOMMENDATIONS

No well maintenance activities are recommended based on observations during the 2023 sampling 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 dedicated low-flow pumps. Samples are not field filtered. A water level measurement tape is the only down-hole equipment used in multiple wells and 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.

Monitoring well MW-17 and leachate headwell LP-1 were not sampled in August 2023 because they were dry during the sampling event. Surface water monitoring points SW-1, SW-2, SW-4, and SW-5, and groundwater underdrain monitoring points GU-1, GU-2, and GU-EX were not sampled in August 2023 because they were either dry or insufficient water was present for sample collection.

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. No detections were reported for the August 2023 field blank sample, with the exception of boron, calcium, and lead at concentrations below the method reporting limits. No detections were reported in the method blanks.

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), LCS duplicate (LCSD), matrix spike (MS), and MS duplicate (MSD). LCS/LCSD samples assess the accuracy of analytical procedures by checking the ability to recover constituents added to clean aqueous matrices. MS/MSD samples check the ability to recover constituents added to the sample matrix. Because the QC samples are run by the laboratory on a per-batch basis and a batch may include other projects, the MS/MSD results run with the batch are included in the laboratory report only if the sample used for the MS/MSD originated in the OML project.

For the analysis of the August 2023 samples, LCS, MS, and MSD results reported in the analytical laboratory report were within applicable 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 or other issues identified during the data review.

5.0 COMPARISON TO STANDARDS

5.1 STATISTICAL ANALYSIS

Statistical analysis is completed for the Site on an annual basis. The 2023 Annual Statistical Summary Report is included in **Appendix D**, including a summary table of data used for the statistical analysis of each parameter. **Table 5** provides the background and GWPS summary for the Site.

Groundwater samples collected in 2023 were unfiltered, in accordance with the variance to 567-103.1(2)f granted on July 20, 2017, and the conditions of the landfill permit renewal dated July 21, 2017. The 2023 sampling event was the seventh round of unfiltered samples collected at the Site, and 2023 was the fourth reporting period during which the statistical approach described below 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, with monitoring well MW-1/1R used as the background well for the shallow unit and MW-102P used as the background well for the mid-depth Pennsylvanian unit. Monitoring results from the downgradient wells were compared to the UPLs to evaluate whether a Statistically Significant Increase (SSI) over background has occurred. UPL calculations were completed in 2023 using the seven 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 MCL if one exists; otherwise, the Iowa SWS for protected groundwater was used. 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 2023 RESULTS

Table 6 is a summary of monitoring points/detected constituents from the 2023 sampling event 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 2017, the first year during which unfiltered samples were collected at the Site. Table 8 does not identify SSIs prior to 2020, as this was the first year UPLs were calculated.

Due to the limited number of sampling events completed since transitioning to unfiltered sampling, trend analyses for wells and parameters with regulatory standard exceedances were not performed. Trend analyses will be performed when at least eight sampling events have been completed. Visual inspection of the time series plots in Appendix D indicates that most parameter concentrations appear to be relatively stable.

5.3 STANDARDS HISTORY

The standards for 2020 through 2023 are summarized in Table 9. Graphs of standards history were not prepared because this is only the fourth year that UPL calculations have been completed since the transition to unfiltered sampling and the change in statistical method. Graphs will be added in future AWQRs.

6.0 SUMMARY OF FINDINGS FOR GROUNDWATER

This was the fourth year that the new statistical approach using UPLs was implemented; results have only been compared to the UPLs for the current year. The UPL exceedances noted for 2023 were generally similar to the UPL exceedances in 2022 and to results flagged as being above background using the previous method (mean plus two standard deviations).

Comparison of the 2023 results to the GWPSs indicated no new GWPS exceedances. GWPS exceedances in 2023 were:

- Shallow wells:
  - Cobalt above the SWS at MW-15R and MW-108
  - Manganese above the SWS at wells MW-15R and MW-108

- Mid-depth Pennsylvanian wells:
  - None

Lithium concentrations at all sampled monitoring wells in August 2023 exceeded the GWPS (14 µg/L). Because this was the first sampling event in which lithium was included, background concentrations have not yet been calculated. However, the widespread nature of lithium GWPS exceedances and the fact that the highest detected lithium concentrations was at background

Pennsylvanian well MW-102P indicate that elevated lithium concentrations occur naturally at the Site.

MW-17 was not sampled in August 2022 and August 2023 because it was dry during the sampling event, but the results for the August 2021 event indicated that concentrations of cobalt and manganese exceeded the SWS. MW-17 was installed in an unconventional manner, in a trench adjacent to the sedimentation basin rather than installed in a boring like a typical monitoring well. Based on this unusual construction MW-17 may not be providing representative or useful data in the context of groundwater monitoring at the Site.

The two shallow wells with cobalt and manganese exceedances are screened within the Pennsylvanian shale. As shown on **Figures 3** and **5**, both are upgradient of the landfill. The cobalt and manganese GWPS exceedances at MW-15R and MW-108 may reflect natural variation within the shale and/or impacts related to the presence of coal and historic coal mining activities.

TSS was added to the monitoring program in 2023. Measured TSS was below 5 mg/L in all monitoring well samples except MW-14 and MW-101R, and elevated TSS is not correlated with GWPS exceedances for metals. At the two wells with GWPS exceedances in 2023, MW-15R and MW-108, TSS results were 1.5 mg/L and 4.2 mg/L, respectively. Dedicated low flow pumps are used at the Site to minimize sample turbidity at monitoring wells to the extent practicable.

Calcium, lithium, and molybdenum were added to the monitoring program for 2023. Per email communication received from IDNR on March 29, 2023, newly-detected parameters will be added to the monitoring program at the site. Calcium, lithium, and molybdenum were all detected at multiple wells in August 2023. There is no applicable GWPS for calcium. Lithium concentrations are discussed above, and all detected molybdenum concentrations were below the applicable GWPS.

7.0 ADDITIONAL REPORTING

7.1 ANNUAL INSPECTION AND LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION

The 2023 Annual Facility Inspection Summary and Leachate Control System Performance Evaluation is included in **Appendix F.**

7.2 OTHER MONITORING POINTS

7.2.1 Surface Water Monitoring

Surface water monitoring points SW-1R, SW-2R, and SW-4 were dry during the August 2023 sampling event (**Table 4A**). SW-5 had insufficient water for sample collection. SW-3 was sampled in August 2023. Analytical results for SW-3 were consistent with historical results and are included in **Table 10**.

7.2.2 Leachate Collection System

A sample was voluntarily collected from the leachate storage lagoon during the August 2023 sampling event. The leachate storage lagoon is located on the south side of 130th Street. The Phase 1 and 2 Temporary Contact Water Basin (TCB-1/2) was also sampled in August 2023.

Results for the 2023 leachate samples were consistent with historical results and are included in **Table 10**. Historic analytical results for leachate sample results are included in **Appendix C** and **Appendix E.**

7.2.3 Underdrain System

Sample collection was attempted at the active landfill underdrain system (GU-EX), the Phase 1 Expansion underdrain system (GU-1 [Temporary]), and underdrain monitoring point GU-2 [Temporary]). These three sampling points were dry or did not produce sufficient water for sample collection in August 2023.

8.0 RECOMMENDATIONS

SCS recommends that the current monitoring program be continued during 2024, with the addition of calcium, lithium, molybdenum, and total suspended solids to the monitoring program. Based on communication with IDNR following submittal of the 2022 AWQR, these parameters were to be added to the ongoing sampling program if they were detected during the 2023 sampling event.

SCS additionally recommends that copper and zinc be considered for removal from the monitoring program. This recommendation was made in the 2022 Annual Water Quality Report Comment Response – Additional Assessment Steps, submitted to IDNR on June 30, 2023. IDNR responded on October 31, 2023, and requested that copper and zinc be included for leachate sampling points only during the 2023 monitoring event. The August 2023 sampling event had been completed and laboratory results received prior to receipt of this recommendation, therefore copper and zinc were included for all sampled points in 2023. The results were similar to previous results: copper and zinc were not detected at most monitoring points and, where they were detected, concentrations were far below applicable GWPSs.

9.0 REFERENCES

Montgomery Watson, 1994, Hydrogeological Investigation Report and Hydrologic Monitoring System Plan, Ottumwa-Midland Commercial Landfill, Ottumwa, IA, May 1994.

SCS Engineers, 2013, Proposed Landfill Expansion Soil and Hydrologic Investigation Report, Ottumwa Midland Landfill, Ottumwa, IA, September 2013.

U.S. Geological Survey, 1983, Water Resources Investigations Open File Report 82-1014, Hydrology of Area 38, Western Region, Interior Coal Province, Iowa and Missouri.

Tables

Table 1
Monitoring Program Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Monitoring Point	Formation	Current Monitoring Program	Change for Next Sampling Event	UPL Exceedances	Total # of Samples in each monitoring program since January 1, 2018
Sampled Monitoring Wells					
MW-1R*	Shallow (Unconsolidated)	Routine	NC	None	6
MW-12	Pennsylvanian Shale	Routine	NC	Chloride, Fluoride	6
MW-13	Pennsylvanian Shale	Routine	NC	Chloride	6
MW-14	Pennsylvanian Shale	Routine	NC	Arsenic, Chloride	6
MW-15R	Shallow (Unconsolidated)	Routine	NC	Boron, Cobalt, Magnesium, Manganese, Sulfate, TDS	6
MW-16R	Pennsylvanian Shale	Routine	NC	Barium, Chloride	6
MW-17	Shallow (Unconsolidated)	Routine	NC	N/A	4
MW-100R	Shallow (Unconsolidated)	Routine	NC	None	6
MW-101R	Shallow (Unconsolidated)	Routine	NC	Boron, Magnesium, Manganese, Sulfate	6
MW-102P	Pennsylvanian Shale	Routine	NC	None	6
MW-108	Shallow (Unconsolidated)	Routine	NC	Boron, Cobalt, Iron, Manganese, Zinc	6

Table 1
Monitoring Program Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
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Monitoring Point	Formation	Current Monitoring Program	Change for Next Sampling Event	UPL Exceedances	Total # of Samples in each monitoring program since January 1, 2018
Water Level Only Monitoring Wells					
MW-5	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-6	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-8	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-9P	Pennsylvanian Shale	Routine	NC	N/A	Water levels only
MW-9M	Mississippian Limestone	Routine	NC	N/A	Water levels only
MW-10R	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-11R	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-102	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-102M	Mississippian Limestone	Routine	NC	N/A	Water levels only
MW-107	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-110	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-110P	Pennsylvanian Shale	Routine	NC	N/A	Water levels only
MW-111	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-112	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-115	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-116	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-116P	Pennsylvanian Shale	Routine	NC	N/A	Water levels only
MW-116M	Mississippian Limestone	Routine	NC	N/A	Water levels only
MW-117	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-122	Shallow (Unconsolidated)	Routine	NC	N/A	Water levels only
MW-122P	Pennsylvanian Shale	Routine	NC	N/A	Water levels only
MW-122M	Mississippian Limestone	Routine	NC	N/A	Water levels only

Table 1
Monitoring Program Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
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Monitoring Point	Formation	Current Monitoring Program	Change for Next Sampling Event	UPL Exceedances	Total # of Samples in each monitoring program since January 1, 2018
Surface Water Monitoring Points					
SW-1R	N/A (Surface Water)	Routine	NC	N/A	1 (typically dry)
SW-2R	N/A (Surface Water)	Routine	NC	N/A	1 (typically dry)
SW-3	N/A (Surface Water)	Routine	NC	N/A	6
SW-4	N/A (Surface Water)	Routine	NC	N/A	2 (often dry)
SW-5	N/A (Surface Water)	Routine	NC	N/A	4
Other monitoring points					
Underdrain Wet Well/Pumping Station (GU-EX)	N/A (Underdrain)	Routine	NC	N/A	5
GU-1 Temp	N/A (Underdrain)	Routine	NC	N/A	4
GU-2 Temp	N/A (Underdrain)	Routine	NC	N/A	1 (typically dry)
TCB-1/2	N/A (Temporary Contact Basin)	Routine	NC	N/A	6
Leachate Wet Well/ Pumping Station	N/A (Leachate)	Routine (Voluntary)	NC	N/A	1
LP-1	N/A (Leachate)	Routine (Voluntary)	NC	N/A	0 (typically dry)
Leachate Basin	N/A (Leachate)	Routine (Voluntary)	NC	N/A	6

Comments:
*: MW-1R was installed in 2019 to replace former monitoring well MW-1
N/A = Not Applicable NC = No change

Updated by MDB Date 10/31/2023
Checked by RM Date 11/1/2023

I:\25223073.00\Deliverables\2023 AWQR\Tables\[awqreport_OML - 2023.xlsx]1 - Monitoring Program Summary

Table 2
Monitoring Program Implementation Schedule
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

	Recent Sampling Dates and Constituents												Upcoming Sampling Dates and Constituents	
Monitoring Point	**4/19/2018**	**8/14/2018**	**4/16/2019**	**8/7-9/2019**	**5/20-21/2020***	**8/24-25/2020**	**4/12-13 & 15/2021**	**8/9-12/2021**	**4/13-14/2022**	**8/22-24/2022**	**4/3-4/2023**	**8/28-31/2023**	**April 2024**	**August 2024**
Sampled Monitoring Wells														
MW-1**	Groundwater Elevation	Not Sampled (Well Dry)	List A + Fluoride and TDS, Groundwater Elevation	Abandoned										
MW-1R**	Not Installed			List A + Fluoride and TDS, Groundwater Elevation	Groundwater Elevation	List A + Fluoride and TDS, Groundwater Elevation	Groundwater Elevation	List A + Fluoride and TDS, Groundwater Elevation	Groundwater Elevation	List A + Fluoride and TDS, Groundwater Elevation	Groundwater Elevation	List A + calcium, lithium, molybdenum, TDS, TSS, Groundwater Elevation	Groundwater Elevation	List A + Fluoride and TDS, Groundwater Elevation
MW-12 MW-13 MW-14 MW-15R MW-16R MW-17 MW-100R MW-101R MW-102P MW-108	Groundwater Elevation	List A + Fluoride and TDS, Groundwater Elevation	Groundwater Elevation											
Water Level Only Monitoring Wells														
MW-5 MW-6 MW-8 MW-9P MW-9M MW-10R MW-11R MW-102 MW-102M MW-107 MW-110 MW-110P MW-111 MW-112 MW-115 MW-116 MW-116P MW-116M MW-117 MW-122 MW-122P MW-122M	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation	Groundwater Elevation
Surface Water Monitoring Points														
SW-1R SW-2R SW-3 SW-4 SW-5	Water Level	List A + Fluoride and TDS, Water level	Water Level	List A + Fluoride and TDS, Water level	Water Level	List A + Fluoride and TDS, Water level	Water Level	List A + Fluoride and TDS, Water level	Water Level	List A + Fluoride and TDS, Water level	Water Level	List A + Ca, Li, Mo, Fluoride and TDS, Water level	Water Level	List A + Fluoride and TDS, Water level
Other monitoring points														
Underdrain Wet Well/Pumping Station (GU-EX) GU-1 Temp GU-2 Temp TCB-1/2 Leachate Wet Well/ Pumping Station (Voluntary) Leachate Lagoon (Voluntary)	--	List A + Fluoride and TDS	--	List A + Fluoride and TDS	--	List A + Fluoride and TDS	--	List A + Fluoride and TDS	--	List A + Fluoride and TDS	--	List A + Ca, Li, Mo, Fluoride and TDS	--	List A + Fluoride and TDS
LP-1 (Voluntary)	Leachate level measurements attempted during all events; point always dry												Leachate Level	

Notes:
(1): List A: Arsenic, barium, beryllium, boron, cobalt, copper, iron, lead, magnesium, manganese, selenium, zinc, sulfate, chloride, field pH, field specific conductance, field temperature, groundwater elevation, and well depth (metals reported as total). Fluoride and total dissolved solids were added in 2014.
(2): Quarterly background monitoring has not been completed at GU-2 Temp because this monitoring point has been dry during most sampling events.
*: The spring 2020 water level measurement event was delayed due to site access restrictions related to the COVID-19 pandemic.
**: MW-1R replaced MW-1 in 2019.

Updated by: RM, 10/10/2023
Checked by: LH, 10/19/2023

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Table 3
Monitoring Well Maintenance and Performance Reevaluation Schedule
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Compliance with:	Monitoring Calendar Years					
	2019	2020	2021	2022	2023	2024
567 IAC 115.21(2)a. high and low water levels (biennial)	Completed		Completed		Completed	
567 IAC 115.21(2)b. changes in the hydrologic setting and flow paths (biennial)	Completed		Completed		Completed	
567 IAC 115.21(2)c. well depths (annual)*	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 April 1, 1999. (Note: 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: RM, 10/3/2023
Checked by: LH, 10/16/2023

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Table 4A
Monitoring Well Maintenance and Performance Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Top of Casing	Top of Screen	Total Depth	Monitoring Parameter	Date of Measurements		Maximum Depth Discrepancy (ft) [1]
					April 3-4, 2023	August 28-31, 2023	
MW-1R	823.31	814.01	24.30	Groundwater Level (ft)	5.95	12.57	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	817.36	810.74	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	N	
MW-5	784.31	737.88	56.43	Groundwater Level (ft)	48.51	49.20	0.21
				Groundwater Elevation (Ft MSL)	735.80	735.11	
				Measured Well Depth (ft)	56.22	56.37	
				Submerged screen	N	N	
MW-6	797.03	786.71	25.32	Groundwater Level (ft)	12.23	15.83	-1.08
				Groundwater Elevation (Ft MSL)	784.8	781.20	
				Measured Well Depth (ft)	26.19	26.40	
				Submerged screen	N	N	
MW-8	804.96	794.56	20.40	Groundwater Level (ft)	16.66	16.72	0.14
				Groundwater Elevation (Ft MSL)	788.3	788.24	
				Measured Well Depth (ft)	20.26	20.28	
				Submerged screen	N	N	
MW-9P	789.78	701.87	92.91	Groundwater Level (ft)	65.94	66.94	-0.33
				Groundwater Elevation (Ft MSL)	723.84	722.84	
				Measured Well Depth (ft)	93.24	92.90	
				Submerged screen	Y	Y	
MW-9M	789.80	638.72	156.08	Groundwater Level (ft)	93.5	92.87	-0.85
				Groundwater Elevation (Ft MSL)	696.30	696.93	
				Measured Well Depth (ft)	156.93	156.23	
				Submerged screen	Y	Y	
MW-10R	788.56	763.06	40.30	Groundwater Level (ft)	28.82	30.65	0.16
				Groundwater Elevation (Ft MSL)	759.74	757.91	
				Measured Well Depth (ft)	40.21	40.14	
				Submerged screen	N	N	

Table 4A
Monitoring Well Maintenance and Performance Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Top of Casing	Top of Screen	Total Depth	Monitoring Parameter	Date of Measurements		Maximum Depth Discrepancy (ft) [1]
					April 3-4, 2023	August 28-31, 2023	
MW-11R	779.96	764.16	30.80	Groundwater Level (ft)	12.21	15.41	-0.31
				Groundwater Elevation (Ft MSL)	767.75	764.55	
				Measured Well Depth (ft)	31.11	30.6	
				Submerged screen	Y	Y	
MW-12	822.43	701.71	125.72	Groundwater Level (ft)	98.79	99.72	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	723.64	722.71	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	Y	
MW-13	762.48	724.08	48.40	Groundwater Level (ft)	38.86	40.15	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	723.62	722.33	
				Measured Well Depth (ft)	--	--	
				Submerged screen	N	N	
MW-14	761.02	723.04	47.98	Groundwater Level (ft)	37.17	38.60	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	723.85	722.42	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	N	
MW-15R	808.49	765.79	57.70	Groundwater Level (ft)	47.73	47.81	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	760.76	760.68	
				Measured Well Depth (ft)	--	--	
				Submerged screen	N	N	
MW-16R	814.13	724.13	105.00	Groundwater Level (ft)	90.34	91.61	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	723.79	722.52	
				Measured Well Depth (ft)	--	--	
				Submerged screen	N	N	
MW-17	760.63	746.01	19.62	Groundwater Level (ft)	12.79	DRY	0.39
				Groundwater Elevation (Ft MSL)	747.84	--	
				Measured Well Depth (ft)	19.23	--	
				Submerged screen	Y	N	

Table 4A
Monitoring Well Maintenance and Performance Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Top of Casing	Top of Screen	Total Depth	Monitoring Parameter	Date of Measurements		Maximum Depth Discrepancy (ft) [1]
					April 3-4, 2023	August 28-31, 2023	
MW-100R	822.40	809.65	27.90	Groundwater Level (ft)	11.57	15.95	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	810.83	806.45	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	N	
MW-101R	799.35	785.35	29.00	Groundwater Level (ft)	14.16	16.70	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	785.19	782.65	
				Measured Well Depth (ft)	--	--	
				Submerged screen	N	N	
MW-102	797.24	782.80	29.70	Groundwater Level (ft)	16.22	17.49	0.24
				Groundwater Elevation (Ft MSL)	781.02	779.75	
				Measured Well Depth (ft)	29.46	29.47	
				Submerged screen	N	N	
MW-102P	797.64	700.10	103.20	Groundwater Level (ft)	73.52	74.44	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	724.12	723.2	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	Y	
MW-102M	798.03	652.65	152.10	Groundwater Level (ft)	96.10	78.04	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	701.93	719.99	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	Y	
MW-107	788.50	776.75	26.80	Groundwater Level (ft)	19.24	19.63	0.05
				Groundwater Elevation (Ft MSL)	769.26	768.87	
				Measured Well Depth (ft)	26.82	26.75	
				Submerged screen	N	N	
MW-108	765.57	746.62	27.70	Groundwater Level (ft)	23.88	24.8	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	741.69	740.77	
				Measured Well Depth (ft)	--	--	
				Submerged screen	N	N	

Table 4A
Monitoring Well Maintenance and Performance Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Top of Casing	Top of Screen	Total Depth	Monitoring Parameter	Date of Measurements		Maximum Depth Discrepancy (ft) [1]
					April 3-4, 2023	August 28-31, 2023	
MW-110	760.39	737.92	37.60	Groundwater Level (ft)	17.35	21.69	-0.30
				Groundwater Elevation (Ft MSL)	743.04	738.7	
				Measured Well Depth (ft)	37.90	37.35	
				Submerged screen	Y	Y	
MW-110P	760.23	689.67	74.80	Groundwater Level (ft)	35.87	36.13	-1.28
				Groundwater Elevation (Ft MSL)	724.36	724.10	
				Measured Well Depth (ft)	76.08	74.84	
				Submerged screen	Y	Y	
MW-111	787.38	760.05	42.70	Groundwater Level (ft)	33.88	40.87	0.34
				Groundwater Elevation (Ft MSL)	753.50	746.51	
				Measured Well Depth (ft)	42.84	42.36	
				Submerged screen	N	N	
MW-112	811.93	799.55	27.90	Groundwater Level (ft)	23.91	24.19	0.56
				Groundwater Elevation (Ft MSL)	788.02	787.74	
				Measured Well Depth (ft)	27.40	27.34	
				Submerged screen	N	N	
MW-115	752.44	740.59	27.40	Groundwater Level (ft)	23.41	25.32	0.53
				Groundwater Elevation (Ft MSL)	729.03	727.12	
				Measured Well Depth (ft)	26.97	26.87	
				Submerged screen	N	N	
MW-116	742.47	729.98	27.70	Groundwater Level (ft)	13.09	16.55	-0.07
				Groundwater Elevation (Ft MSL)	729.38	725.92	
				Measured Well Depth (ft)	27.77	27.70	
				Submerged screen	N	N	
MW-116P	742.33	695.7	51.70	Groundwater Level (ft)	18.79	19.68	-0.69
				Groundwater Elevation (Ft MSL)	723.54	722.65	
				Measured Well Depth (ft)	52.39	51.51	
				Submerged screen	Y	Y	

Table 4A
Monitoring Well Maintenance and Performance Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Top of Casing	Top of Screen	Total Depth	Monitoring Parameter	Date of Measurements		Maximum Depth Discrepancy (ft) [1]
					April 3-4, 2023	August 28-31, 2023	
MW-116M	742.25	640.06	107.20	Groundwater Level (ft)	18.37	18.89	-1.92
				Groundwater Elevation (Ft MSL)	723.88	723.36	
				Measured Well Depth (ft)	109.12	107.35	
				Submerged screen	Y	Y	
MW-117	780.77	769.96	28.70	Groundwater Level (ft)	21.62	21.97	1.20
				Groundwater Elevation (Ft MSL)	759.15	758.80	
				Measured Well Depth (ft)	27.63	27.50	
				Submerged screen	N	N	
MW-122	794.02	765.84	43.80	Groundwater Level (ft)	7.91	18.82	0.40
				Groundwater Elevation (Ft MSL)	786.11	775.2	
				Measured Well Depth (ft)	43.84	43.40	
				Submerged screen	Y	Y	
MW-122P	794.74	665.65	104.70	Groundwater Level (ft)	70.77	71.75	-1.20
				Groundwater Elevation (Ft MSL)	723.97	722.99	
				Measured Well Depth (ft)	105.90	105.80	
				Submerged screen	Y	Y	
MW-122M	792.54	642.94	155.30	Groundwater Level (ft)	85.80	90.93	Not Measured (dedicated pump in well)
				Groundwater Elevation (Ft MSL)	706.74	701.61	
				Measured Well Depth (ft)	--	--	
				Submerged screen	Y	Y	
SW-01R	NA	NA	NA	Surface Water Depth (ft)	--	DRY	--
SW-02R	NA	NA	NA	Surface Water Depth (ft)	--	DRY	--
SW-03	NA	NA	NA	Surface Water Depth (ft)	--	DRY	--
SW-04	NA	NA	NA	Surface Water Depth (ft)	--	3	--
SW-05	NA	NA	NA	Surface Water Depth (ft)	--	DRY	--

Comments:
(1) 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. Depths are checked when pumps are pulled for maintenance or replacement.

Updated by RM Date: 10/10/2023
Checked by LH Date: 10/19/2023

Table 4B
Vertical Gradients
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

	Well Pair		Vertical Hydraulic Gradient (feet/foot)(1)	
	Shallower Well	**Deeper Well**	**April 2023**	**August 2023**
Water Table & Pennsylvanian Wells	MW-1R	MW-12	-0.860	-0.833
	MW-10R	MW-9P	-0.657	-0.653
	MW-102	MW-102P	-0.736	-0.737
	MW-110	MW-110P	-0.415	-0.341
	MW-116	MW-116P	-0.202	-0.120
	MW-122	MW-122P	-0.822	-0.744
Pennsylvanian & Mississippian Wells	MW-9P	MW-9M	-0.436	-0.410
	MW-102P	MW-102M	-0.474	-0.069
	MW-116P	MW-116M	0.006	0.013
	MW-122P	MW-122M	-0.331	-0.410

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

Updated by: RM Date: 10/10/2023
Checked by: LH Date: 10/10/2023

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Table 5
Background Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Interwell Background								
Constituent	**Units**	**Samples**	**Detections**	**UPL**	**Statistical Test**	**GWPS**	**Source**	**Other Standards**
Shallow Hydrogeologic Unit - MW-1/MW-1R								
Field pH	SU	7	7	N/A	N/A	none	--	SMCL <6.5 or >8.5
Field Temperature	deg C	7	7	N/A	N/A	none	--	--
Field Specific Conductance	µmhos/cm	7	7	N/A	N/A	none	--	--
Field Oxidation Potential	mV	1	1*	N/A	N/A	none	--	--
Dissolved Oxygen	mg/L	1	1*	N/A	N/A	none	--	--
Arsenic	µg/l	7	1	0.880	PL(NP)	10.00	MCL	--
Barium	µg/l	7	7	95.60	PL(P)	2,000	MCL	--
Beryllium	µg/l	7	1	DQ	DQ	4.00	MCL	--
Boron	µg/l	7	4	129	PL(P)	6,000	SWS	--
Calcium	mg/L	1	1	N/A	N/A	none	--	--
Cobalt	µg/l	7	3	0.370	PL(NP)	2.1	SWS	--
Copper	µg/l	7	3	2.10	PL(NP)	1,300	SWS	SMCL 1,000
Iron	µg/l	7	4	665	PL(P)	none	--	SMCL 300
Lead	µg/l	7	4	1.32	PL(P)	15.00	SWS	--
Lithium	µg/l	1	1	N/A	N/A	14	SWS	--
Magnesium	µg/l	7	7	48,100	PL(NP)	none	--	--
Manganese	µg/l	7	4	33	PL(P)	300	SWS	SWS 300, SMCL 50
Molybdenum	µg/l	1	1	N/A	N/A	40	SWS	--
Selenium	µg/l	7	5	3.45	PL(P)	50	MCL	--
Zinc	µg/l	7	1	10.00	PL(NP)	2,000	SWS	SMCL 5,000
Chloride	mg/L	7	7	287	PL(P)	none	--	SMCL 250
Fluoride	mg/L	7	6	1.1	PL(P)	4.00	MCL	SMCL 2
Sulfate	mg/L	7	7	483	PL(P)	none	--	SMCL 250
Total Dissolved Solids	mg/L	7	7	1,130	PL(P)	none	--	SMCL 500
Total Suspended Solids	mg/L	1	1	N/A	N/A	none	--	--

Table 5
Background Summary
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Interwell Background								
Constituent	**Units**	**Samples**	**Detections**	**UPL**	**Statistical Test**	**GWPS**	**Source**	**Other Standards**
Pennsylvanian Shale Hydrogeologic Unit - MW-102P								
Field pH	SU	7	7	N/A	N/A	none	--	SMCL <6.5 or >8.5
Field Temperature	deg C	7	7	N/A	N/A	none	--	--
Field Specific Conductance	µmhos/cm	7	7	N/A	N/A	none	--	--
Field Oxidation Potential	mV	1	1*	N/A	N/A	none	--	--
Dissolved Oxygen	mg/L	1	1*	N/A	N/A	none	--	--
Arsenic	µg/l	7	2	0.880	PL(NP)	10.00	MCL	--
Barium	µg/l	7	7	28	PL(P)	2,000	MCL	--
Beryllium	µg/l	7	1	1.30	PL(NP)	4.00	MCL	--
Boron	µg/l	7	7	2,190	PL(P)	6,000	SWS	--
Calcium	mg/L	1	1	N/A	N/A	none	--	--
Cobalt	µg/l	7	7	1.6	PL(P)	2.1	SWS	--
Copper	µg/l	7	2	2.70	PL(NP)	1,300	SWS	SMCL 1,000
Iron	µg/l	7	7	5,500	PL(NP)	none	--	SMCL 300
Lead	µg/l	7	2	1.10	PL(NP)	15.00	SWS	--
Lithium	µg/l	1	1	N/A	N/A	14	SWS	--
Magnesium	µg/l	7	7	206,000	PL(P)	none	--	--
Manganese	µg/l	7	7	755	PL(P)	755	Background	SWS 300, SMCL 50
Molybdenum	µg/l	1	1	N/A	N/A	40	SWS	--
Selenium	µg/l	7	0	DQ	DQ	50	MCL	--
Zinc	µg/l	7	4	23.1	PL(P)	2,000	SWS	SMCL 5,000
Chloride	mg/L	7	7	9.63	PL(P)	none	--	SMCL 250
Fluoride	mg/L	7	5	1.06	PL(P)	4.00	MCL	SMCL 2
Sulfate	mg/L	7	7	2,200	PL(P)	none	--	SMCL 250
Total Dissolved Solids	mg/L	7	7	3,510	PL(P)	none	--	SMCL 500
Total Suspended Solids	mg/L	1	1	N/A	N/A	none	--	--

PL(NP) - Prediction Limit (Non-Parametric)
PL(P) - Prediction Limit (Parametric)
MCL - Maximum Contaminant Level
SWS - Statewide Standard for Groundwater
SMCL - Secondary Maximum Contaminant Level
GWPS - Groundwater Protection Standard
DQ - Double Quantification

Notes:

* = Field parameters ORP and DO have been collected historically as part of stability requirements for low-flow sampling, but were not reported in AWQRs prior to 2023.

Updated by RM Date 10/10/2023
Checked by LH Date 10/16/2023

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Table 6
Summary of Well/Detected Constituent Pairs With No SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL
MW-1R	Field pH	SU	7.09	N/A
	Field Temperature	deg C	14.9	N/A
	Field Specific Conductance	µmhos/cm	794	N/A
	Field Oxidation Potential	mV	66.7	N/A
	Dissolved Oxygen	mg/L	1.29	N/A
	Barium	µg/l	75	95.6
	Beryllium	µg/l	0.40 J	DQ
	Calcium	mg/L	100	N/A
	Lead	µg/l	0.29 J, B	1.32
	Lithium	µg/l	31	N/A
	Magnesium	µg/l	29000	48100
	Molybdenum	µg/l	1.8 J	N/A
	Selenium	µg/l	2.6 J	3.45
	Chloride	mg/L	26	287
	Fluoride	mg/L	0.40 J	1.1
	Sulfate	mg/L	60	483
	Total Dissolved Solids	mg/L	530	1130
	Total Suspended Solids	mg/L	7.4	N/A
MW-12	Field pH	SU	7.80	N/A
	Field Temperature	deg C	15.3	N/A
	Field Specific Conductance	µmhos/cm	2651	N/A
	Field Oxidation Potential	mV	16.10	N/A
	Dissolved Oxygen	mg/L	2.96	N/A
	Barium	µg/l	18	28
	Boron	µg/l	1,200	2190
	Calcium	mg/L	15	N/A
	Lead	µg/l	0.3 J	1.1
	Lithium	µg/l	110	N/A
	Magnesium	µg/l	6500	206000
	Manganese	µg/l	50	755
	Molybdenum	µg/l	2.7	N/A
	Selenium	µg/l	1.4 J	DQ
	Sulfate	mg/L	810.0	2200
	Total Dissolved Solids	mg/L	1800	3510
	Total Suspended Solids	mg/L	1.8 J	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL
MW-13	Field pH	SU	7.00	N/A
	Field Temperature	deg C	16.30	N/A
	Field Specific Conductance	µmhos/cm	3242	N/A
	Field Oxidation Potential	mV	53.70	N/A
	Dissolved Oxygen	mg/L	0.57	N/A
	Barium	µg/l	19.00	28
	Boron	µg/l	1,700	2190
	Calcium	mg/L	110	N/A
	Cobalt	µg/l	1.3	1.6
	Lead	µg/l	0.37 J	1.1
	Lithium	µg/l	170	N/A
	Magnesium	µg/l	54000	206000
	Manganese	µg/l	260	755
	Fluoride	mg/L	0.70 J	1.06
	Sulfate	mg/L	1400.00	2200
	Total Dissolved Solids	mg/L	2,100	3510
MW-14	Field pH	SU	7.12	N/A
	Field Temperature	deg C	14.20	N/A
	Field Specific Conductance	µmhos/cm	2904	N/A
	Field Oxidation Potential	mV	66.10	N/A
	Dissolved Oxygen	mg/L	0.66	N/A
	Barium	µg/l	22.00	28
	Boron	µg/l	1,700	2190
	Calcium	mg/L	67.0	N/A
	Cobalt	µg/l	0.5	1.6
	Lead	µg/l	0.34 J	1.1
	Lithium	µg/l	140	N/A
	Magnesium	µg/l	31,000	206000
	Manganese	µg/l	140	755
	Molybdenum	µg/l	11	N/A
	Fluoride	mg/L	0.75 J	1.06
	Sulfate	mg/L	810	2200
	Total Dissolved Solids	mg/L	1800	3510
	Total Suspended Solids	mg/L	9.0	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL
MW-15R	Field pH	SU	6.32	N/A
	Field Temperature	deg C	18.4	N/A
	Field Specific Conductance	µmhos/cm	2287	N/A
	Field Oxidation Potential	mV	50.9	N/A
	Dissolved Oxygen	mg/L	0.58	N/A
	Barium	µg/l	31	95.6
	Calcium	mg/L	300	N/A
	Iron	µg/l	540	665
	Lead	µg/l	0.48 J	1.32
	Lithium	µg/l	85	N/A
	Molybdenum	µg/l	4.9	N/A
	Chloride	mg/L	9.2	287
	Total Suspended Solids	mg/L	1.5 J	N/A
MW-16R	Field pH	SU	6.87	N/A
	Field Temperature	deg C	14.6	N/A
	Field Specific Conductance	µmhos/cm	3188	N/A
	Field Oxidation Potential	mV	-10.4	N/A
	Dissolved Oxygen	mg/L	0.52	N/A
	Boron	µg/l	1,800	2190
	Calcium	mg/L	74	N/A
	Cobalt	µg/l	0.99	1.6
	Iron	µg/l	320	5500
	Lead	µg/l	0.36 J	1.1
	Lithium	µg/l	110	N/A
	Magnesium	µg/l	36,000	206000
	Manganese	µg/l	260	755
	Selenium	µg/l	1.8 J	DQ
	Fluoride	mg/L	0.46 J	1.06
	Sulfate	mg/L	960	2200
	Total Dissolved Solids	mg/L	2200	3510
	Total Suspended Solids	mg/L	2.4	N/A

Table 6

Summary of Well/Detected Constituent Pairs With No SSIs

2023 Annual Water Quality Report

Ottumwa Midland Landfill

Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL
MW-100R	Field pH	SU	7.17	N/A
	Field Temperature	deg C	14.8	N/A
	Field Specific Conductance	µmhos/cm	938	N/A
	Field Oxidation Potential	mV	80.2	N/A
	Dissolved Oxygen	mg/L	4.45	N/A
	Barium	µg/l	50	95.6
	Calcium	mg/L	120	N/A
	Copper	µg/l	1.8 J	2.1
	Lead	µg/l	0.24 J	1.32
	Lithium	µg/l	19	N/A
	Magnesium	µg/l	35000	48,100
	Molybdenum	µg/l	2.7	N/A
	Selenium	µg/l	1.4 J	3.45
	Chloride	mg/L	32	287
	Sulfate	mg/L	190	483
	Total Dissolved Solids	mg/L	600	1130
	Total Suspended Solids	mg/L	1.4 J	N/A
MW-101R	Field pH	SU	6.90	N/A
	Field Temperature	deg C	13.8	N/A
	Field Specific Conductance	µmhos/cm	1,364	N/A
	Field Oxidation Potential	mV	80.1	N/A
	Dissolved Oxygen	mg/L	0.36	N/A
	Barium	µg/l	47	95.6
	Calcium	mg/L	200	N/A
	Cobalt	µg/l	0.34 J	0.37
	Iron	µg/l	130	665
	Lead	µg/l	0.44 J	1.32
	Lithium	µg/l	75	N/A
	Molybdenum	µg/l	6.3	N/A
	Selenium	µg/l	4.1 J	3.45
	Chloride	mg/L	6.9	287
	Fluoride	mg/L	0.42 J	1.1
	Total Dissolved Solids	mg/L	1000	1130
	Total Suspended Solids	mg/L	15	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL
MW-102P	Field pH	SU	6.38	N/A
	Field Temperature	deg C	14.3	N/A
	Field Specific Conductance	µmhos/cm	3037	N/A
	Field Oxidation Potential	mV	-11.4	N/A
	Dissolved Oxygen	mg/L	0.53	N/A
	Barium	µg/l	25	28
	Boron	µg/l	1400	2190
	Calcium	mg/L	380	N/A
	Cobalt	µg/l	0.87	1.6
	Copper	µg/l	2.7 J	2.7
	Iron	µg/l	3400	5500
	Lead	µg/l	0.27 J B	1.1
	Lithium	µg/l	220	N/A
	Magnesium	µg/l	120000	206000
	Manganese	µg/l	340	755
	Zinc	µg/l	6.9 J	23.1
	Chloride	mg/L	9.5	9.63
	Fluoride	mg/L	0.58 J	1.06
	Sulfate	mg/L	1500	2200
	Total Dissolved Solids	mg/L	2600	3510
	Total Suspended Solids	mg/L	8.5	N/A

Table 6
Summary of Well/Detected Constituent Pairs With No SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL
MW-108	Field pH	SU	6.32	N/A
	Field Temperature	deg C	14.6	N/A
	Field Specific Conductance	µmhos/cm	511	N/A
	Field Oxidation Potential	mV	20.6	N/A
	Dissolved Oxygen	mg/L	0.77	N/A
	Arsenic	µg/l	1.7 J	0.88
	Barium	µg/l	34	95.6
	Calcium	mg/L	67.0	N/A
	Copper	µg/l	2 J	2.1
	Lithium	µg/l	40	N/A
	Magnesium	µg/l	13,000	48,100
	Molybdenum	µg/l	1.7 J	N/A
	Selenium	µg/l	1.9 J	3.45
	Sulfate	mg/L	140	483
	Total Dissolved Solids	mg/L	290	1130
	Total Suspended Solids	mg/L	4.2	N/A

UPL = Upper Prediction Limit
SSI = Statistically Significant Increase
ND = Non-detect
J = Estimated concentration at or above the LOD and below the LOQ.

mg/= milligrams per liter
µg/L = micrograms per liter

Comments:
1. This table provides a summary of detected constituents from the 2023 sampling event that did not exceed the UPL in 2023. The background levels listed are interwell prediction limits calculated using MW-1/1R data for the shallow aquifer and MW-102P data for the Pennsylvanian unit. UPLs were first calculated in 2020 using data from 2017 through 2020, and were updated in 2022 and 2023.
2. Results below the limit of quantitation (J flags) are estimated values and are not compared to the UPL or GWPS. They are included in this table regardless of whether the estimated value is higher or lower than the UPL.
3. MW-17 was dry during the October 2023 sampling event.

Updated by MDB — Date 10/31/2023
Checked by RM — Date 11/1/2023

Table 7
Summary of Ongoing and Newly Identified SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Well	Constituent	Units	Most Recent Result	UPL	Action Level (GWPS)
Shallow Hydrogeologic Unit					
MW-1R	Lithium	µg/L	31	N/A	14
MW-15R	Boron	µg/l	590	129	6000
	Cobalt	µg/l	4.1	0.37	2
	Lithium	µg/L	85	N/A	14
	Magnesium	µg/l	110000	48100	none
	Manganese	µg/l	840	33	300
	Sulfate	mg/L	680	483	none
	Total Dissolved Solids	mg/L	1300	1130	none
MW-100R	Lithium	µg/L	19	N/A	14
MW-101R	Boron	µg/l	620	129	6000
	Lithium	µg/l	75	N/A	14
	Magnesium	µg/l	58000	48100	none
	Manganese	mg/L	84	33	300
	Sulfate	mg/L	490	483	none
MW-108	Boron	µg/l	230	129	6000
	Cobalt	µg/l	3.5	0.37	2
	Iron	µg/l	2,200	665	none
	Lithium	µg/l	40	N/A	14
	Manganese	µg/l	620	33	300
	Zinc	µg/l	40	10	2000
Mid-Depth (Pennsylvanian) Hydrogeologic Unit					
MW-12	Chloride	mg/L	48	9.63	none
	Fluoride	mg/L	2.6	1.06	4
	Lithium	µg/L	110	N/A	14
MW-13	Chloride	mg/L	12	9.63	none
	Lithium	µg/L	170	N/A	14
MW-14	Arsenic	µg/l	2.6	0.88	10
	Chloride	mg/L	20	9.63	none
	Lithium	µg/L	140	N/A	14
MW-16R	Barium	µg/l	41	28	2000
	Chloride	mg/L	20	9.63	none
	Lithium	µg/l	110	N/A	14
MW-102P	Lithium	µg/l	220	N/A	14

UPL = Upper Prediction Limit
GWPS = Groundwater Protection Standard

mg/= milligrams per liter
µg/L = micrograms per liter

Table 7
Summary of Ongoing and Newly Identified SSIs
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Comments:

1. This table includes results for wells/constituents that exceeded the UPL in 2023, which is the third year for which UPLs were calculated.

2. Results below the limit of quantitation (J flags) are estimated values and are not compared to the UPL or GWPS.

Updated by	MDB	Date	10/31/2023
Checked by	RM	Date	11/1/2023

I:\25223073.00\Deliverables\2023 AWQR\Tables\[awqreport_OML - 2023.xlsx]7- Standards Exceed Summary

Table 8
Historic SSIs & GWPS Exceedances
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

Key: gray =UPL; black =action level (GWPS) **Well**	**Constituent**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Shallow Hydrogeologic Unit								
MW-1R	Lithium*							
MW-15R	Boron							
	Cobalt							
	Iron							
	Lithium*							
	Magnesium							
	Manganese							
	Zinc							
	Sulfate							
	Total Dissolved Solids							
MW-17	Boron						Dry in August 2022 - not sampled	Dry in August 2023 - not sampled
	Cobalt							
	Manganese							
MW-100R	Lithium*							
MW-101R	Boron							
	Lithium*							
	Magnesium							
	Manganese							
	Sulfate							
MW-108	Arsenic							
	Boron							
	Cobalt							
	Iron							
	Lithium*							
	Manganese							
	Zinc							
Pennsylvanian Hydrogeologic Unit								
MW-12	Chloride							
	Fluoride							
	Lithium*							
MW-13	Chloride							
	Lithium*							
MW-14	Arsenic							
	Chloride							
	Lithium*							
MW-16R	Barium							
	Chloride							
	Lithium*							
MW-102P	Lithium*							

Abbreviations:
UPL = Upper Prediction Limit
SSI = Statistically Significant Increase
GWPS = Groundwater Protection Standard

1: UPLs were calculated annually beginning in 2020 when at least four sampling events with unfiltered (total) data. UPLs are only applied to results from 2020 onwards in this table.
*: Lithium was added to the sampling program in 2023

Updated by	MDB	Date	10/31/2023
Checked by	RM	Date	11/1/2023

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Table 9
Historic Prediction Limits and Groundwater Protection Standards
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

		UPL				GWPS			
Constituent	**Units**	**2020**	**2021**	**2022**	**2023**	**2020**	**2021**	**2022**	**2023**
Shallow Hydrogeological Units									
Arsenic	mg/L	0.880	0.880	0.880	0.880	10	10	10	10
Barium	µg/L	125	109	99.7	95.6	2,000	2,000	2,000	2,000
Beryllium	µg/L	0.270	0.270	DQ	DQ	4	4	4	4
Boron	µg/L	287	256	198	129	6,000	6,000	6,000	6,000
Cobalt	mg/L	1.10	0.799	0.37	0.37	2.10	2.10	2.10	2.10
Copper	mg/L	4.74	3.80	2.10	2.10	1,300	1,300	1,300	1,300
Iron	µg/L	1,140	840	4,000	665	none	none	none	none
Lead	µg/L	2.62	2.04	0.90	1.32	15.00	15.00	15.00	15.00
Magnesium	µg/L	135,000	48,100	48,100	48,100	none	none	none	none
Manganese	mg/L	59.00	391	85.50	33.00	300	391	300	300
Selenium	µg/L	4.42	3.48	2.87	3.45	50.00	50.00	50.00	50.00
Zinc	µg/L	10.0	10.0	10.0	10.0	2,000	2,000	2,000	2,000
Chloride	mg/L	180	335	178	287	none	none	none	none
Fluoride	µg/L	1.47	1.21	1.16	1.10	4	4	4	4
Sulfate	mg/L	482	482	485	483	none	none	none	none
Total Dissolved Solids	µg/L	1,600	1,350	1,240	1,130	none	none	none	none
Pennsylvanian Shale Hydrogeologic Unit									
Arsenic	mg/L	0.880	0.880	0.880	0.880	10	10	10	10
Barium	µg/L	32.1	29.9	29.9	28.0	2,000	2,000	2,000	2,000
Beryllium	µg/L	0.270	0.270	0.270	1.300	4	4	4	4
Boron	µg/L	3,090	2,690	2,400	2,190	6,000	6,000	6,000	6,000
Cobalt	mg/L	2.24	1.87	1.89	1.60	2.24	2.1	2.1	2.1
Copper	mg/L	2.00	2.00	2.00	2.70	1,300	1,300	1,300	1,300
Iron	µg/L	6,140	6,040	5,500	5,500	none	none	none	none
Lead	µg/L	1.10	1.10	1.10	1.10	15.00	15.00	15.00	15.00
Magnesium	µg/L	205,000	193,000	225,000	206,000	none	none	none	none
Manganese	mg/L	627	662	574	755	627	662	755	755
Selenium	µg/L	1.00	0.96	DQ	DQ	50	50	50	50
Zinc	µg/L	40.00	40.00	40.00	23.10	2,000	2,000	2,000	2,000
Chloride	mg/L	9.68	9.60	9.70	9.63	none	none	none	none
Fluoride	µg/L	1.80	1.53	1.44	1.06	4	4	4	4
Sulfate	mg/L	2,300	2,260	2,410	2,200	none	none	none	none
Total Dissolved Solids	µg/L	3,670	3,650	3,950	3,510	none	none	none	none

Comments: Graphs were not generated in 2023 due to the small number of events completed to date (2020 was first year for UPL calculations).

Updated by: RM, 10/10/2023
Checked by: LH, 10/16/2023

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Table 10
Data Analytical Summary - Additional Points
2023 Annual Water Quality Report
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

CHEMICAL PARAMETER	GWPS	GWPS SOURCE	EVENT	GU-1 TEMP	GU-2	GU-EX	LP-1	SW-1R	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	TCB-1/2
ARSENIC, µg/L	10	MCL	2023-Aug	DRY	DRY	DRY	DRY	DRY	DRY	3.1	DRY	Too Little Water to Sample	4.9	1.3 J
BARIUM, µg/L	2,000	MCL	2023-Aug							21			61	63
BERYLLIUM, µg/L	4	MCL	2023-Aug							<0.33			<0.33	<0.33
BORON, µg/L	6,000	SWS	2023-Aug							960			2,200	480
CALCIUM, mg/L	--	--	2023-Aug							140			200	140
COBALT, µg/L	2.1	SWS	2023-Aug							0.41 J			0.30 J	<0.17
COPPER, µg/L	1,300	SWS	2023-Aug							<1.8			2.4 J	<1.8
FLUORIDE, mg/L	4	MCL	2023-Aug							<0.38			<0.38	<0.38
IRON, µg/L	--	--	2023-Aug							130			<36	52 J
LEAD, µg/L	15	SWS	2023-Aug							0.28 J			<0.24	<0.24
LITHIUM, µg/L	14	SWS	2023-Aug							11			35	<2.5
MAGNESIUM, µg/L	--	--	2023-Aug							54000			34000	15000
MANGANESE, µg/L	300	SWS	2023-Aug							45			16	8.9 J
MOLYBDENUM, µg/L	40	SWS	2023-Aug							25			790	4.1
SELENIUM, µg/L	50	MCL	2023-Aug							2.1 J			38	<1.4
ZINC, µg/L	2000	SWS	2023-Aug							9.8 J			6.9 J	<6.4
CHLORIDE, mg/L	--	--	2023-Aug							16			410	18
SULFATE, mg/L	--	--	2023-Aug							830			2,500	560
TOTAL DISSOLVED SOLIDS, mg/L	--	--	2023-Aug							1000			3,300	730
TOTAL SUSPENDED SOLIDS, mg/L	--	--	2023-Aug							14			8.7	1.3 J
pH, SU	--	--	2023-Aug							9.01			8.86	7.79
TEMPERATURE, DEGREES C	--	--	2023-Aug							31.4			30.3	26.6
DISSOLVED OXYGEN	--	--	2023-Aug							7.64			10.40	7.47
OXIDATION REDUCTION POTENTIAL	--	--	2023-Aug							45.8			63.3	67.0
SPECIFIC CONDUCTANCE, UMHOS/CM	--	--	2023-Aug							--(1)			5,364	1003

NOTES:
MCL = Maximum Contaminant Level
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
SWS = Statewide Standard for Groundwater
-- = Not Applicable

(1) = The specific conductivity probe was not fully submerged by field staff when collecting field parameters at SW-3.

Updated by: RM Date: 10/10/2023
Checked by: LH Date: 10/16/2023

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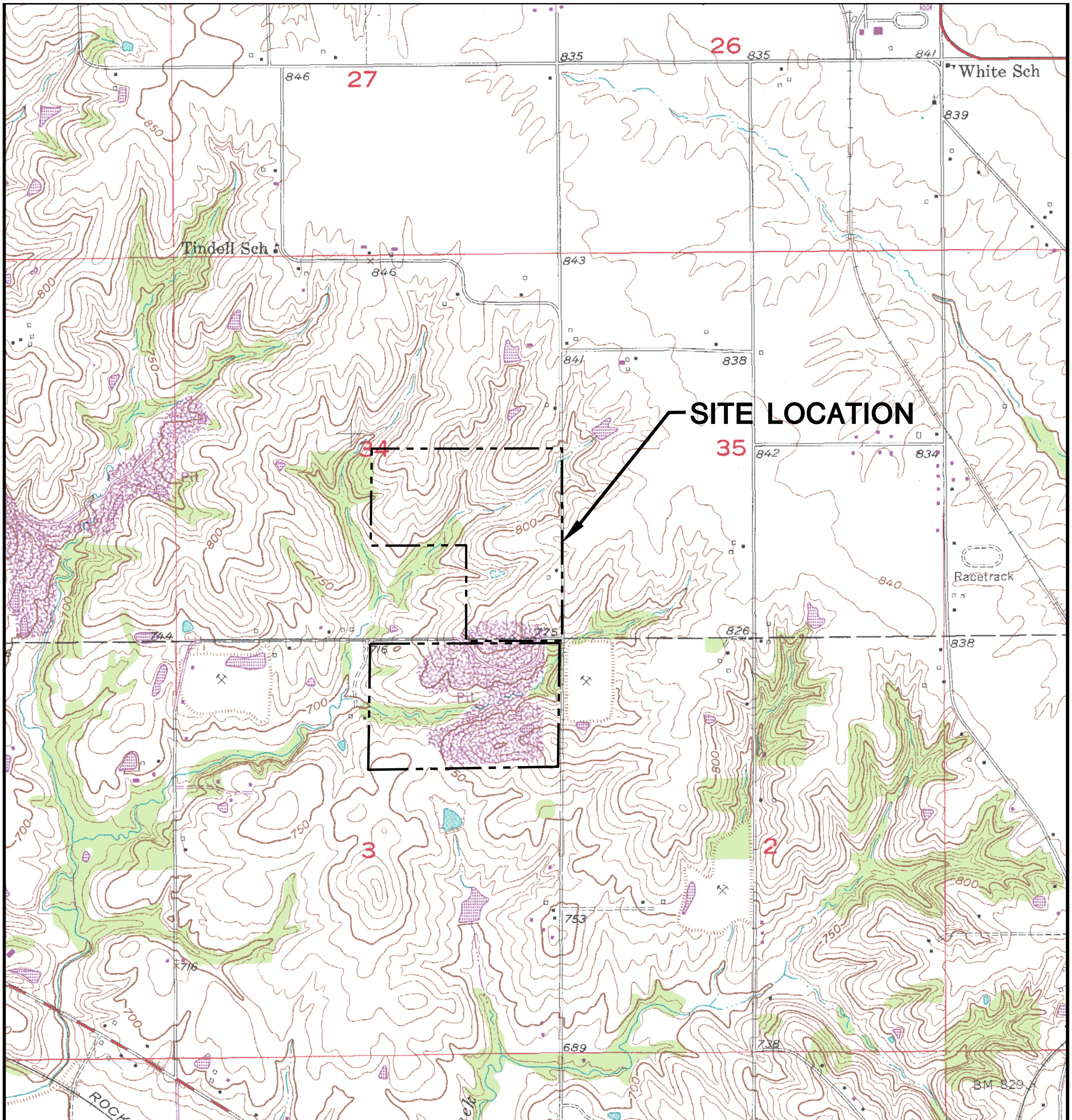
Figures

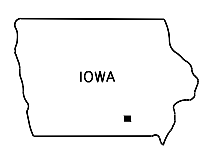


LEGEND

APPROXIMATE PROPERTY LINE

OTTUMWA NORTH QUADRANGLE
IOWA–WAPELLO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 OTTUMWA NORTH 15' QUADRANGLE
1976
SCALE: 1" = 2,000'

N



CLIENT	INTERSTATE POWER AND LIGHT CO. 15300 130th STREET OTTUMWA, IA 52501	SITE	OTTUMWA MIDLAND LANDFILL OTTUMWA, IOWA

SITE LOCATION MAP

PROJECT NO.	25216073.00	DRAWN BY:	KP
DRAWN:	09/15/11	CHECKED BY:	MB
REVISED:	11/17/16	APPROVED BY:	TK 11/21/17

ENGINEER

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

FIGURE
1

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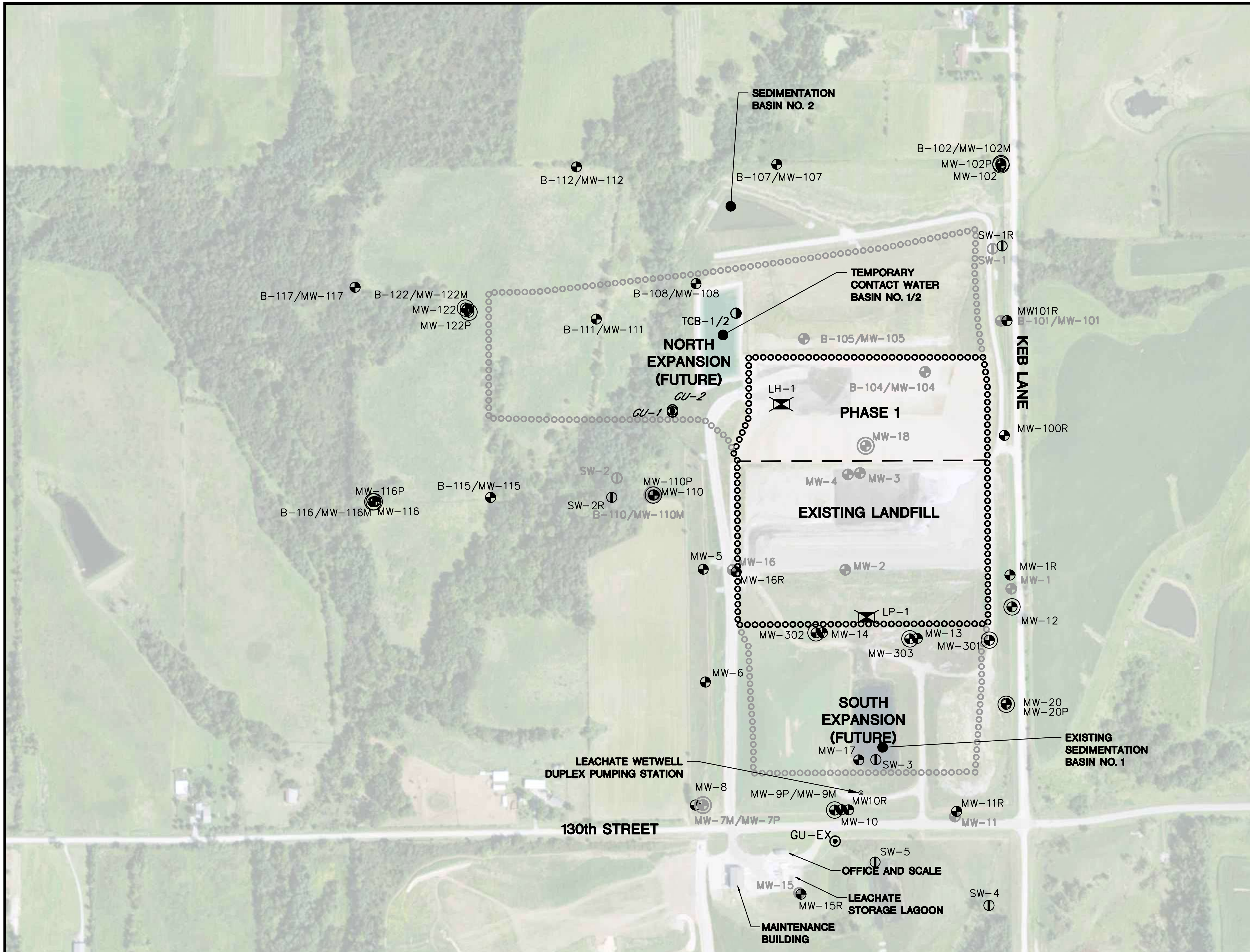

LEGEND

- APPROXIMATE PROPERTY LINE
- APPROVED WASTE LIMITS
- EXISTING WASTE LIMITS
- PHASE LIMIT
- EXISTING SOIL BORING
- EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- EXISTING SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED MONITORING WELL
- ABANDONED SURFACE WATER MONITORING STAFF GAUGE
- LEACHATE HEADWELL
- GROUNDWATER UNDERDRAIN
- TEMPORARY CONTACT WATER BASIN

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER–IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.

N

400 0 400

SCALE: 1" = 400'

PROJECT NO.	25221073.00	DRAWN BY:	AHB/KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	CLIENT	INTERSTATE POWER AND LIGHT CO. 15300 130th STREET OTTUMWA, IA 52501	SITE	OTTUMWA MIDLAND LANDFILL OTTUMWA, IOWA	SITE PLAN	FIGURE 2
DRAWN:	11/17/2011	CHECKED BY:	PEG								
REVISED:	02/16/2021	APPROVED BY:	TK, 11/10/2023								

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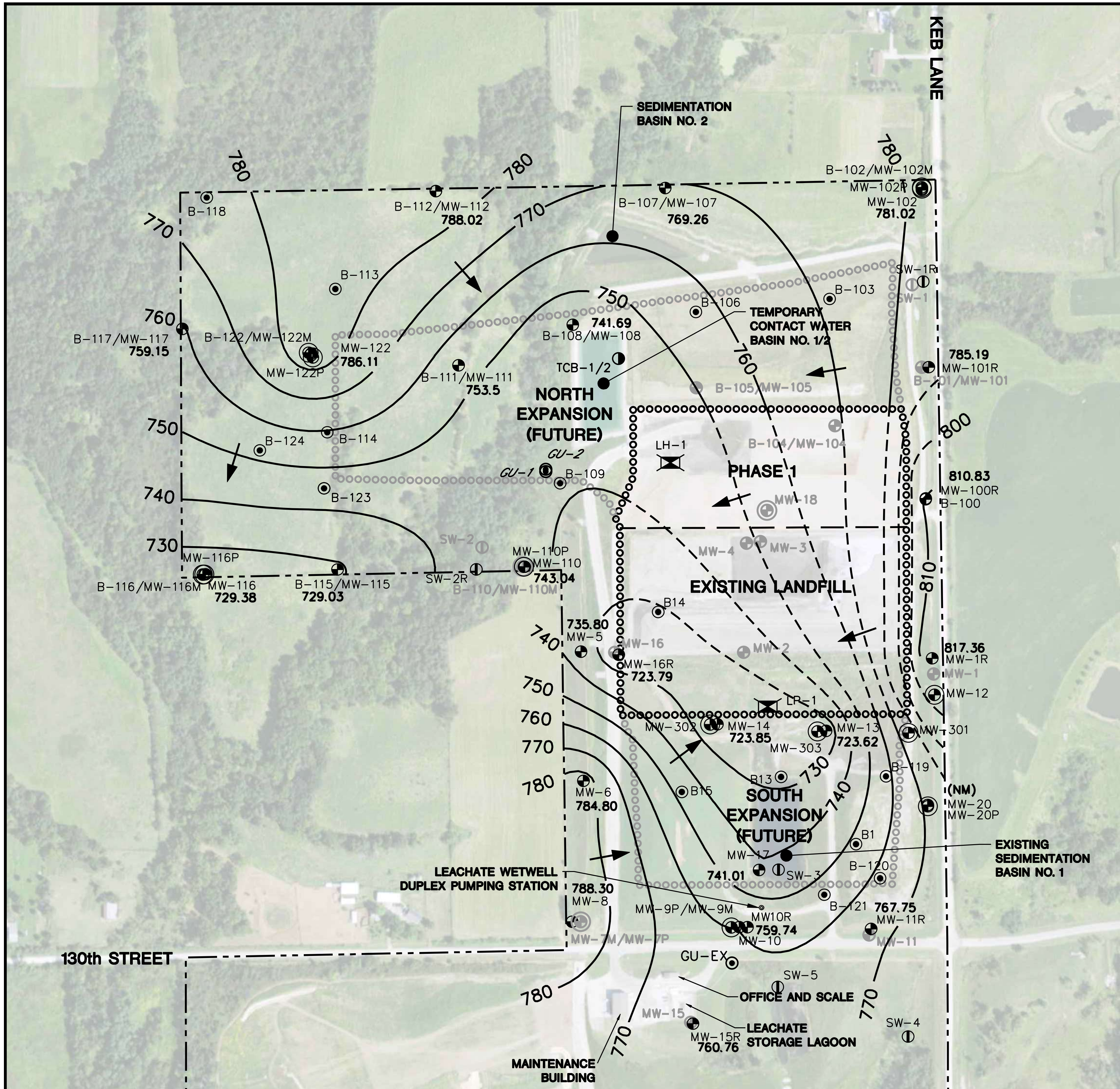

LEGEND

- APPROXIMATE PROPERTY LINE
- APPROVED LIMITS OF WASTE
- EXISTING WASTE LIMITS
- PHASE LIMIT
- EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- EXISTING SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED MONITORING WELL
- LEACHATE HEADWELL
- GROUNDWATER UNDERDRAIN
- TEMPORARY CONTACT WATER BASIN
- 780.01 WATER TABLE ELEVATION MEASURED IN APRIL 4, 2023
- (NM) NOT MEASURED
- WATER TABLE CONTOUR (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER–IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.
5. MW-13 AND MW-14 ARE USED IN THE INTERPRETATION OF BOTH THE WATER TABLE MAP AND THE POTENTIOMETRIC SURFACE MAP BECAUSE THEY ARE SCREENED IN THE PENNSYLVANIAN UNIT AND ACROSS WHAT COULD BE INTERPRETED AS THE WATER TABLE (1ST OCCURRENCE OF GROUNDWATER AT THE WELL LOCATIONS).
6. A GROUNDWATER UNDERDRAIN SYSTEM IS PRESENT BELOW THE BASE OF THE CURRENT FILL AREA. ELEVATIONS IN THE BASE UNDERDRAIN SYSTEM RANGE FROM 748' TO 762'. ADDITIONALLY, FINGER DRAINS WERE INSTALLED ALONG THE EASTERN EDGE OF THE FILL AREA AT THE AN ELEVATION OF APPROXIMATELY 795'. THESE FINGER DRAINS ARE TIED TO THE UNDERDRAIN SYSTEM.

400 0 400

SCALE: 1" = 400'

N

PROJECT NO.	25223073.00	DRAWN BY:	KP	ENGINEER: SCS ENGINEERS, 2830 DAIRY DRIVE MADISON, WI 53718-6751, PHONE: (608) 224-2830	CLIENT: INTERSTATE POWER AND LIGHT CO., 15300 130th STREET, OTTUMWA, IA 52501	SITE: OTTUMWA MIDLAND LANDFILL, OTTUMWA, IOWA	WATER TABLE MAP, APRIL 4, 2023
DRAWN:	08/03/2023	CHECKED BY:	RM/MDB				FIGURE
REVISED:	11/02/2023	APPROVED BY:	TK, 11/10/2023				3

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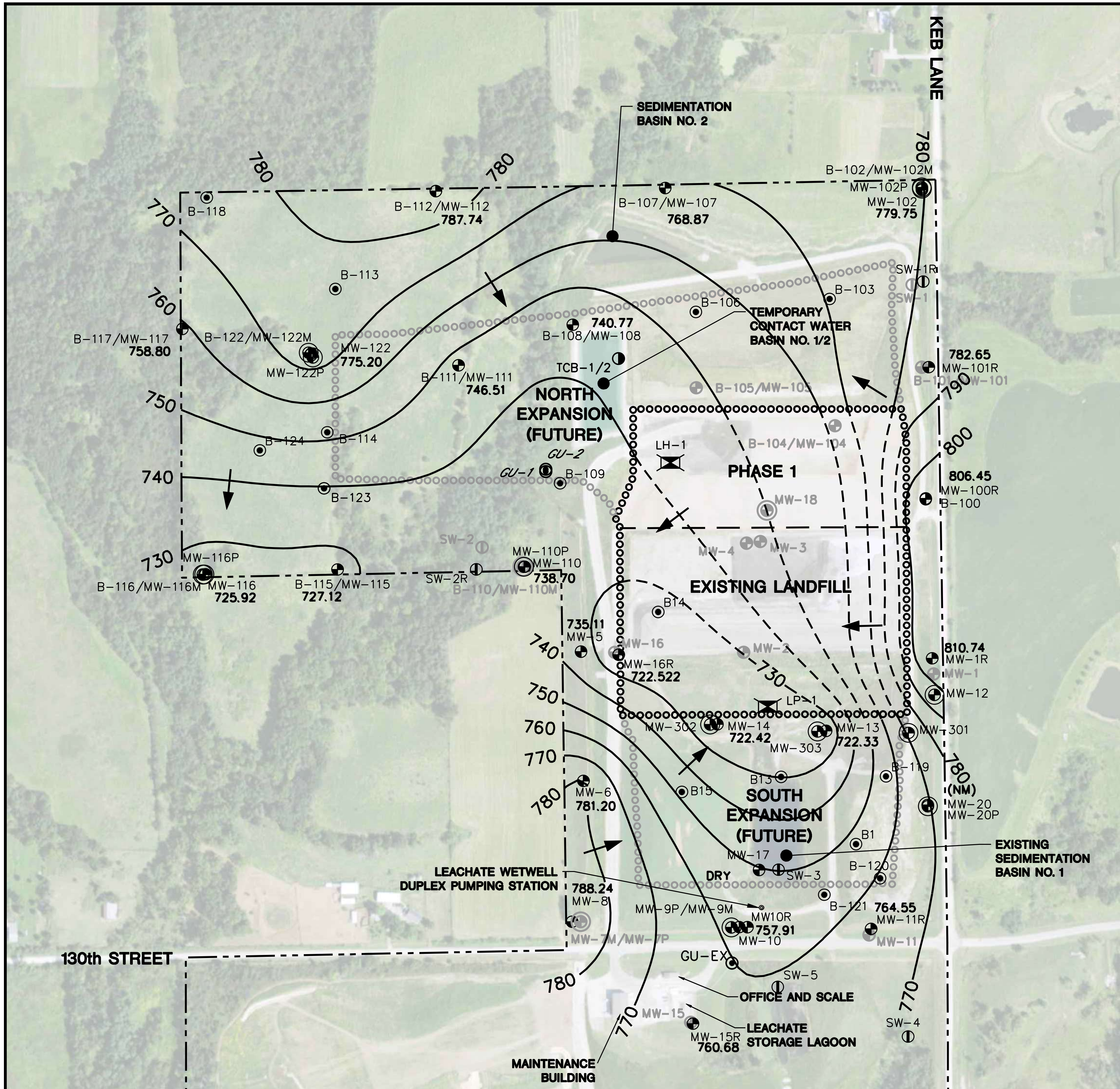

LEGEND

- APPROXIMATE PROPERTY LINE
- APPROVED LIMITS OF WASTE
- EXISTING WASTE LIMITS
- PHASE LIMIT
- EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- EXISTING SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED MONITORING WELL
- LEACHATE HEADWELL
- GROUNDWATER UNDERDRAIN
- TEMPORARY CONTACT WATER BASIN
- 780.01 WATER TABLE ELEVATION MEASURED IN AUGUST 28–31, 2023
- (NM) NOT MEASURED
- WATER TABLE CONTOUR (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER–IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.
5. MW-13 AND MW-14 ARE USED IN THE INTERPRETATION OF BOTH THE WATER TABLE MAP AND THE POTENTIOMETRIC SURFACE MAP BECAUSE THEY ARE SCREENED IN THE PENNSYLVANIAN UNIT AND ACROSS WHAT COULD BE INTERPRETED AS THE WATER TABLE (1ST OCCURRENCE OF GROUNDWATER AT THE WELL LOCATIONS).
6. A GROUNDWATER UNDERDRAIN SYSTEM IS PRESENT BELOW THE BASE OF THE CURRENT FILL AREA. ELEVATIONS IN THE BASE UNDERDRAIN SYSTEM RANGE FROM 748' TO 762'. ADDITIONALLY, FINGER DRAINS WERE INSTALLED ALONG THE EASTERN EDGE OF THE FILL AREA AT THE AN ELEVATION OF APPROXIMATELY 795'. THESE FINGER DRAINS ARE TIED TO THE UNDERDRAIN SYSTEM.

400 0 400

SCALE: 1" = 400'

N

PROJECT NO.	25223073.00	DRAWN BY:	KP
DRAWN:	10/31/2023	CHECKED BY:	NLB
REVISED:	11/02/2023	APPROVED BY:	TK, 11/10/2023

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

CLIENT: INTERSTATE POWER AND LIGHT CO.
15300 130th STREET
OTTUMWA, IA 52501

SITE: OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

WATER TABLE MAP
AUGUST 2023

FIGURE 4

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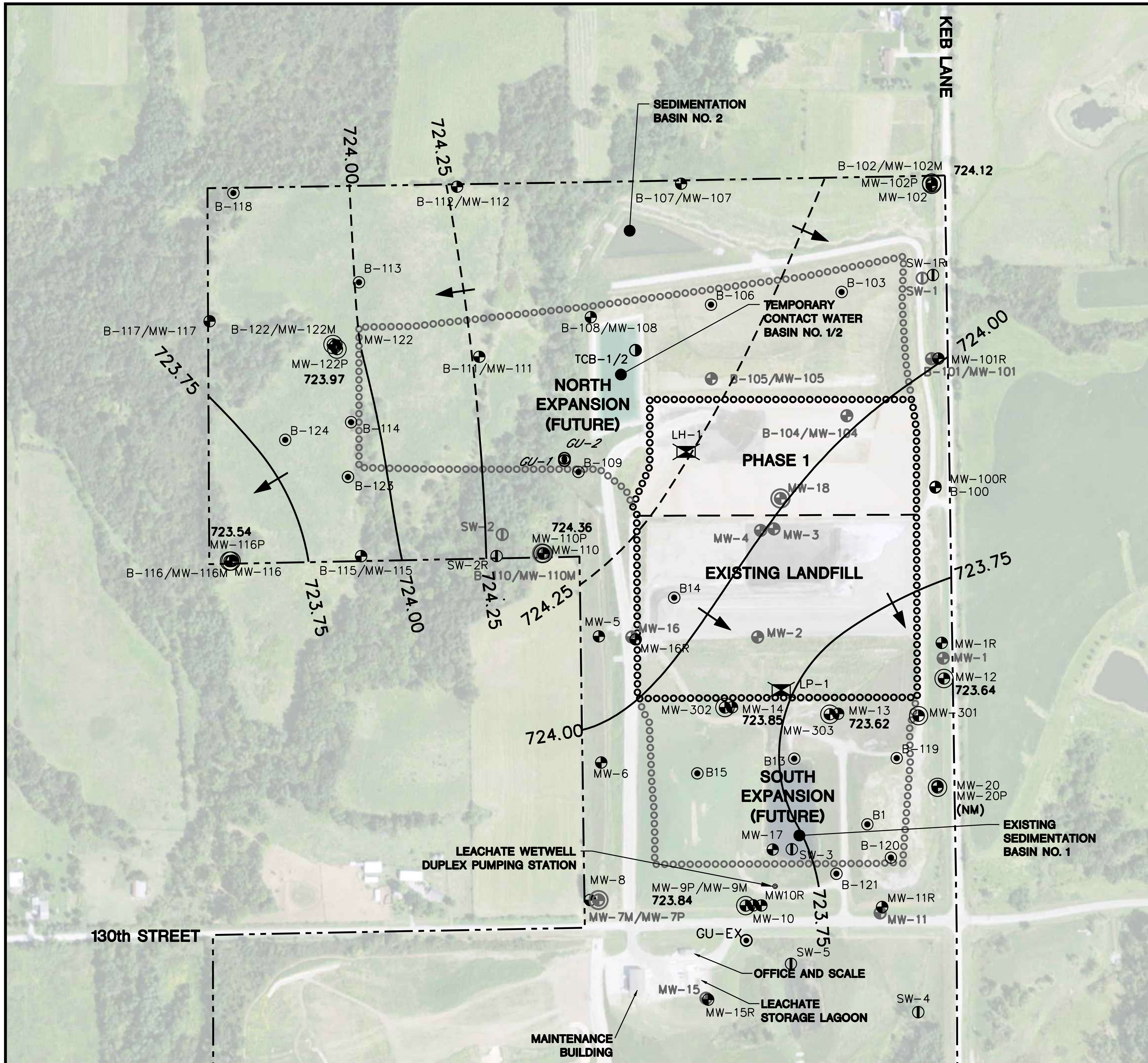

LEGEND

- APPROXIMATE PROPERTY LINE
- APPROVED WASTE LIMITS
- EXISTING WASTE LIMITS
- PHASE LIMIT
- EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- EXISTING SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED MONITORING WELL
- LEACHATE HEADWELL
- GROUNDWATER UNDERDRAIN
- TEMPORARY CONTACT WATER BASIN
- **723.59** POTENTIOMETRIC SURFACE ELEVATION MEASURED ON APRIL 4, 2023
- **(NM)** NOT MEASURED
- POTENTIOMETRIC SURFACE CONTOUR (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER-IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.
5. MW-13 AND MW-14 ARE USED IN THE INTERPRETATION OF BOTH THE WATER TABLE MAP AND THE POTENTIOMETRIC SURFACE MAP BECAUSE THEY ARE SCREENED IN THE PENNSYLVANIAN UNIT (UPPERMOST AQUIFER) AND ACROSS WHAT COULD BE INTERPRETED AS THE WATER TABLE (1ST OCCURRENCE OF GROUNDWATER AT THE WELL LOCATIONS).

400 0 400

SCALE: 1" = 400'

PROJECT NO.	25223073.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	CLIENT	INTERSTATE POWER AND LIGHT CO. 15300 130th STREET OTTUMWA, IA 52501	SITE
DRAWN:	08/23/2022	CHECKED BY:	RM/MDB					
REVISED:	11/01/2022	APPROVED BY:	TK, 11/10/2023					

OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

POTENTIOMETRIC SURFACE MAP-PENNSYLVANIAN
APRIL 4, 2023

FIGURE 5

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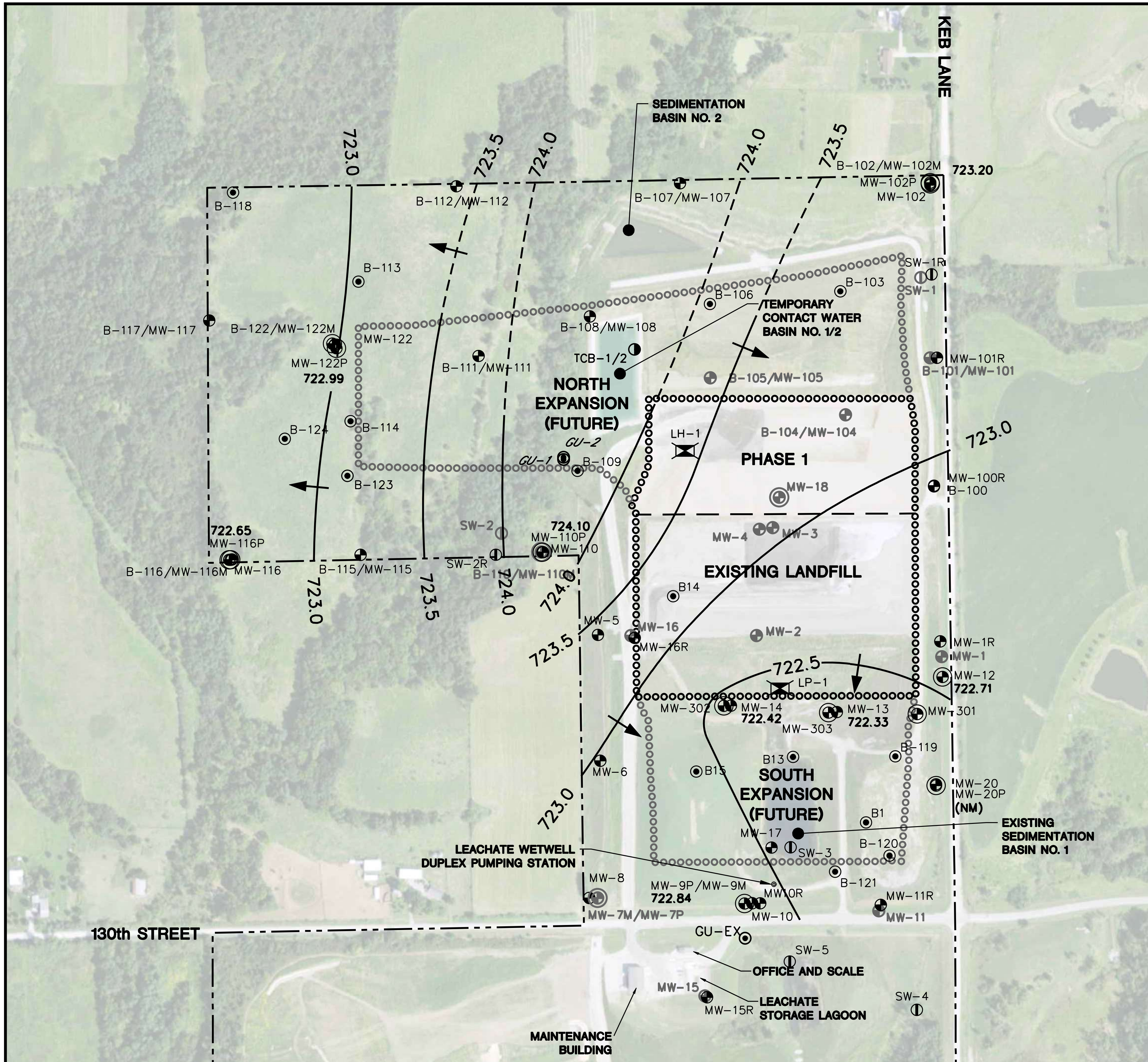

LEGEND

- APPROXIMATE PROPERTY LINE
- APPROVED WASTE LIMITS
- EXISTING WASTE LIMITS
- PHASE LIMIT
- EXISTING MONITORING WELL
- EXISTING PIEZOMETER
- EXISTING SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED SURFACE WATER MONITORING STAFF GAUGE
- ABANDONED MONITORING WELL
- LEACHATE HEADWELL
- GROUNDWATER UNDERDRAIN
- TEMPORARY CONTACT WATER BASIN
- **723.59** POTENTIOMETRIC SURFACE ELEVATION MEASURED ON AUGUST 28-31, 2023
- **(NM)** NOT MEASURED
- POTENTIOMETRIC SURFACE CONTOUR (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER-IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.
5. MW-13 AND MW-14 ARE USED IN THE INTERPRETATION OF BOTH THE WATER TABLE MAP AND THE POTENTIOMETRIC SURFACE MAP BECAUSE THEY ARE SCREENED IN THE PENNSYLVANIAN UNIT (UPPERMOST AQUIFER) AND ACROSS WHAT COULD BE INTERPRETED AS THE WATER TABLE (1ST OCCURRENCE OF GROUNDWATER AT THE WELL LOCATIONS).

PROJECT NO.	25223073.00	DRAWN BY:	KP
DRAWN:	10/31/2023	CHECKED BY:	RM/MDB
REVISED:	11/02/2023	APPROVED BY:	TK, 11/10/2023

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

CLIENT: INTERSTATE POWER AND LIGHT CO., 15300 130th STREET, OTTUMWA, IA 52501

SITE: OTTUMWA MIDLAND LANDFILL, OTTUMWA, IOWA

POTENTIOMETRIC SURFACE MAP-PENNSYLVANIAN AUGUST 2023

FIGURE 6

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Appendix A

Groundwater Sampling Field Sheets

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill   Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-1R   Weather: 75°F, Wind Direction: E, Sunny, No precipitation

Date: 8/29/2023   Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in): ____   Depth to Tope of Screen (ft): 9.3

Casing Diameter (in): 2.01   Casing Material: PVC

Top of Casing Elevation (ft. MSL): 823.31   Ground Surface Elevation (ft. MSL): ____

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	12.57	13.45	13.45
Water Elevation (ft. MSL):	810.74	809.86	809.86

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/29, 13:05	8/29, 13:35

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify): ____

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify): ____

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time				8/29, 13:10	8/29, 13:15	8/29, 13:20	8/29, 13:25
Depth to Water (ft)				12.82	13.24	13.41	13.45
Volume Purged (L)				0.5	1.0	1.5	2.0
Temp (°C)				15.2	15.1	14.9	14.9
Sp. Cond (umhos/cm)				802	796	796	794
pH				7.09	7.08	7.09	7.09
DO (mg/l)				1.48	1.21	1.30	1.29
ORP (mV)				75.1	64.3	64.6	66.7
Turbidity (NTU)				2.68	1.43	1.17	1.48

Equipment Depth: ____   Flow Rate: 100mL/min   Volume Removed: 3L   Volume Sampled: 1L

Odor? ☐ Yes ☒ No   Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill   Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-12   Weather: 74°F, Wind Direction: E, Sunny, No precipitation

Date: 8/29/2023   Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in): ____   Depth to Tope of Screen (ft): 120.7

Casing Diameter (in): 2.01   Casing Material: PVC

Top of Casing Elevation (ft. MSL): 822.43   Ground Surface Elevation (ft. MSL): ____

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	99.72	107.64	107.64
Water Elevation (ft. MSL):	722.71	714.79	714.79

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ■ Yes ☐ No

	Start	End
Purge Date/Time	8/29, 12:15	8/29, 13:00

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify): ____

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify): ____

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time		8/29, 12:20	8/29, 12:25	8/29, 12:30	8/29, 12:35	8/29, 12:40	8/29, 12:45
Depth to Water (ft)		99.72	99.72	102.18	105.41	106.78	107.64
Volume Purged (L)		0.5	1.0	1.5	2.0	2.5	3.0
Temp (°C)		15.4	15.5	15.5	15.5	15.3	15.3
Sp. Cond (umhos/cm)		2650	2644	2645	2648	2650	2651
pH		7.86	7.82	7.82	7.81	7.80	7.80
DO (mg/l)		3.60	3.26	3.13	3.00	2.97	2.96
ORP (mV)		73.7	48.6	36.4	25.2	19.6	16.1
Turbidity (NTU)		2.03	0.55	1.17	0.67	0.51	0.78

Equipment Depth: ____   Flow Rate: 100mL/min   Volume Removed: 4.5L   Volume Sampled: 1L

Odor? ☐ Yes ☒ No   Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill　　Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-13　　Weather: 70°F, Wind Direction: E, Sunny, No precipitation

Date: 8/30/2023　　Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in): ______　　Depth to Tope of Screen (ft): 38.4

Casing Diameter (in): 2.01　　Casing Material: PVC

Top of Casing Elevation (ft. MSL): 762.48　　Ground Surface Elevation (ft. MSL): ______

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	40.15	40.15	40.15
Water Elevation (ft. MSL):	722.33	722.33	722.33

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/30, 9:25	8/30, 10:15

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify): ______

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify): ______

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time	8/30, 9:30	8/30, 9:35	8/30, 9:40	8/30, 9:45	8/30, 9:50	8/30, 9:55	8/30, 10:00
Depth to Water (ft)	40.15	40.15	40.15	40.15	40.15	40.15	40.15
Volume Purged (L)	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Temp (°C)	15.1	16.0	16.1	16.3	16.3	16.3	16.3
Sp. Cond (umhos/cm)	3224	3237	3241	3242	3244	3245	3242
pH	7.03	7.02	7.02	7.02	7.01	7.01	7.00
DO (mg/l)	0.97	0.82	0.74	0.67	0.61	0.59	0.57
ORP (mV)	90.5	82.0	75.7	67.5	61.3	59.0	53.7
Turbidity (NTU)	4.84	0.62	0.55	0.52	0.17	0.09	0.03

Equipment Depth: ______　　Flow Rate: 100mL/min　　Volume Removed: 5L　　Volume Sampled: 1L

Odor? ☐ Yes ☒ No　　Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-14 Weather: 70 F, Wind direction: E, Sunny, No precipitation

Date: 8/30/2023 Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in): Depth to Tope of Screen (ft): 38.0

Casing Diameter (in): 2.01 Casing Material: PVC

Top of Casing Elevation (ft. MSL): 761.02 Ground Surface Elevation (ft. MSL):

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	38.60	38.60	38.60
Water Elevation (ft. MSL):	722.42	722.42	722.42

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/30, 8:40	8/30, 9:05

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify):

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify):

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time					8/30, 8:55	8/30, 9:00	8/30, 9:05
Depth to Water (ft)					38.60	38.60	38.60
Volume Purged (L)					1.5	2.0	2.5
Temp (°C)					14.2	14.2	14.2
Sp. Cond (umhos/cm)					2922	2905	2904
pH					7.13	7.12	7.12
DO (mg/l)					0.71	0.69	0.66
ORP (mV)					72.9	68.1	66.1
Turbidity (NTU)					0.10	0.06	0.03

Equipment Depth: Flow Rate: 100 mL/min Volume Removed: 3.5L Volume Sampled: 1L

Odor? ☐ Yes ☒ No Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill   Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-15R   Weather: 75°F, Wind Direction: N, Sunny, No precipitation

Date: 8/30/2023   Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in):   Depth to Tope of Screen (ft): 42.7

Casing Diameter (in): 2.01   Casing Material: PVC

Top of Casing Elevation (ft. MSL): 808.49   Ground Surface Elevation (ft. MSL):

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	47.81	47.81	47.81
Water Elevation (ft. MSL):	760.68	760.68	760.68

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/30, 12:25	8/30, 13:05

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify):

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify):

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time	12:35	12:40	12:45	12:50	12:55	13:00	13:05
Depth to Water (ft)	47.81	47.81	47.81	47.81	47.81	47.81	47.81
Volume Purged (L)	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Temp (°C)	17.9	18.1	18.2	18.4	18.4	18.4	18.4
Sp. Cond (umhos/cm)	2384	2377	2354	2339	2330	2305	2287
pH	6.35	6.34	6.34	6.33	6.32	6.32	6.32
DO (mg/l)	1.26	0.94	0.79	0.67	0.61	0.58	0.58
ORP (mV)	9.9	18.5	25.6	36.9	42.2	47.8	50.9
Turbidity (NTU)	2.26	2.35	2.17	2.63	2.24	1.56	2.25

Equipment Depth: Flow Rate: 100mL/min   Volume Removed: 5.0   Volume Sampled: 1L

Odor? ☐ Yes ☒ No   Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill   Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-16R   Weather: 72°F, Wind Direction: East, Sunny, No precipitation

Date: 8/29/2023   Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in):   Depth to Tope of Screen (ft): 90.0

Casing Diameter (in): 2.01   Casing Material: PVC

Top of Casing Elevation (ft. MSL): 814.13   Ground Surface Elevation (ft. MSL):

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	91.61	91.61	91.61
Water Elevation (ft. MSL):	722.52	722.52	722.52

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/29, 8:55	8/29, 9:35

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify):

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify):

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time		8/29, 9:00	8/29, 9:05	8/29, 9:10	8/29, 9:15	8/29, 9:20	8/29, 9:25
Depth to Water (ft)		91.61	91.61	91.61	91.61	91.61	91.61
Volume Purged (L)		0.5	1.0	1.5	2.0	2.5	3.0
Temp (°C)		15.2	14.8	14.7	14.7	14.7	14.6
Sp. Cond (umhos/cm)		3129	3111	3157	3180	3193	3188
pH		7.02	6.90	6.87	6.87	6.87	6.87
DO (mg/l)		2.52	1.01	0.62	0.55	0.52	0.52
ORP (mV)		108.8	80.3	15.7	-4.5	-9.9	-10.4
Turbidity (NTU)		9.20	3.87	1.38	1.26	1.21	1.32

Equipment Depth: Flow Rate: 100mL/min   Volume Removed: 4L   Volume Sampled: 1L

Odor? ☐ Yes ☒ No   Color? ☐ Yes ☒ No

Comments: Dust kicked up while collecting unpreserved sample by trucks.

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill   Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-100R   Weather: 72°F, Wind Direction: East, Sunny, No precipitation

Date: 8/29/2023   Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in):   Depth to Tope of Screen (ft): 12.9

Casing Diameter (in): 2.01   Casing Material: PVC

Top of Casing Elevation (ft. MSL): 822.40   Ground Surface Elevation (ft. MSL):

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	15.95	15.95	15.95
Water Elevation (ft. MSL):	806.45	806.45	806.45

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/29, 10:35	8/29, 11:05

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify):

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify):

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time				8/29, 10:40	8/29, 10:45	8/29, 10:50	8/29, 10:55
Depth to Water (ft)				15.95	15.95	15.95	15.95
Volume Purged (L)				0.5	1.0	1.5	2.0
Temp (°C)				15.4	14.7	14.8	14.8
Sp. Cond (umhos/cm)				1020	979	944	938
pH				7.17	7.16	7.17	7.17
DO (mg/l)				4.40	4.50	4.48	4.45
ORP (mV)				80.9	80.1	79.8	80.2
Turbidity (NTU)				3.28	2.83	2.12	1.04

Equipment Depth: Flow Rate: 100mL/min   Volume Removed: 3.0   Volume Sampled: 1L

Odor? ☐ Yes ☒ No   Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill
Permit No.: 90-SDP-8-92P
Well/Piezometer: MW-101R
Weather: 72°F, Wind Direction: East, Sunny, No precipitation
Date: 8/29/2023
Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in):
Depth to Tope of Screen (ft): 14.0
Casing Diameter (in): 2.01
Casing Material: PVC
Top of Casing Elevation (ft. MSL): 799.35
Ground Surface Elevation (ft. MSL):

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	16.70	17.14	17.14
Water Elevation (ft. MSL):	782.65	782.21	782.21

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	8/29, 11:30	8/29, 11:55

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler
☐ Bailer ☐ Other (specify):

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify):

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time					8/29, 11:35	8/29, 11:40	8/30, 11:45
Depth to Water (ft)					16.70	16.70	17.14
Volume Purged (L)					1.0	1.5	2.0
Temp (°C)					13.9	13.8	13.8
Sp. Cond (umhos/cm)					1377	1377	1364
pH					6.90	6.90	6.90
DO (mg/l)					0.41	0.38	0.36
ORP (mV)					89.6	83.1	80.1
Turbidity (NTU)					4.74	3.56	4.04

Equipment Depth:
Flow Rate: 100ml/min
Volume Removed: 2.5
Volume Sampled: 1L

Odor? ☐ Yes ☒ No
Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-102P Weather: 72°F, Wind Direction: East, Sunny, No precipitation

Date: 8/29/23 Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in): Depth to Tope of Screen (ft): 98.2

Casing Diameter (in): 2.01 Casing Material: PVC

Top of Casing Elevation (ft. MSL): 797.64 Ground Surface Elevation (ft. MSL):

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	74.44	74.44	74.44
Water Elevation (ft. MSL):	723.20	723.20	723.20

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ■ Yes ☐ No

	Start	End
Purge Date/Time	8/29, 9:45	8/29, 10:25

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify):

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify):

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

						Final Reading
Date/Time		8/29, 9:50	8/29, 9:55	8/29, 10:00	8/29, 10:05	8/29, 10:10	8/29, 10:15
Depth to Water (ft)		74.44	74.44	74.44	74.44	74.44	74.44
Volume Purged (L)		0.75	1.5	2.25	3.0	3.75	4.5
Temp (°C)		14.5	14.3	14.3	14.4	14.4	14.3
Sp. Cond (umhos/cm)		2929	3016	3013	3039	3036	3037
pH		6.42	6.37	6.37	6.38	6.38	6.38
DO (mg/l)		1.92	0.85	0.74	0.56	0.55	0.53
ORP (mV)		-8.5	-12.5	-12.5	-12.2	-11.9	-11.4
Turbidity (NTU)		1.71	0.99	1.34	0.71	1.09	0.74

Equipment Depth: Flow Rate: 150mL/min Volume Removed: 6L Volume Sampled: 1L

Odor? ☐ Yes ☒ No Color? ☐ Yes ☒ No

Comments: --

Groundwater Sampling Field Sheet

Disposal Site Name: IPL - Ottumwa Midland Landfill　Permit No.: 90-SDP-8-92P

Well/Piezometer: MW-108　Weather: 73°F, Wind Direction: East, Sunny, No precipitation

Date: 8/30/2023　Sampler Name: Tyler Stirling

Monitoring Well Details

Construction Data

Borehole Diameter (in): ______　Depth to Tope of Screen (ft): 12.7

Casing Diameter (in): 2.01　Casing Material: PVC

Top of Casing Elevation (ft. MSL): 765.57　Ground Surface Elevation (ft. MSL): ______

Field Observations

Locked: ☒ Yes ☐ No

	Before Purging	After Purging	Before Sampling
Depth to Water Level (ft.):	24.80	24.80	24.80
Water Elevation (ft. MSL):	740.77	740.77	740.77

Screen Submerged? (Depth to Water Level < Depth to Top of Screen) ☐ Yes ■ No

	Start	End
Purge Date/Time	10/18 11:25	10/18 12:00

Well Conditions Commentary: --

Sampling Equipment (check one)

☒ Pump ☐ Interval Sampler

☐ Bailer ☐ Other (specify): ______

Equipment Name & Description: Well Wizard

Pump Types (check one)

☐ Submersible ☐ Peristaltic ☒ Bladder ☐ Inertial Lift Pump ☐ Other (specify): ______

Method (check one)

☒ Low Flow ☐ No Purge ☐ Purge

Options (check one)

☒ Dedicated ☐ Disposable ☐ Portable

Decontamination Method: N/A. Dedicated pump.

Field Analysis

							Final Reading
Date/Time	8/30, 11:30	8/30, 11:35	8/30, 11:40	8/30, 11:45	8/30, 11:50	8/30, 11:55	8/30, 12:00
Depth to Water (ft)	24.80	24.80	24.80	24.80	24.80	24.80	24.80
Volume Purged (L)	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Temp (°C)	14.6	14.6	14.6	14.8	14.8	14.6	14.6
Sp. Cond (umhos/cm)	737	671	639	577	507	509	511
pH	6.71	6.62	6.53	6.40	6.31	6.32	6.32
DO (mg/l)	0.59	0.41	0.27	0.46	0.76	0.78	0.77
ORP (mV)	-8.2	7.6	26.5	19.4	15.6	19.8	20.6
Turbidity (NTU)	78.87	40.45	26.09	21.40	2.59	2.25	2.45

Equipment Depth: ______　Flow Rate: 100mL/min　Volume Removed: 4.5L　Volume Sampled: 1L

Odor? ☐ Yes ☒ No　Color? ☐ Yes ☒ No

Comments: --

Appendix B

Laboratory Analytical Reports

eurofins Environment Testing

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ANALYTICAL REPORT

PREPARED FOR

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

Generated 9/21/2023 5:29:09 PM

JOB DESCRIPTION

Ottumwa Midland Landfill 25223073

JOB NUMBER

310-263836-1

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls IA 50613

See page two for job notes and contact information.

myEOL

Eurofins Cedar Falls

Job Notes

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

Table of Contents

Job ID: 310-263836-1

Laboratory: Eurofins Cedar Falls

Narrative

Job Narrative
310-263836-1

Receipt
The samples were received on 8/31/2023 4:50 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.1º C.

HPLC/IC
Method 9056A: The following samples were diluted due to the nature of the sample matrix: MW-15R (310-263836-5), MW-100R (310-263836-7) and MW-108 (310-263836-10). 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: Ottumwa Midland Landfill 25223073

Job ID: 310-263836-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-263836-1	MW-1R	Water	08/29/23 13:25	08/31/23 16:50
310-263836-2	MW-12	Water	08/29/23 12:45	08/31/23 16:50
310-263836-3	MW-13	Water	08/30/23 10:00	08/31/23 16:50
310-263836-4	MW-14	Water	08/30/23 09:05	08/31/23 16:50
310-263836-5	MW-15R	Water	08/30/23 13:05	08/31/23 16:50
310-263836-6	MW-16R	Water	08/29/23 09:25	08/31/23 16:50
310-263836-7	MW-100R	Water	08/29/23 10:55	08/31/23 16:50
310-263836-8	MW-101R	Water	08/29/23 11:45	08/31/23 16:50
310-263836-9	MW-102P	Water	08/29/23 10:15	08/31/23 16:50
310-263836-10	MW-108	Water	08/30/23 12:00	08/31/23 16:50
310-263836-11	Field Blank	Water	08/30/23 14:00	08/31/23 16:50

Detection Summary

Client: SCS Engineers | Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: MW-1R | Lab Sample ID: 310-263836-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	26		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	60		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	75		2.0	0.64	ug/L	1		6020B	Total/NA
Beryllium	0.40	J	1.0	0.33	ug/L	1		6020B	Total/NA
Calcium	100		0.50	0.19	mg/L	1		6020B	Total/NA
Lead	0.29	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	31		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	29000		500	150	ug/L	1		6020B	Total/NA
Molybdenum	1.8	J	2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	2.6	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	7.4		1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	530		50	34	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	810.74				ft	1		Field Sampling	Total/NA
Field pH	7.09				SU	1		Field Sampling	Total/NA
Field Conductivity	794				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.9				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-12 | Lab Sample ID: 310-263836-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	48		5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	2.6		1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	810		20	8.4	mg/L	20		9056A	Total/NA
Barium	18		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	1200		100	76	ug/L	1		6020B	Total/NA
Calcium	15		0.50	0.19	mg/L	1		6020B	Total/NA
Lead	0.30	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	110		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	6500		500	150	ug/L	1		6020B	Total/NA
Manganese	50		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	2.7		2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	1.4	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	1.8	J	1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	1800		250	170	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	722.71				ft	1		Field Sampling	Total/NA
Field pH	7.80				SU	1		Field Sampling	Total/NA
Field Conductivity	2651				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	15.3				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-13 | Lab Sample ID: 310-263836-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	12		5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.70	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	1400		50	21	mg/L	50		9056A	Total/NA
Barium	19		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	1700		100	76	ug/L	1		6020B	Total/NA
Calcium	110		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	1.3		0.50	0.17	ug/L	1		6020B	Total/NA
Lead	0.37	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	170		10	2.5	ug/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: MW-13 (Continued)
Lab Sample ID: 310-263836-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Magnesium	54000		500	150	ug/L	1		6020B	Total/NA
Manganese	260		10	3.6	ug/L	1		6020B	Total/NA
Total Dissolved Solids	2100		250	170	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	722.33				ft	1		Field Sampling	Total/NA
Field pH	7.00				SU	1		Field Sampling	Total/NA
Field Conductivity	3242				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	16.3				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-14
Lab Sample ID: 310-263836-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	20		5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.75	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	810		20	8.4	mg/L	20		9056A	Total/NA
Arsenic	2.6		2.0	0.53	ug/L	1		6020B	Total/NA
Barium	22		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	1700		100	76	ug/L	1		6020B	Total/NA
Calcium	67		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.50		0.50	0.17	ug/L	1		6020B	Total/NA
Lead	0.34	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	140		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	31000		500	150	ug/L	1		6020B	Total/NA
Manganese	140		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	11		2.0	0.91	ug/L	1		6020B	Total/NA
Total Suspended Solids	9.0		1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	1800		250	170	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	722.42				ft	1		Field Sampling	Total/NA
Field pH	7.12				SU	1		Field Sampling	Total/NA
Field Conductivity	2904				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.2				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-15R
Lab Sample ID: 310-263836-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	9.2		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	680		20	8.4	mg/L	20		9056A	Total/NA
Barium	31		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	590		100	76	ug/L	1		6020B	Total/NA
Calcium	300		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	4.1		0.50	0.17	ug/L	1		6020B	Total/NA
Iron	540		100	36	ug/L	1		6020B	Total/NA
Lead	0.48	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	85		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	110000		2000	600	ug/L	4		6020B	Total/NA
Manganese	840		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	4.9		2.0	0.91	ug/L	1		6020B	Total/NA
Total Suspended Solids	1.5	J	1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	1300		250	170	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	760.68				ft	1		Field Sampling	Total/NA
Field pH	6.32				SU	1		Field Sampling	Total/NA
Field Conductivity	2287				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	18.4				Degrees C	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-16R   Lab Sample ID: 310-263836-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	20		5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.46	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	960		20	8.4	mg/L	20		9056A	Total/NA
Barium	41		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	1800		100	76	ug/L	1		6020B	Total/NA
Calcium	74		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.99		0.50	0.17	ug/L	1		6020B	Total/NA
Iron	320		100	36	ug/L	1		6020B	Total/NA
Lead	0.36	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	110		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	36000		500	150	ug/L	1		6020B	Total/NA
Manganese	260		10	3.6	ug/L	1		6020B	Total/NA
Selenium	1.8	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	2.4		1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	2200		250	170	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	722.52				ft	1		Field Sampling	Total/NA
Field pH	6.87				SU	1		Field Sampling	Total/NA
Field Conductivity	3188				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.6				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-100R   Lab Sample ID: 310-263836-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	32		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	190		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	50		2.0	0.64	ug/L	1		6020B	Total/NA
Calcium	120		0.50	0.19	mg/L	1		6020B	Total/NA
Copper	1.8	J	5.0	1.8	ug/L	1		6020B	Total/NA
Lead	0.24	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	19		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	35000		500	150	ug/L	1		6020B	Total/NA
Molybdenum	2.7		2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	1.4	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	1.4	J	1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	600		50	34	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	806.45				ft	1		Field Sampling	Total/NA
Field pH	7.17				SU	1		Field Sampling	Total/NA
Field Conductivity	938				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.8				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-101R   Lab Sample ID: 310-263836-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	6.9		5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.42	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	490		5.0	2.1	mg/L	5		9056A	Total/NA
Barium	47		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	620		100	76	ug/L	1		6020B	Total/NA
Calcium	200		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.34	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	130		100	36	ug/L	1		6020B	Total/NA
Lead	0.44	J B	0.50	0.24	ug/L	1		6020B	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-101R (Continued) Lab Sample ID: 310-263836-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	75		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	58000		500	150	ug/L	1		6020B	Total/NA
Manganese	84		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	6.3		2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	4.1	J	5.0	1.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	15		1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	1000		50	34	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	782.65				ft	1		Field Sampling	Total/NA
Field pH	6.90				SU	1		Field Sampling	Total/NA
Field Conductivity	1364				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	13.8				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-102P Lab Sample ID: 310-263836-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	9.5		5.0	2.3	mg/L	5		9056A	Total/NA
Fluoride	0.58	J	1.0	0.38	mg/L	5		9056A	Total/NA
Sulfate	1500		50	21	mg/L	50		9056A	Total/NA
Barium	25		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	1400		100	76	ug/L	1		6020B	Total/NA
Calcium	380		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.87		0.50	0.17	ug/L	1		6020B	Total/NA
Copper	2.7	J	5.0	1.8	ug/L	1		6020B	Total/NA
Iron	3400		100	36	ug/L	1		6020B	Total/NA
Lead	0.27	J B	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	220		40	10	ug/L	4		6020B	Total/NA
Magnesium	120000		2000	600	ug/L	4		6020B	Total/NA
Manganese	340		10	3.6	ug/L	1		6020B	Total/NA
Zinc	6.9	J	20	6.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	8.5		3.8	1.3	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	2600		250	170	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	723.20				ft	1		Field Sampling	Total/NA
Field pH	6.38				SU	1		Field Sampling	Total/NA
Field Conductivity	3037				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.3				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-108 Lab Sample ID: 310-263836-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	140		5.0	2.1	mg/L	5		9056A	Total/NA
Arsenic	1.7	J	2.0	0.53	ug/L	1		6020B	Total/NA
Barium	34		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	230		100	76	ug/L	1		6020B	Total/NA
Calcium	67		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	3.5		0.50	0.17	ug/L	1		6020B	Total/NA
Copper	2.0	J	5.0	1.8	ug/L	1		6020B	Total/NA
Iron	2200		100	36	ug/L	1		6020B	Total/NA
Lithium	40		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	13000		500	150	ug/L	1		6020B	Total/NA
Manganese	620		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	1.7	J	2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	1.9	J	5.0	1.4	ug/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: MW-108 (Continued)
Lab Sample ID: 310-263836-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Zinc	40		20	6.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	4.2		1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	290		50	34	mg/L	1		SM 2540C	Total/NA
Groundwater Elevation	740.77				ft	1		Field Sampling	Total/NA
Field pH	6.32				SU	1		Field Sampling	Total/NA
Field Conductivity	511.0				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	14.6				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: Field Blank
Lab Sample ID: 310-263836-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	84	J	100	76	ug/L	1		6020B	Total/NA
Calcium	0.27	J	0.50	0.19	mg/L	1		6020B	Total/NA
Lead	0.27	J B	0.50	0.24	ug/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-1R
Lab Sample ID: 310-263836-1

Date Collected: 08/29/23 13:25
Matrix: Water
Date Received: 08/31/23 16:50

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			09/06/23 21:20	5
Fluoride	0.40	J	1.0	0.38	mg/L			09/06/23 21:20	5
Sulfate	60		5.0	2.1	mg/L			09/06/23 21:20	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		09/05/23 08:00	09/15/23 23:57	1
Barium	75		2.0	0.64	ug/L		09/05/23 08:00	09/15/23 23:57	1
Beryllium	0.40	J	1.0	0.33	ug/L		09/05/23 08:00	09/19/23 11:49	1
Boron	<76		100	76	ug/L		09/05/23 08:00	09/15/23 23:57	1
Calcium	100		0.50	0.19	mg/L		09/05/23 08:00	09/15/23 23:57	1
Cobalt	<0.17		0.50	0.17	ug/L		09/05/23 08:00	09/15/23 23:57	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/15/23 23:57	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/15/23 23:57	1
Lead	0.29	J B	0.50	0.24	ug/L		09/05/23 08:00	09/15/23 23:57	1
Lithium	31		10	2.5	ug/L		09/05/23 08:00	09/19/23 11:49	1
Magnesium	29000		500	150	ug/L		09/05/23 08:00	09/15/23 23:57	1
Manganese	<3.6		10	3.6	ug/L		09/05/23 08:00	09/15/23 23:57	1
Molybdenum	1.8	J	2.0	0.91	ug/L		09/05/23 08:00	09/15/23 23:57	1
Selenium	2.6	J	5.0	1.4	ug/L		09/05/23 08:00	09/15/23 23:57	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/15/23 23:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	7.4		1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	530		50	34	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	810.74				ft			08/29/23 13:25	1
Field pH	7.09				SU			08/29/23 13:25	1
Field Conductivity	794				umhos/cm			08/29/23 13:25	1
Field Temperature	14.9				Degrees C			08/29/23 13:25	1

Client Sample ID: MW-12

Lab Sample ID: 310-263836-2

Date Collected: 08/29/23 12:45

Matrix: Water

Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	48		5.0	2.3	mg/L			09/06/23 21:35	5
Fluoride	2.6		1.0	0.38	mg/L			09/06/23 21:35	5
Sulfate	810		20	8.4	mg/L			09/13/23 12:10	20

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		09/05/23 08:00	09/16/23 00:04	1
Barium	18		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:04	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 11:56	1
Boron	1200		100	76	ug/L		09/05/23 08:00	09/16/23 00:04	1
Calcium	15		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:04	1
Cobalt	<0.17		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:04	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:04	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/16/23 00:04	1
Lead	0.30	J B	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:04	1
Lithium	110		10	2.5	ug/L		09/05/23 08:00	09/19/23 11:56	1
Magnesium	6500		500	150	ug/L		09/05/23 08:00	09/16/23 00:04	1
Manganese	50		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:04	1
Molybdenum	2.7		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:04	1
Selenium	1.4	J	5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:04	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	1.8	J	1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	1800		250	170	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	722.71				ft			08/29/23 12:45	1
Field pH	7.80				SU			08/29/23 12:45	1
Field Conductivity	2651				umhos/cm			08/29/23 12:45	1
Field Temperature	15.3				Degrees C			08/29/23 12:45	1

Client Sample ID: MW-13
Lab Sample ID: 310-263836-3

Date Collected: 08/30/23 10:00
Matrix: Water
Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**12**		5.0	2.3	mg/L			09/06/23 22:17	5
Fluoride	**0.70**	**J**	1.0	0.38	mg/L			09/06/23 22:17	5
Sulfate	**1400**		50	21	mg/L			09/13/23 12:23	50

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		09/05/23 08:00	09/16/23 00:07	1
Barium	**19**		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:07	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:11	1
Boron	**1700**		100	76	ug/L		09/05/23 08:00	09/16/23 00:07	1
Calcium	**110**		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:07	1
Cobalt	**1.3**		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:07	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:07	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/16/23 00:07	1
Lead	**0.37**	**J B**	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:07	1
Lithium	**170**		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:11	1
Magnesium	**54000**		500	150	ug/L		09/05/23 08:00	09/16/23 00:07	1
Manganese	**260**		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:07	1
Molybdenum	<0.91		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:07	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:07	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	<0.64		1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	**2100**		250	170	mg/L			09/05/23 19:03	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**722.33**				ft			08/30/23 10:00	1
Field pH	**7.00**				SU			08/30/23 10:00	1
Field Conductivity	**3242**				umhos/cm			08/30/23 10:00	1
Field Temperature	**16.3**				Degrees C			08/30/23 10:00	1

Client Sample ID: MW-14

Lab Sample ID: 310-263836-4

Date Collected: 08/30/23 09:05

Matrix: Water

Date Received: 08/31/23 16:50

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			09/06/23 22:31	5
Fluoride	0.75	J	1.0	0.38	mg/L			09/06/23 22:31	5
Sulfate	810		20	8.4	mg/L			09/13/23 12:36	20

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	2.6		2.0	0.53	ug/L		09/05/23 08:00	09/16/23 00:09	1
Barium	22		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:09	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:14	1
Boron	1700		100	76	ug/L		09/05/23 08:00	09/16/23 00:09	1
Calcium	67		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:09	1
Cobalt	0.50		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:09	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:09	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/16/23 00:09	1
Lead	0.34	J B	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:09	1
Lithium	140		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:14	1
Magnesium	31000		500	150	ug/L		09/05/23 08:00	09/16/23 00:09	1
Manganese	140		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:09	1
Molybdenum	11		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:09	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:09	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	9.0		1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	1800		250	170	mg/L			09/05/23 19:03	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	722.42				ft			08/30/23 09:05	1
Field pH	7.12				SU			08/30/23 09:05	1
Field Conductivity	2904				umhos/cm			08/30/23 09:05	1
Field Temperature	14.2				Degrees C			08/30/23 09:05	1

Client: SCS Engineers
Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: MW-15R
Lab Sample ID: 310-263836-5
Date Collected: 08/30/23 13:05
Matrix: Water
Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.2		5.0	2.3	mg/L			09/06/23 22:45	5
Fluoride	<0.38		1.0	0.38	mg/L			09/06/23 22:45	5
Sulfate	680		20	8.4	mg/L			09/13/23 13:16	20

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		09/05/23 08:00	09/16/23 00:12	1
Barium	31		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:12	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:16	1
Boron	590		100	76	ug/L		09/05/23 08:00	09/16/23 00:12	1
Calcium	300		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:12	1
Cobalt	4.1		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:12	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:12	1
Iron	540		100	36	ug/L		09/05/23 08:00	09/16/23 00:12	1
Lead	0.48	J B	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:12	1
Lithium	85		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:16	1
Magnesium	110000		2000	600	ug/L		09/05/23 08:00	09/21/23 14:39	4
Manganese	840		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:12	1
Molybdenum	4.9		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:12	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:12	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:12	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	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	1300		250	170	mg/L			09/05/23 19:03	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	760.68				ft			08/30/23 13:05	1
Field pH	6.32				SU			08/30/23 13:05	1
Field Conductivity	2287				umhos/cm			08/30/23 13:05	1
Field Temperature	18.4				Degrees C			08/30/23 13:05	1

Client Sample Results

Client: SCS Engineers
Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: MW-16R

Lab Sample ID: 310-263836-6

Date Collected: 08/29/23 09:25
Matrix: Water
Date Received: 08/31/23 16:50

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			09/06/23 22:59	5
Fluoride	**0.46**	**J**	1.0	0.38	mg/L			09/06/23 22:59	5
Sulfate	**960**		20	8.4	mg/L			09/13/23 13:30	20

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		09/05/23 08:00	09/16/23 00:14	1
Barium	**41**		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:14	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:18	1
Boron	**1800**		100	76	ug/L		09/05/23 08:00	09/16/23 00:14	1
Calcium	**74**		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:14	1
Cobalt	**0.99**		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:14	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:14	1
Iron	**320**		100	36	ug/L		09/05/23 08:00	09/16/23 00:14	1
Lead	**0.36**	**J B**	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:14	1
Lithium	**110**		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:18	1
Magnesium	**36000**		500	150	ug/L		09/05/23 08:00	09/16/23 00:14	1
Manganese	**260**		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:14	1
Molybdenum	<0.91		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:14	1
Selenium	**1.8**	**J**	5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:14	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:14	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**2.4**		1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	**2200**		250	170	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**722.52**				ft			08/29/23 09:25	1
Field pH	**6.87**				SU			08/29/23 09:25	1
Field Conductivity	**3188**				umhos/cm			08/29/23 09:25	1
Field Temperature	**14.6**				Degrees C			08/29/23 09:25	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263836-1

Client Sample ID: MW-100R

Date Collected: 08/29/23 10:55
Date Received: 08/31/23 16:50

Lab Sample ID: 310-263836-7

Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**32**		5.0	2.3	mg/L			09/06/23 23:13	5
Fluoride	<0.38		1.0	0.38	mg/L			09/06/23 23:13	5
Sulfate	**190**		5.0	2.1	mg/L			09/06/23 23:13	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		09/05/23 08:00	09/16/23 00:26	1
Barium	**50**		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:26	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:21	1
Boron	<76		100	76	ug/L		09/05/23 08:00	09/16/23 00:26	1
Calcium	**120**		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:26	1
Cobalt	<0.17		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:26	1
Copper	**1.8**	**J**	5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:26	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/16/23 00:26	1
Lead	**0.24**	**J B**	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:26	1
Lithium	**19**		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:21	1
Magnesium	**35000**		500	150	ug/L		09/05/23 08:00	09/16/23 00:26	1
Manganese	<3.6		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:26	1
Molybdenum	**2.7**		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:26	1
Selenium	**1.4**	**J**	5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:26	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:26	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**1.4**	**J**	1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	**600**		50	34	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**806.45**				ft			08/29/23 10:55	1
Field pH	**7.17**				SU			08/29/23 10:55	1
Field Conductivity	**938**				umhos/cm			08/29/23 10:55	1
Field Temperature	**14.8**				Degrees C			08/29/23 10:55	1

Client Sample ID: MW-101R **Lab Sample ID: 310-263836-8**
Date Collected: 08/29/23 11:45 **Matrix: Water**
Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.9		5.0	2.3	mg/L			09/06/23 23:27	5
Fluoride	0.42	J	1.0	0.38	mg/L			09/06/23 23:27	5
Sulfate	490		5.0	2.1	mg/L			09/06/23 23:27	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		09/05/23 08:00	09/16/23 00:28	1
Barium	47		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:28	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:23	1
Boron	620		100	76	ug/L		09/05/23 08:00	09/16/23 00:28	1
Calcium	200		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:28	1
Cobalt	0.34	J	0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:28	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:28	1
Iron	130		100	36	ug/L		09/05/23 08:00	09/16/23 00:28	1
Lead	0.44	J B	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:28	1
Lithium	75		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:23	1
Magnesium	58000		500	150	ug/L		09/05/23 08:00	09/16/23 00:28	1
Manganese	84		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:28	1
Molybdenum	6.3		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:28	1
Selenium	4.1	J	5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:28	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	15		1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	1000		50	34	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	782.65				ft			08/29/23 11:45	1
Field pH	6.90				SU			08/29/23 11:45	1
Field Conductivity	1364				umhos/cm			08/29/23 11:45	1
Field Temperature	13.8				Degrees C			08/29/23 11:45	1

Client Sample ID: MW-102P — Lab Sample ID: 310-263836-9

Date Collected: 08/29/23 10:15 — **Matrix: Water**
Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.5		5.0	2.3	mg/L			09/06/23 23:41	5
Fluoride	0.58	J	1.0	0.38	mg/L			09/06/23 23:41	5
Sulfate	1500		50	21	mg/L			09/13/23 13:44	50

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		09/05/23 08:00	09/16/23 00:31	1
Barium	25		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:31	1
Beryllium	<1.3		4.0	1.3	ug/L		09/05/23 08:00	09/19/23 12:25	4
Boron	1400		100	76	ug/L		09/05/23 08:00	09/16/23 00:31	1
Calcium	380		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:31	1
Cobalt	0.87		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:31	1
Copper	2.7	J	5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:31	1
Iron	3400		100	36	ug/L		09/05/23 08:00	09/16/23 00:31	1
Lead	0.27	J B	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:31	1
Lithium	220		40	10	ug/L		09/05/23 08:00	09/19/23 12:25	4
Magnesium	120000		2000	600	ug/L		09/05/23 08:00	09/20/23 13:43	4
Manganese	340		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:31	1
Molybdenum	<0.91		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:31	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:31	1
Zinc	6.9	J	20	6.4	ug/L		09/05/23 08:00	09/16/23 00:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	8.5		3.8	1.3	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	2600		250	170	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	723.20				ft			08/29/23 10:15	1
Field pH	6.38				SU			08/29/23 10:15	1
Field Conductivity	3037				umhos/cm			08/29/23 10:15	1
Field Temperature	14.3				Degrees C			08/29/23 10:15	1

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263836-1

Client Sample ID: MW-108

Date Collected: 08/30/23 12:00
Date Received: 08/31/23 16:50

Lab Sample ID: 310-263836-10

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			09/06/23 23:56	5
Fluoride	<0.38		1.0	0.38	mg/L			09/06/23 23:56	5
Sulfate	**140**		5.0	2.1	mg/L			09/06/23 23:56	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.7**	**J**	2.0	0.53	ug/L		09/05/23 08:00	09/16/23 00:33	1
Barium	**34**		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:33	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:28	1
Boron	**230**		100	76	ug/L		09/05/23 08:00	09/16/23 00:33	1
Calcium	**67**		0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:33	1
Cobalt	**3.5**		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:33	1
Copper	**2.0**	**J**	5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:33	1
Iron	**2200**		100	36	ug/L		09/05/23 08:00	09/16/23 00:33	1
Lead	<0.24		0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:33	1
Lithium	**40**		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:28	1
Magnesium	**13000**		500	150	ug/L		09/05/23 08:00	09/16/23 00:33	1
Manganese	**620**		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:33	1
Molybdenum	**1.7**	**J**	2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:33	1
Selenium	**1.9**	**J**	5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:33	1
Zinc	**40**		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**4.2**		1.9	0.64	mg/L			09/01/23 10:23	1
Total Dissolved Solids (SM 2540C)	**290**		50	34	mg/L			09/05/23 19:03	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Groundwater Elevation	**740.77**				ft			08/30/23 12:00	1
Field pH	**6.32**				SU			08/30/23 12:00	1
Field Conductivity	**511.0**				umhos/cm			08/30/23 12:00	1
Field Temperature	**14.6**				Degrees C			08/30/23 12:00	1

Client Sample ID: Field Blank | Lab Sample ID: 310-263836-11

Date Collected: 08/30/23 14:00 | **Matrix: Water**

Date Received: 08/31/23 16:50

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			09/07/23 00:10	1
Fluoride	<0.075		0.20	0.075	mg/L			09/07/23 00:10	1
Sulfate	<0.42		1.0	0.42	mg/L			09/07/23 00:10	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		09/05/23 08:00	09/16/23 00:36	1
Barium	<0.64		2.0	0.64	ug/L		09/05/23 08:00	09/16/23 00:36	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/19/23 12:31	1
Boron	**84**	**J**	100	76	ug/L		09/05/23 08:00	09/16/23 00:36	1
Calcium	**0.27**	**J**	0.50	0.19	mg/L		09/05/23 08:00	09/16/23 00:36	1
Cobalt	<0.17		0.50	0.17	ug/L		09/05/23 08:00	09/16/23 00:36	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/16/23 00:36	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/16/23 00:36	1
Lead	**0.27**	**J B**	0.50	0.24	ug/L		09/05/23 08:00	09/16/23 00:36	1
Lithium	<2.5		10	2.5	ug/L		09/05/23 08:00	09/19/23 12:31	1
Magnesium	<150		500	150	ug/L		09/05/23 08:00	09/16/23 00:36	1
Manganese	<3.6		10	3.6	ug/L		09/05/23 08:00	09/16/23 00:36	1
Molybdenum	<0.91		2.0	0.91	ug/L		09/05/23 08:00	09/16/23 00:36	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/16/23 00:36	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/16/23 00:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	<0.64		1.9	0.64	mg/L			09/01/23 10:23	1
Total Dissolved Solids (SM 2540C)	<34		50	34	mg/L			09/05/23 19:03	1

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

Qualifiers

HPLC/IC

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.

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.
B	Compound was found in the blank and sample.
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

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-399437/3
Matrix: Water
Analysis Batch: 399437

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			09/06/23 19:42	1
Fluoride	<0.075		0.20	0.075	mg/L			09/06/23 19:42	1
Sulfate	<0.42		1.0	0.42	mg/L			09/06/23 19:42	1

Lab Sample ID: LCS 310-399437/35
Matrix: Water
Analysis Batch: 399437

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	9.51		mg/L		95	90 - 110
Fluoride	2.00	2.07		mg/L		103	90 - 110
Sulfate	10.0	9.60		mg/L		96	90 - 110

Lab Sample ID: MB 310-399469/3
Matrix: Water
Analysis Batch: 399469

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			09/13/23 10:38	1
Fluoride	<0.075		0.20	0.075	mg/L			09/13/23 10:38	1
Sulfate	<0.42		1.0	0.42	mg/L			09/13/23 10:38	1

Lab Sample ID: LCS 310-399469/4
Matrix: Water
Analysis Batch: 399469

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	9.57		mg/L		96	90 - 110
Fluoride	2.00	2.06		mg/L		103	90 - 110
Sulfate	10.0	9.98		mg/L		100	90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-398503/1-A
Matrix: Water
Analysis Batch: 399799

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 398503

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	<3.6		10	3.6	ug/L		09/05/23 08:00	09/15/23 23:52	1

Lab Sample ID: LCS 310-398503/2-A
Matrix: Water
Analysis Batch: 399799

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Manganese	100	94.2		ug/L		94	80 - 120

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

Lab Sample ID: 310-263836-1 MS
Matrix: Water
Analysis Batch: 399799

Client Sample ID: MW-1R
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	<0.53		200	210		ug/L		105	75 - 125
Barium	75		100	182		ug/L		106	75 - 125
Boron	<76		200	228		ug/L		114	75 - 125
Calcium	100		2.00	100	4	mg/L		-6	75 - 125
Cobalt	<0.17		100	96.3		ug/L		96	75 - 125
Copper	<1.8		200	197		ug/L		99	75 - 125
Iron	<36		200	231		ug/L		115	75 - 125
Lead	0.29	J B	200	203		ug/L		101	75 - 125
Magnesium	29000		2000	30600	4	ug/L		70	75 - 125
Manganese	<3.6		100	98.7		ug/L		99	75 - 125
Molybdenum	1.8	J	200	207		ug/L		102	75 - 125
Selenium	2.6	J	400	413		ug/L		102	75 - 125
Zinc	<6.4		200	202		ug/L		101	75 - 125

Lab Sample ID: 310-263836-1 MS
Matrix: Water
Analysis Batch: 400008

Client Sample ID: MW-1R
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Beryllium	0.40	J	100	106		ug/L		105	75 - 125
Lithium	31		200	247		ug/L		108	75 - 125

Lab Sample ID: 310-263836-1 MSD
Matrix: Water
Analysis Batch: 399799

Client Sample ID: MW-1R
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	<0.53		200	212		ug/L		106	75 - 125	1	20
Barium	75		100	181		ug/L		106	75 - 125	0	20
Boron	<76		200	232		ug/L		116	75 - 125	1	20
Calcium	100		2.00	99.8	4	mg/L		-15	75 - 125	0	20
Cobalt	<0.17		100	97.2		ug/L		97	75 - 125	1	20
Copper	<1.8		200	199		ug/L		100	75 - 125	1	20
Iron	<36		200	241		ug/L		120	75 - 125	4	20
Lead	0.29	J B	200	204		ug/L		102	75 - 125	1	20
Magnesium	29000		2000	30900	4	ug/L		86	75 - 125	1	20
Manganese	<3.6		100	99.1		ug/L		99	75 - 125	0	20
Molybdenum	1.8	J	200	210		ug/L		104	75 - 125	2	20
Selenium	2.6	J	400	415		ug/L		103	75 - 125	0	20
Zinc	<6.4		200	204		ug/L		102	75 - 125	1	20

Lab Sample ID: 310-263836-1 MSD
Matrix: Water
Analysis Batch: 400008

Client Sample ID: MW-1R
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Beryllium	0.40	J	100	106		ug/L		106	75 - 125	0	20
Lithium	31		200	250		ug/L		110	75 - 125	1	20

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263836-1

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

Lab Sample ID: 310-263836-11 DU
Matrix: Water
Analysis Batch: 399799

Client Sample ID: Field Blank
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	<0.53		<0.53		ug/L		NC	20
Barium	<0.64		<0.64		ug/L		NC	20
Boron	84	J	<76		ug/L		NC	20
Calcium	0.27	J	<0.19		mg/L		NC	20
Cobalt	<0.17		<0.17		ug/L		NC	20
Copper	<1.8		<1.8		ug/L		NC	20
Iron	<36		<36		ug/L		NC	20
Lead	0.27	J B	<0.24		ug/L		NC	20
Magnesium	<150		<150		ug/L		NC	20
Manganese	<3.6		<3.6		ug/L		NC	20
Molybdenum	<0.91		<0.91		ug/L		NC	20
Selenium	<1.4		<1.4		ug/L		NC	20
Zinc	<6.4		<6.4		ug/L		NC	20

Lab Sample ID: 310-263836-11 DU
Matrix: Water
Analysis Batch: 400008

Client Sample ID: Field Blank
Prep Type: Total/NA
Prep Batch: 398503

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	<0.33		<0.33		ug/L		NC	20
Lithium	<2.5		<2.5		ug/L		NC	20

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

Lab Sample ID: MB 310-398435/1
Matrix: Water
Analysis Batch: 398435

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	<1.7		5.0	1.7	mg/L			09/01/23 10:23	1

Lab Sample ID: LCS 310-398435/2
Matrix: Water
Analysis Batch: 398435

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	75 - 116

Lab Sample ID: MB 310-398454/1
Matrix: Water
Analysis Batch: 398454

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	<1.7		5.0	1.7	mg/L			09/01/23 11:27	1

Client: SCS Engineers Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

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

Lab Sample ID: LCS 310-398454/2 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 398454

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Suspended Solids	100	102		mg/L		102	75 - 116

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

Lab Sample ID: MB 310-398464/1 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 398464

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<34		50	34	mg/L			09/01/23 12:12	1

Lab Sample ID: LCS 310-398464/2 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 398464

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	940		mg/L		94	90 - 110

Lab Sample ID: MB 310-398653/1 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 398653

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<34		50	34	mg/L			09/05/23 19:03	1

Lab Sample ID: LCS 310-398653/2 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 398653

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	970		mg/L		97	90 - 110

HPLC/IC

Analysis Batch: 399437

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	9056A	
310-263836-2	MW-12	Total/NA	Water	9056A	
310-263836-3	MW-13	Total/NA	Water	9056A	
310-263836-4	MW-14	Total/NA	Water	9056A	
310-263836-5	MW-15R	Total/NA	Water	9056A	
310-263836-6	MW-16R	Total/NA	Water	9056A	
310-263836-7	MW-100R	Total/NA	Water	9056A	
310-263836-8	MW-101R	Total/NA	Water	9056A	
310-263836-9	MW-102P	Total/NA	Water	9056A	
310-263836-10	MW-108	Total/NA	Water	9056A	
310-263836-11	Field Blank	Total/NA	Water	9056A	
MB 310-399437/3	Method Blank	Total/NA	Water	9056A	
LCS 310-399437/35	Lab Control Sample	Total/NA	Water	9056A	

Analysis Batch: 399469

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-2	MW-12	Total/NA	Water	9056A	
310-263836-3	MW-13	Total/NA	Water	9056A	
310-263836-4	MW-14	Total/NA	Water	9056A	
310-263836-5	MW-15R	Total/NA	Water	9056A	
310-263836-6	MW-16R	Total/NA	Water	9056A	
310-263836-9	MW-102P	Total/NA	Water	9056A	
MB 310-399469/3	Method Blank	Total/NA	Water	9056A	
LCS 310-399469/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 398503

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	3005A	
310-263836-2	MW-12	Total/NA	Water	3005A	
310-263836-3	MW-13	Total/NA	Water	3005A	
310-263836-4	MW-14	Total/NA	Water	3005A	
310-263836-5	MW-15R	Total/NA	Water	3005A	
310-263836-6	MW-16R	Total/NA	Water	3005A	
310-263836-7	MW-100R	Total/NA	Water	3005A	
310-263836-8	MW-101R	Total/NA	Water	3005A	
310-263836-9	MW-102P	Total/NA	Water	3005A	
310-263836-10	MW-108	Total/NA	Water	3005A	
310-263836-11	Field Blank	Total/NA	Water	3005A	
MB 310-398503/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-398503/2-A	Lab Control Sample	Total/NA	Water	3005A	
310-263836-1 MS	MW-1R	Total/NA	Water	3005A	
310-263836-1 MSD	MW-1R	Total/NA	Water	3005A	
310-263836-11 DU	Field Blank	Total/NA	Water	3005A	

Analysis Batch: 399799

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	6020B	398503
310-263836-2	MW-12	Total/NA	Water	6020B	398503
310-263836-3	MW-13	Total/NA	Water	6020B	398503

Metals (Continued)

Analysis Batch: 399799 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-4	MW-14	Total/NA	Water	6020B	398503
310-263836-5	MW-15R	Total/NA	Water	6020B	398503
310-263836-6	MW-16R	Total/NA	Water	6020B	398503
310-263836-7	MW-100R	Total/NA	Water	6020B	398503
310-263836-8	MW-101R	Total/NA	Water	6020B	398503
310-263836-9	MW-102P	Total/NA	Water	6020B	398503
310-263836-10	MW-108	Total/NA	Water	6020B	398503
310-263836-11	Field Blank	Total/NA	Water	6020B	398503
MB 310-398503/1-A	Method Blank	Total/NA	Water	6020B	398503
LCS 310-398503/2-A	Lab Control Sample	Total/NA	Water	6020B	398503
310-263836-1 MS	MW-1R	Total/NA	Water	6020B	398503
310-263836-1 MSD	MW-1R	Total/NA	Water	6020B	398503
310-263836-11 DU	Field Blank	Total/NA	Water	6020B	398503

Analysis Batch: 400008

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	6020B	398503
310-263836-2	MW-12	Total/NA	Water	6020B	398503
310-263836-3	MW-13	Total/NA	Water	6020B	398503
310-263836-4	MW-14	Total/NA	Water	6020B	398503
310-263836-5	MW-15R	Total/NA	Water	6020B	398503
310-263836-6	MW-16R	Total/NA	Water	6020B	398503
310-263836-7	MW-100R	Total/NA	Water	6020B	398503
310-263836-8	MW-101R	Total/NA	Water	6020B	398503
310-263836-9	MW-102P	Total/NA	Water	6020B	398503
310-263836-10	MW-108	Total/NA	Water	6020B	398503
310-263836-11	Field Blank	Total/NA	Water	6020B	398503
310-263836-1 MS	MW-1R	Total/NA	Water	6020B	398503
310-263836-1 MSD	MW-1R	Total/NA	Water	6020B	398503
310-263836-11 DU	Field Blank	Total/NA	Water	6020B	398503

Analysis Batch: 400141

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-9	MW-102P	Total/NA	Water	6020B	398503

Analysis Batch: 400290

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-5	MW-15R	Total/NA	Water	6020B	398503

General Chemistry

Analysis Batch: 398435

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-10	MW-108	Total/NA	Water	I-3765-85	
310-263836-11	Field Blank	Total/NA	Water	I-3765-85	
MB 310-398435/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-398435/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 398454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	I-3765-85	

General Chemistry (Continued)

Analysis Batch: 398454 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-2	MW-12	Total/NA	Water	I-3765-85	
310-263836-3	MW-13	Total/NA	Water	I-3765-85	
310-263836-4	MW-14	Total/NA	Water	I-3765-85	
310-263836-5	MW-15R	Total/NA	Water	I-3765-85	
310-263836-6	MW-16R	Total/NA	Water	I-3765-85	
310-263836-7	MW-100R	Total/NA	Water	I-3765-85	
310-263836-8	MW-101R	Total/NA	Water	I-3765-85	
310-263836-9	MW-102P	Total/NA	Water	I-3765-85	
MB 310-398454/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-398454/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 398464

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	SM 2540C	
310-263836-2	MW-12	Total/NA	Water	SM 2540C	
310-263836-6	MW-16R	Total/NA	Water	SM 2540C	
310-263836-7	MW-100R	Total/NA	Water	SM 2540C	
310-263836-8	MW-101R	Total/NA	Water	SM 2540C	
310-263836-9	MW-102P	Total/NA	Water	SM 2540C	
MB 310-398464/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-398464/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 398653

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-3	MW-13	Total/NA	Water	SM 2540C	
310-263836-4	MW-14	Total/NA	Water	SM 2540C	
310-263836-5	MW-15R	Total/NA	Water	SM 2540C	
310-263836-10	MW-108	Total/NA	Water	SM 2540C	
310-263836-11	Field Blank	Total/NA	Water	SM 2540C	
MB 310-398653/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-398653/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 398708

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263836-1	MW-1R	Total/NA	Water	Field Sampling	
310-263836-2	MW-12	Total/NA	Water	Field Sampling	
310-263836-3	MW-13	Total/NA	Water	Field Sampling	
310-263836-4	MW-14	Total/NA	Water	Field Sampling	
310-263836-5	MW-15R	Total/NA	Water	Field Sampling	
310-263836-6	MW-16R	Total/NA	Water	Field Sampling	
310-263836-7	MW-100R	Total/NA	Water	Field Sampling	
310-263836-8	MW-101R	Total/NA	Water	Field Sampling	
310-263836-9	MW-102P	Total/NA	Water	Field Sampling	
310-263836-10	MW-108	Total/NA	Water	Field Sampling	

Lab Chronicle

Client: SCS Engineers
Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: MW-1R
Lab Sample ID: 310-263836-1
Date Collected: 08/29/23 13:25
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 21:20
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/15/23 23:57
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 11:49
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/29/23 13:25

Client Sample ID: MW-12
Lab Sample ID: 310-263836-2
Date Collected: 08/29/23 12:45
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 21:35
Total/NA	Analysis	9056A		20	399469	QTZ5	EET CF	09/13/23 12:10
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:04
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 11:56
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/29/23 12:45

Client Sample ID: MW-13
Lab Sample ID: 310-263836-3
Date Collected: 08/30/23 10:00
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 22:17
Total/NA	Analysis	9056A		50	399469	QTZ5	EET CF	09/13/23 12:23
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:07
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:11
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/30/23 10:00

Client Sample ID: MW-14 Lab Sample ID: 310-263836-4

Date Collected: 08/30/23 09:05 Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 22:31
Total/NA	Analysis	9056A		20	399469	QTZ5	EET CF	09/13/23 12:36
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:09
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:14
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/30/23 09:05

Client Sample ID: MW-15R Lab Sample ID: 310-263836-5

Date Collected: 08/30/23 13:05 Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 22:45
Total/NA	Analysis	9056A		20	399469	QTZ5	EET CF	09/13/23 13:16
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:12
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:16
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		4	400290	A6US	EET CF	09/21/23 14:39
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/30/23 13:05

Client Sample ID: MW-16R Lab Sample ID: 310-263836-6

Date Collected: 08/29/23 09:25 Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 22:59
Total/NA	Analysis	9056A		20	399469	QTZ5	EET CF	09/13/23 13:30
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:14
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:18
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/29/23 09:25

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263836-1

Client Sample ID: MW-100R

Lab Sample ID: 310-263836-7

Date Collected: 08/29/23 10:55
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 23:13
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:26
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:21
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/29/23 10:55

Client Sample ID: MW-101R

Lab Sample ID: 310-263836-8

Date Collected: 08/29/23 11:45
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 23:27
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:28
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:23
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/29/23 11:45

Client Sample ID: MW-102P

Lab Sample ID: 310-263836-9

Date Collected: 08/29/23 10:15
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 23:41
Total/NA	Analysis	9056A		50	399469	QTZ5	EET CF	09/13/23 13:44
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:31
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		4	400008	DHM5	EET CF	09/19/23 12:25
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		4	400141	A6US	EET CF	09/20/23 13:43
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/29/23 10:15

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263836-1

Client Sample ID: MW-108

Lab Sample ID: 310-263836-10

Date Collected: 08/30/23 12:00
Date Received: 08/31/23 16:50

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 23:56
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:33
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:28
Total/NA	Analysis	I-3765-85		1	398435	DGU1	EET CF	09/01/23 10:23
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03
Total/NA	Analysis	Field Sampling		1	398708	BJ0R	EET CF	08/30/23 12:00

Client Sample ID: Field Blank

Lab Sample ID: 310-263836-11

Date Collected: 08/30/23 14:00
Date Received: 08/31/23 16:50

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		1	399437	QTZ5	EET CF	09/07/23 00:10
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	399799	A6US	EET CF	09/16/23 00:36
Total/NA	Prep	3005A			398503	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400008	DHM5	EET CF	09/19/23 12:31
Total/NA	Analysis	I-3765-85		1	398435	DGU1	EET CF	09/01/23 10:23
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03

Laboratory References:

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

Client: SCS Engineers | Job ID: 310-263836-1
Project/Site: Ottumwa Midland Landfill 25223073

Laboratory: Eurofins Cedar Falls

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

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-23

Method Summary

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

310-263836 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: SCS			
City/State.	CITY	STATE	Project: Ottumwa
Receipt Information			
Date/Time Received·	DATE 8/31/23	TIME 1650	Received By· LR
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 # _____ of _____	
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): 1.1		Corrected Temp (°C)· 1.1	
• **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 | Environment Testing

Client Information	Sampler: Tyler Stirling	Lab PM: Fredrick, Sandie	Carrier Tracking No(s).	COC No: 310-84287-22373.1
Client Contact: Meghan Blodgett	Phone: 615-505-2716	E-Mail: Sandra.Fredrick@et.eurofinsus.com	State of Origin:	Page: Page 1 of 3
Company: SCS Engineers	PWSID:			Job #: 25223073
Address: 2830 Dairy Drive	Due Date Requested:			
City: Madison	TAT Requested (days):			
State, Zip: WI, 53718	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 25223073			
Email: mblodgett@scsengineers.com	WO #:			
Project Name: Ottumwa Midland Landfill 25223073	Project #: 31011020			
Site:	SSOW#:			

Analysis Requested

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)	2540C_Calcd, 9056A_ORGFM_28D, I_3766_86	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	N		
MW-1R	8/29/23	1 25	G	Water			X	X		
MW-12	8/29/23	12:45	G	Water			X	X		
MW-13	8/30/23	10 00	G	Water			X	X		
MW-14	8/30/23	9 05	G	Water			X	X		
MW-15R	8/30/23	1 05	G	Water			X	X		
MW-16R	8/29/23	9:25	G	Water			X	X		
MW-100R	8/29/23	10 55	G	Water			X	X		
MW-101R	8/29/23	11:45	G	Water			X	X		
MW-102P	8/29/23	10 15	G	Water			X	X		
MW-108	8/30/23	12:00	G	Water			X	X		
Field Blank	8/30/23	2:00	G	Water			X	X		

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Y - Trizma
Z - other (specify)
Other:

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: Tyler S	Date/Time: 8/31/23 @ 1 30	Company: SCS	Received by: [signature]	Date/Time: 8/31/23 1650	Company
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: 06/08/2021

Table 1 Sampling Points and Parameters

Groundwater Monitoring - Ottumwa Midland CCR Landfill / SCS Engineers Project #25223073

		Groundwater Monitoring Wells																																	
	Parameter	MW-1R	MW-5	MW-6	MW-8	MW-9P	MW-9M	MW-10	MW-10R	MW-11R	MW-12	MW-13	MW-14	MW-15R	MW-16R	MW-17	MW-100R	MW-101R	MW-102	MW-102P	MW-102M	MW-107	MW-108	MW-110	MW-110P	MW-111	MW-112	MW-115	MW-116	MW-116P	MW-116M	MW-117	MW-122	MW-122P	MW-122M
Unfiltered Metals	Arsenic, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Barium, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Beryllium, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Boron, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Calcium, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Cobalt, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Copper, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Iron, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Lead, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Lithium, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Magnesium, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Manganese, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Molybdenum, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Selenium, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Zinc, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
Additional Lab Parameters	Chloride, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Sulfate, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Fluoride, Total (Unfiltered)	x									x	x	x	x	x	x	x	x		x			x												
	Total Dissolved Solids	x									x	x	x	x	x	x	x	x		x			x												
	Total Suspended Solids	x									x	x	x	x	x	x	x	x		x			x												
	Field Parameters																																		
	pH	x									x	x	x	x	x	x	x	x		x			x												
	Conductance	x									x	x	x	x	x	x	x	x		x			x												
	Temperature	x									x	x	x	x	x	x	x	x		x			x												
	Turbidity Field	x									x	x	x	x	x	x	x	x		x			x												
	Color Field	x									x	x	x	x	x	x	x	x		x			x												
	Odor Field	x									x	x	x	x	x	x	x	x		x			x												
	Water 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	x	x	x	x	x	x	x	x	x	x
	Well Depth**		x	x	x	x	x	x	x	x						x			x			x		x	x	x	x	x	x	x	x	x	x	x	
	Surface Water Depth*																																		

Updated 7/20/2023

I:\25223073.00\Data and Calculations\Field Work Requests\August 2023\[State_Sampling_Points_Parameters_OML_Aug_Table for Lab.xls]Sampling

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-263836-1

Login Number: 263836
List Number: 1
Creator: Tucker, Sarah L

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	

Groundwater Monitoring Results - Field Parameters
Ottumwa Midland Landfill / SCS Engineers Project #25223073.00
August 2023

Sample	Date	Temperature (Deg. C)	pH (Std. Units)	Specific Conductivity (µmhos/cm)	GW Elevation (feet)
MW-1R	8/29/2023	14.9	7.09	794	810.74
MW-12	8/29/2023	15.3	7.80	2651	722.71
MW-13	8/30/2023	16.3	7.00	3242	722.33
MW-14	8/30/2023	14.2	7.12	2904	722.42
MW-15R	8/30/2023	18.4	6.32	2287	760.68
MW-16R	8/29/2023	14.6	6.87	3188	722.52
MW-100R	8/29/2023	14.8	7.17	938	806.45
MW-101R	8/29/2023	13.8	6.90	1364	782.65
MW-102P	8/29/2023	14.3	6.38	3037	723.20
MW-108	8/30/2023	14.6	6.32	511.0	740.77
SW-3	8/30/2023	31.4	9.01	--	--
TCB-1/2	8/30/2023	26.6	7.79	1003	--
Leachate Basin	8/30/2023	30.3	8.86	5364	--

Abbreviations:
amsl = above mean sea level
µmhos/cm = microSiemens per centimeter
NM = Not Measured

Laboratory Notes/Qualifiers:
none

Created by:	AJR	Date:	8/15/2019
Last revision by:	RM	Date:	9/1/2023
Checked by:	EMS	Date:	9/1/2023

C:\Users\hld0\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\USG3GGGC\[2308_OML_GW_Field_Data.xlsx]GW Field Data

Table 1, Page 1 of 1

Sandra Fredrick

From: Matzuk, Ryan <RMatzuk@scsengineers.com>
Sent: Friday, September 1, 2023 3:24 PM
To: Sandra Fredrick
Cc: Blodgett, Meghan; Burris, Natalie
Subject: Re: Eurofins Environment Testing North Central, LLC Sample Login Confirmation files from 310-263831-1 Ottumwa Midland Landfill 25223073
Attachments: 2308_OML_GW_Field_Data.xlsx

EXTERNAL EMAIL*

Hi Sandie - I have attached the field data for 310-263831-1 and 310-263836-1.

Two changes requested for the surface water sampling report 310-263831-1:
We changed our minds about running SW-5, please cancel/do not run this sampling point.
Please change "Leachate Lagoon" sample name to "Leachate Basin".

Happy with everything else on both SAFs.

Thank you,

Ryan Matzuk
Hydrogeologist
2830 Dairy Drive
Madison, WI 53718-6751 USA
608-400-9597 (C)
608-216-7326 (W)
rmatzuk@scsengineers.com

Driven by Client Success
www.scsengineers.com

From: Sandie Fredrick <Sandra.Fredrick@et.eurofinsus.com>
Sent: Thursday, August 31, 2023 7:50 PM
To: Blodgett, Meghan <mblodgett@scsengineers.com>; Burris, Natalie <NBurris@scsengineers.com>; Matzuk, Ryan <RMatzuk@scsengineers.com>; Clark, Sherren <SClark@scsengineers.com>; Karwoski, Thomas <TKarwoski@scsengineers.com>
Subject: Eurofins Environment Testing North Central, LLC Sample Login Confirmation files from 310-263831-1 Ottumwa Midland Landfill 25223073

This email originated from outside of SCS Engineers. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello All,

Please send field data when you can.
Thanks
Sandie

Attached, please find the Sample Confirmation files for job 310-263831-1; Ottumwa Midland Landfill 25223073

Please feel free to contact me if you have any questions.

Thank you.

Sandie Fredrick
Project Manager

Eurofins Environment Testing

Phone: 920-261-1660

E-mail: Sandra.Fredrick@et.eurofinsus.com
www.eurofinsus.com/env

Reference: [310-663094]
Attachments: 3

* WARNING - EXTERNAL: This email originated from outside of Eurofins Environment Testing America. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!

Environment Testing

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ANALYTICAL REPORT

PREPARED FOR

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

Generated 10/2/2023 9:10:43 AM Revision 1

JOB DESCRIPTION

Ottumwa Midland Landfill 25223073

JOB NUMBER

310-263831-1

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls IA 50613

See page two for job notes and contact information.

my EOL

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

Generated
10/2/2023 9:10:43 AM
Revision 1

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

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

Table of Contents

Case Narrative

Client: SCS Engineers Job ID: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263831-1

Laboratory: Eurofins Cedar Falls

Narrative

Job Narrative
310-263831-1

Revision
The report being provided is a revision of the original report sent on 09/21/23. The report (revision 1) is being revised due to: The specific conductivity value for TCB-1/2 is listed in this report as Field Turbidity..

Receipt
The samples were received on 08/31/23 16:50. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.7º C.

HPLC/IC
Method 9056A: The following samples were diluted due to the nature of the sample matrix: TCB 1/2 (310-263831-1), SW-3 (310-263831-2) and Leachate Basin (310-263831-4). 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: Ottumwa Midland Landfill 25223073

Job ID: 310-263831-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-263831-1	TCB 1/2	Water	08/29/23 08:00	08/31/23 16:50
310-263831-2	SW-3	Water	08/30/23 10:15	08/31/23 16:50
310-263831-4	Leachate Basin	Water	08/30/23 13:15	08/31/23 16:50

Detection Summary

Client: SCS Engineers
Job ID: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: TCB 1/2
Lab Sample ID: 310-263831-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	18		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	560		20	8.4	mg/L	20		9056A	Total/NA
Arsenic	1.3	J	2.0	0.53	ug/L	1		6020B	Total/NA
Barium	63		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	480		100	76	ug/L	1		6020B	Total/NA
Calcium	140		0.50	0.19	mg/L	1		6020B	Total/NA
Iron	52	J	100	36	ug/L	1		6020B	Total/NA
Magnesium	15000		500	150	ug/L	1		6020B	Total/NA
Manganese	8.9	J	10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	4.1		2.0	0.91	ug/L	1		6020B	Total/NA
Total Suspended Solids	1.3	J	1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	730		50	34	mg/L	1		SM 2540C	Total/NA
Field pH	7.79				SU	1		Field Sampling	Total/NA
Field Conductivity	1003				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	26.6				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: SW-3
Lab Sample ID: 310-263831-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	16		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	830		20	8.4	mg/L	20		9056A	Total/NA
Arsenic	3.1		2.0	0.53	ug/L	1		6020B	Total/NA
Barium	21		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	960		100	76	ug/L	1		6020B	Total/NA
Calcium	140		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.41	J	0.50	0.17	ug/L	1		6020B	Total/NA
Iron	130		100	36	ug/L	1		6020B	Total/NA
Lead	0.28	J	0.50	0.24	ug/L	1		6020B	Total/NA
Lithium	11		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	54000		500	150	ug/L	1		6020B	Total/NA
Manganese	45		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	25		2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	2.1	J	5.0	1.4	ug/L	1		6020B	Total/NA
Zinc	9.8	J	20	6.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	14		1.9	0.64	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	1000		50	34	mg/L	1		SM 2540C	Total/NA
Field pH	9.01				SU	1		Field Sampling	Total/NA
Field Temperature	31.4				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: Leachate Basin
Lab Sample ID: 310-263831-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	410		5.0	2.3	mg/L	5		9056A	Total/NA
Sulfate	2500		50	21	mg/L	50		9056A	Total/NA
Arsenic	4.9		2.0	0.53	ug/L	1		6020B	Total/NA
Barium	61		2.0	0.64	ug/L	1		6020B	Total/NA
Boron	2200		100	76	ug/L	1		6020B	Total/NA
Calcium	200		0.50	0.19	mg/L	1		6020B	Total/NA
Cobalt	0.30	J	0.50	0.17	ug/L	1		6020B	Total/NA
Copper	2.4	J	5.0	1.8	ug/L	1		6020B	Total/NA
Lithium	35		10	2.5	ug/L	1		6020B	Total/NA
Magnesium	34000		500	150	ug/L	1		6020B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Job ID: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: Leachate Basin (Continued) — Lab Sample ID: 310-263831-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Manganese	16		10	3.6	ug/L	1		6020B	Total/NA
Molybdenum	790		2.0	0.91	ug/L	1		6020B	Total/NA
Selenium	38		5.0	1.4	ug/L	1		6020B	Total/NA
Zinc	6.9	J	20	6.4	ug/L	1		6020B	Total/NA
Total Suspended Solids	8.7		5.0	1.7	mg/L	1		I-3765-85	Total/NA
Total Dissolved Solids	3300		500	340	mg/L	1		SM 2540C	Total/NA
Field pH	8.86				SU	1		Field Sampling	Total/NA
Field Conductivity	5364				umhos/cm	1		Field Sampling	Total/NA
Field Temperature	30.3				Degrees C	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: TCB 1/2 Lab Sample ID: 310-263831-1

Date Collected: 08/29/23 08:00 **Matrix: Water**
Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**18**		5.0	2.3	mg/L			09/06/23 20:10	5
Fluoride	<0.38		1.0	0.38	mg/L			09/06/23 20:10	5
Sulfate	**560**		20	8.4	mg/L			09/13/23 11:04	20

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.3**	**J**	2.0	0.53	ug/L		09/05/23 08:00	09/20/23 20:29	1
Barium	**63**		2.0	0.64	ug/L		09/05/23 08:00	09/20/23 20:29	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/20/23 20:29	1
Boron	**480**		100	76	ug/L		09/05/23 08:00	09/20/23 20:29	1
Calcium	**140**		0.50	0.19	mg/L		09/05/23 08:00	09/20/23 20:29	1
Cobalt	<0.17		0.50	0.17	ug/L		09/05/23 08:00	09/20/23 20:29	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/20/23 20:29	1
Iron	**52**	**J**	100	36	ug/L		09/05/23 08:00	09/20/23 20:29	1
Lead	<0.24		0.50	0.24	ug/L		09/05/23 08:00	09/20/23 20:29	1
Lithium	<2.5		10	2.5	ug/L		09/05/23 08:00	09/20/23 20:29	1
Magnesium	**15000**		500	150	ug/L		09/05/23 08:00	09/20/23 20:29	1
Manganese	**8.9**	**J**	10	3.6	ug/L		09/05/23 08:00	09/20/23 20:29	1
Molybdenum	**4.1**		2.0	0.91	ug/L		09/05/23 08:00	09/20/23 20:29	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/20/23 20:29	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/20/23 20:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**1.3**	**J**	1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	**730**		50	34	mg/L			09/01/23 12:12	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	**7.79**				SU			08/29/23 08:00	1
Field Conductivity	**1003**				umhos/cm			08/29/23 08:00	1
Field Temperature	**26.6**				Degrees C			08/29/23 08:00	1

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263831-1

Client Sample ID: SW-3
Date Collected: 08/30/23 10:15
Date Received: 08/31/23 16:50

Lab Sample ID: 310-263831-2
Matrix: Water

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**16**		5.0	2.3	mg/L			09/06/23 20:52	5
Fluoride	<0.38		1.0	0.38	mg/L			09/06/23 20:52	5
Sulfate	**830**		20	8.4	mg/L			09/13/23 11:43	20

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.1**		2.0	0.53	ug/L		09/05/23 08:00	09/20/23 20:32	1
Barium	**21**		2.0	0.64	ug/L		09/05/23 08:00	09/20/23 20:32	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/20/23 20:32	1
Boron	**960**		100	76	ug/L		09/05/23 08:00	09/20/23 20:32	1
Calcium	**140**		0.50	0.19	mg/L		09/05/23 08:00	09/20/23 20:32	1
Cobalt	**0.41**	**J**	0.50	0.17	ug/L		09/05/23 08:00	09/20/23 20:32	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/20/23 20:32	1
Iron	**130**		100	36	ug/L		09/05/23 08:00	09/20/23 20:32	1
Lead	**0.28**	**J**	0.50	0.24	ug/L		09/05/23 08:00	09/20/23 20:32	1
Lithium	**11**		10	2.5	ug/L		09/05/23 08:00	09/20/23 20:32	1
Magnesium	**54000**		500	150	ug/L		09/05/23 08:00	09/20/23 20:32	1
Manganese	**45**		10	3.6	ug/L		09/05/23 08:00	09/20/23 20:32	1
Molybdenum	**25**		2.0	0.91	ug/L		09/05/23 08:00	09/20/23 20:32	1
Selenium	**2.1**	**J**	5.0	1.4	ug/L		09/05/23 08:00	09/20/23 20:32	1
Zinc	**9.8**	**J**	20	6.4	ug/L		09/05/23 08:00	09/20/23 20:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**14**		1.9	0.64	mg/L			09/01/23 11:27	1
Total Dissolved Solids (SM 2540C)	**1000**		50	34	mg/L			09/05/23 19:03	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	**9.01**				SU			08/30/23 10:15	1
Field Temperature	**31.4**				Degrees C			08/30/23 10:15	1

Client Sample Results

Client: SCS Engineers　　　　Job ID: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: Leachate Basin　　　　Lab Sample ID: 310-263831-4

Date Collected: 08/30/23 13:15　　　　**Matrix: Water**
Date Received: 08/31/23 16:50

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**410**		5.0	2.3	mg/L			09/06/23 21:06	5
Fluoride	<0.38		1.0	0.38	mg/L			09/06/23 21:06	5
Sulfate	**2500**		50	21	mg/L			09/13/23 11:56	50

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**4.9**		2.0	0.53	ug/L		09/05/23 08:00	09/20/23 20:39	1
Barium	**61**		2.0	0.64	ug/L		09/05/23 08:00	09/20/23 20:39	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/20/23 20:39	1
Boron	**2200**		100	76	ug/L		09/05/23 08:00	09/20/23 20:39	1
Calcium	**200**		0.50	0.19	mg/L		09/05/23 08:00	09/20/23 20:39	1
Cobalt	**0.30**	**J**	0.50	0.17	ug/L		09/05/23 08:00	09/20/23 20:39	1
Copper	**2.4**	**J**	5.0	1.8	ug/L		09/05/23 08:00	09/20/23 20:39	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/20/23 20:39	1
Lead	<0.24		0.50	0.24	ug/L		09/05/23 08:00	09/20/23 20:39	1
Lithium	**35**		10	2.5	ug/L		09/05/23 08:00	09/20/23 20:39	1
Magnesium	**34000**		500	150	ug/L		09/05/23 08:00	09/20/23 20:39	1
Manganese	**16**		10	3.6	ug/L		09/05/23 08:00	09/20/23 20:39	1
Molybdenum	**790**		2.0	0.91	ug/L		09/05/23 08:00	09/20/23 20:39	1
Selenium	**38**		5.0	1.4	ug/L		09/05/23 08:00	09/20/23 20:39	1
Zinc	**6.9**	**J**	20	6.4	ug/L		09/05/23 08:00	09/20/23 20:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids (USGS I-3765-85)	**8.7**		5.0	1.7	mg/L			09/01/23 10:23	1
Total Dissolved Solids (SM 2540C)	**3300**		500	340	mg/L			09/05/23 19:03	1

Method: EPA Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	**8.86**				SU			08/30/23 13:15	1
Field Conductivity	**5364**				umhos/cm			08/30/23 13:15	1
Field Temperature	**30.3**				Degrees C			08/30/23 13:15	1

Client: SCS Engineers | Job ID: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

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.

Metals

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.

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

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-399437/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 399437

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.45		1.0	0.45	mg/L			09/06/23 19:42	1
Fluoride	<0.075		0.20	0.075	mg/L			09/06/23 19:42	1
Sulfate	<0.42		1.0	0.42	mg/L			09/06/23 19:42	1

Lab Sample ID: LCS 310-399437/35 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 399437

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.51		mg/L		95	90 - 110
Fluoride	2.00	2.07		mg/L		103	90 - 110
Sulfate	10.0	9.60		mg/L		96	90 - 110

Lab Sample ID: 310-263831-1 MS — **Client Sample ID: TCB 1/2**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 399437

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	18		25.0	42.3		mg/L		97	80 - 120
Fluoride	<0.38		5.00	5.37		mg/L		107	80 - 120

Lab Sample ID: 310-263831-1 MSD — **Client Sample ID: TCB 1/2**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 399437

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	18		25.0	42.4		mg/L		97	80 - 120	0	15
Fluoride	<0.38		5.00	5.40		mg/L		108	80 - 120	1	15

Lab Sample ID: MB 310-399469/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 399469

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.45		1.0	0.45	mg/L			09/13/23 10:38	1
Fluoride	<0.075		0.20	0.075	mg/L			09/13/23 10:38	1
Sulfate	<0.42		1.0	0.42	mg/L			09/13/23 10:38	1

Lab Sample ID: LCS 310-399469/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 399469

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.57		mg/L		96	90 - 110
Fluoride	2.00	2.06		mg/L		103	90 - 110
Sulfate	10.0	9.98		mg/L		100	90 - 110

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

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

Lab Sample ID: 310-263831-1 MS
Matrix: Water
Analysis Batch: 399469

Client Sample ID: TCB 1/2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Sulfate	560		100	655	4	mg/L		97	80 - 120

Lab Sample ID: 310-263831-1 MSD
Matrix: Water
Analysis Batch: 399469

Client Sample ID: TCB 1/2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Sulfate	560		100	642	4	mg/L		84	80 - 120	2	15

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-398504/1-A
Matrix: Water
Analysis Batch: 400176

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 398504

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	<0.53		2.0	0.53	ug/L		09/05/23 08:00	09/20/23 18:47	1
Barium	<0.64		2.0	0.64	ug/L		09/05/23 08:00	09/20/23 18:47	1
Beryllium	<0.33		1.0	0.33	ug/L		09/05/23 08:00	09/20/23 18:47	1
Boron	<76		100	76	ug/L		09/05/23 08:00	09/20/23 18:47	1
Calcium	<0.19		0.50	0.19	mg/L		09/05/23 08:00	09/20/23 18:47	1
Cobalt	<0.17		0.50	0.17	ug/L		09/05/23 08:00	09/20/23 18:47	1
Copper	<1.8		5.0	1.8	ug/L		09/05/23 08:00	09/20/23 18:47	1
Iron	<36		100	36	ug/L		09/05/23 08:00	09/20/23 18:47	1
Lead	<0.24		0.50	0.24	ug/L		09/05/23 08:00	09/20/23 18:47	1
Lithium	<2.5		10	2.5	ug/L		09/05/23 08:00	09/20/23 18:47	1
Magnesium	<150		500	150	ug/L		09/05/23 08:00	09/20/23 18:47	1
Manganese	<3.6		10	3.6	ug/L		09/05/23 08:00	09/20/23 18:47	1
Molybdenum	<0.91		2.0	0.91	ug/L		09/05/23 08:00	09/20/23 18:47	1
Selenium	<1.4		5.0	1.4	ug/L		09/05/23 08:00	09/20/23 18:47	1
Zinc	<6.4		20	6.4	ug/L		09/05/23 08:00	09/20/23 18:47	1

Lab Sample ID: LCS 310-398504/2-A
Matrix: Water
Analysis Batch: 400176

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 398504

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	200	199		ug/L		100	80 - 120
Barium	100	90.3		ug/L		90	80 - 120
Beryllium	100	99.0		ug/L		99	80 - 120
Boron	200	194		ug/L		97	80 - 120
Calcium	2.00	1.91		mg/L		95	80 - 120
Cobalt	100	104		ug/L		104	80 - 120
Copper	200	198		ug/L		99	80 - 120
Iron	200	176		ug/L		88	80 - 120
Lead	200	202		ug/L		101	80 - 120
Lithium	200	205		ug/L		102	80 - 120
Magnesium	2000	1910		ug/L		95	80 - 120
Manganese	100	95.5		ug/L		95	80 - 120

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263831-1

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

Lab Sample ID: LCS 310-398504/2-A
Matrix: Water
Analysis Batch: 400176

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 398504

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Molybdenum	200	179		ug/L		90	80 - 120
Selenium	400	373		ug/L		93	80 - 120
Zinc	200	197		ug/L		99	80 - 120

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

Lab Sample ID: MB 310-398435/1
Matrix: Water
Analysis Batch: 398435

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	<1.7		5.0	1.7	mg/L			09/01/23 10:23	1

Lab Sample ID: LCS 310-398435/2
Matrix: Water
Analysis Batch: 398435

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	75 - 116

Lab Sample ID: MB 310-398454/1
Matrix: Water
Analysis Batch: 398454

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	<1.7		5.0	1.7	mg/L			09/01/23 11:27	1

Lab Sample ID: LCS 310-398454/2
Matrix: Water
Analysis Batch: 398454

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	102		mg/L		102	75 - 116

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

Lab Sample ID: MB 310-398464/1
Matrix: Water
Analysis Batch: 398464

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	<34		50	34	mg/L			09/01/23 12:12	1

Lab Sample ID: LCS 310-398464/2
Matrix: Water
Analysis Batch: 398464

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	940		mg/L		94	90 - 110

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

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

Lab Sample ID: MB 310-398653/1 | **Client Sample ID: Method Blank**
Matrix: Water | **Prep Type: Total/NA**
Analysis Batch: 398653

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<34		50	34	mg/L			09/05/23 19:03	1

Lab Sample ID: LCS 310-398653/2 | **Client Sample ID: Lab Control Sample**
Matrix: Water | **Prep Type: Total/NA**
Analysis Batch: 398653

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	970		mg/L		97	90 - 110

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263831-1

HPLC/IC

Analysis Batch: 399437

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	9056A	
310-263831-2	SW-3	Total/NA	Water	9056A	
310-263831-4	Leachate Basin	Total/NA	Water	9056A	
MB 310-399437/3	Method Blank	Total/NA	Water	9056A	
LCS 310-399437/35	Lab Control Sample	Total/NA	Water	9056A	
310-263831-1 MS	TCB 1/2	Total/NA	Water	9056A	
310-263831-1 MSD	TCB 1/2	Total/NA	Water	9056A	

Analysis Batch: 399469

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	9056A	
310-263831-2	SW-3	Total/NA	Water	9056A	
310-263831-4	Leachate Basin	Total/NA	Water	9056A	
MB 310-399469/3	Method Blank	Total/NA	Water	9056A	
LCS 310-399469/4	Lab Control Sample	Total/NA	Water	9056A	
310-263831-1 MS	TCB 1/2	Total/NA	Water	9056A	
310-263831-1 MSD	TCB 1/2	Total/NA	Water	9056A	

Metals

Prep Batch: 398504

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	3005A	
310-263831-2	SW-3	Total/NA	Water	3005A	
310-263831-4	Leachate Basin	Total/NA	Water	3005A	
MB 310-398504/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-398504/2-A	Lab Control Sample	Total/NA	Water	3005A	

Analysis Batch: 400176

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	6020B	398504
310-263831-2	SW-3	Total/NA	Water	6020B	398504
310-263831-4	Leachate Basin	Total/NA	Water	6020B	398504
MB 310-398504/1-A	Method Blank	Total/NA	Water	6020B	398504
LCS 310-398504/2-A	Lab Control Sample	Total/NA	Water	6020B	398504

General Chemistry

Analysis Batch: 398435

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-4	Leachate Basin	Total/NA	Water	I-3765-85	
MB 310-398435/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-398435/2	Lab Control Sample	Total/NA	Water	I-3765-85	

Analysis Batch: 398454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	I-3765-85	
310-263831-2	SW-3	Total/NA	Water	I-3765-85	
MB 310-398454/1	Method Blank	Total/NA	Water	I-3765-85	
LCS 310-398454/2	Lab Control Sample	Total/NA	Water	I-3765-85	

QC Association Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25223073

Job ID: 310-263831-1

General Chemistry

Analysis Batch: 398464

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	SM 2540C	
MB 310-398464/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-398464/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 398653

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-2	SW-3	Total/NA	Water	SM 2540C	
310-263831-4	Leachate Basin	Total/NA	Water	SM 2540C	
MB 310-398653/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-398653/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 398837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-263831-1	TCB 1/2	Total/NA	Water	Field Sampling	
310-263831-2	SW-3	Total/NA	Water	Field Sampling	
310-263831-4	Leachate Basin	Total/NA	Water	Field Sampling	

Lab Chronicle

Client: SCS Engineers
Job ID: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

Client Sample ID: TCB 1/2
Lab Sample ID: 310-263831-1
Date Collected: 08/29/23 08:00
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 20:10
Total/NA	Analysis	9056A		20	399469	QTZ5	EET CF	09/13/23 11:04
Total/NA	Prep	3005A			398504	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400176	DHM5	EET CF	09/20/23 20:29
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398464	D7CP	EET CF	09/01/23 12:12
Total/NA	Analysis	Field Sampling		1	398837	SJF	EET CF	08/29/23 08:00

Client Sample ID: SW-3
Lab Sample ID: 310-263831-2
Date Collected: 08/30/23 10:15
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 20:52
Total/NA	Analysis	9056A		20	399469	QTZ5	EET CF	09/13/23 11:43
Total/NA	Prep	3005A			398504	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400176	DHM5	EET CF	09/20/23 20:32
Total/NA	Analysis	I-3765-85		1	398454	DGU1	EET CF	09/01/23 11:27
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03
Total/NA	Analysis	Field Sampling		1	398837	SJF	EET CF	08/30/23 10:15

Client Sample ID: Leachate Basin
Lab Sample ID: 310-263831-4
Date Collected: 08/30/23 13:15
Matrix: Water
Date Received: 08/31/23 16:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	399437	QTZ5	EET CF	09/06/23 21:06
Total/NA	Analysis	9056A		50	399469	QTZ5	EET CF	09/13/23 11:56
Total/NA	Prep	3005A			398504	QTZ5	EET CF	09/05/23 08:00
Total/NA	Analysis	6020B		1	400176	DHM5	EET CF	09/20/23 20:39
Total/NA	Analysis	I-3765-85		1	398435	DGU1	EET CF	09/01/23 10:23
Total/NA	Analysis	SM 2540C		1	398653	D7CP	EET CF	09/05/23 19:03
Total/NA	Analysis	Field Sampling		1	398837	SJF	EET CF	08/30/23 13:15

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: 310-263831-1
Project/Site: Ottumwa Midland Landfill 25223073

Laboratory: Eurofins Cedar Falls

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

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	09-28-23

Method Summary

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

310-263831 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information

Client: SCS

City/State: CITY | STATE WI | Project:

Receipt Information

Date/Time Received: DATE 8-31-23 | TIME 1650 | Received By: ML

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 # _____ of _____

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: P | 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): 1.7 | Corrected Temp (°C): 1.7

• 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 | Environment Testing

Client Information	Sampler: Tyler Stirling	Lab PM: Fredrick, Sandie	Carrier Tracking No(s):	COC No: 310-84287-22373.3
Client Contact: Meghan Blodgett	Phone: 515-505-2716	E-Mail: Sandra Fredrick@et.eurofinsus.com	State of Origin:	Page: Page 3 of 3
Company: SCS Engineers	PWSID:	Analysis Requested		Job #: 25223073
Address: 2830 Dairy Drive	Due Date Requested:			
City: Madison	TAT Requested (days):			
State Zip: WI, 53718	Compliance Project: Δ Yes Δ No			
Phone:	PO #: 25223073			
Email: mblodgett@scsengineers.com	WO #:			
Project Name: Ottumwa Midland Landfill 25223073	Project #: 31011020			
Site:	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
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)	2540C_Calcd, 9056A_ORGFM_28D, I_3765_85	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	N		
TCB 1/2	8/29/23	8:00	G	Water						
SW-3	8/30/23	10:15	G	Water						
SW-5	8/30/23	8:15	G	Water						
Leachate Lagoon	8/30/23	1:15	G	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: Tyler S	Date/Time: 8/31/23 @1 30	Company: SCS	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by: SL	Date/Time: 8/31/23 1650	Company: Eurofins
Custody Seals Intact: Δ Yes Δ No	Custody Seal No		Cooler Temperature(s) °C and Other Remarks:		

Ver 06/08/2021

		Groundwater Underdrain Discharge			Contact Water	Surface Water Monitoring Points					Leachate			
	Parameter	GU-1 Temp	GU-2 Temp	GU-EX	TCB-1/2**	SW-01R	SW-02R	SW-03	SW-04	SW-05	LP-1	Leachate Basin	Field Blank	TOTAL
Unfiltered Metals	Arsenic, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Barium, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Beryllium, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Boron, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Calcium, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Cobalt, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Copper, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Iron, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Lead, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Lithium, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Magnesium, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Manganese, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Molybdenum, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Selenium, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Zinc, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
Additional Lab Parameters	Chloride, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Sulfate, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Fluoride, Total (Unfiltered)	x	x	x	x	x	x	x	x	x	x	x	x	23
	Total Dissolved Solids	x	x	x	x	x	x	x	x	x	x	x	x	23
	Total Suspended Solids	x	x	x	x	x	x	x	x	x	x	x	x	23
	Field Parameters													
	pH	x	x	x	x	x	x	x	x	x	x	x	x	23
	Conductance	x	x	x	x	x	x	x	x	x	x	x	x	23
	Temperature	x	x	x	x	x	x	x	x	x	x	x	x	23
	Turbidity Field	x	x	x	x	x	x	x	x	x	x	x	x	23
	Color Field	x	x	x	x	x	x	x	x	x			x	21
	Odor Field	x	x	x	x	x	x	x	x	x			x	21
	Water Elevation													36
	Well Depth**													24
	Surface Water Depth*					x	x	x	x	x				5

* Measure surface water depth at staff gauge or if no staff gauge present, measure depth at center of stream.

** Total depth measurements not required at wells with dedicated pumps

Updated 7/20/2023
I:\25223073.00\Data and Calculatic

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-263831-1

Login Number: 263831
List Number: 1
Creator: Lage, Sydney

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	

Groundwater Monitoring Results - Field Parameters
Ottumwa Midland Landfill / SCS Engineers Project #25223073.00
August 2023

Sample	Date	Temperature (Deg. C)	pH (Std. Units)	Specific Conductivity (µmhos/cm)	GW Elevation (feet)
MW-1R	8/29/2023	14.9	7.09	794	810.74
MW-12	8/29/2023	15.3	7.80	2651	722.71
MW-13	8/30/2023	16.3	7.00	3242	722.33
MW-14	8/30/2023	14.2	7.12	2904	722.42
MW-15R	8/30/2023	18.4	6.32	2287	760.68
MW-16R	8/29/2023	14.6	6.87	3188	722.52
MW-100R	8/29/2023	14.8	7.17	938	806.45
MW-101R	8/29/2023	13.8	6.90	1364	782.65
MW-102P	8/29/2023	14.3	6.38	3037	723.20
MW-108	8/30/2023	14.6	6.32	511.0	740.77
SW-3	8/30/2023	31.4	9.01	--	--
TCB-1/2	8/30/2023	26.6	7.79	1003	--
Leachate Basin	8/30/2023	30.3	8.86	5364	--

Abbreviations:
amsl = above mean sea level
µmhos/cm = microSiemens per centimeter
NM = Not Measured

Laboratory Notes/Qualifiers:
none

Created by:	AJR	Date:	8/15/2019
Last revision by:	RM	Date:	9/1/2023
Checked by:	EMS	Date:	9/1/2023

C:\Users\hld0\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\USG3GGGC\[2308_OML_GW_Field_Data.xlsx]GW Field Data

Table 1, Page 1 of 1

Appendix C

Summary of Historical Groundwater Chemistry

IPL Ottumwa Midland Landfill
Historic Monitoring Results

ARSENIC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
ARSENIC, DISSOLVED	1995-Aug	<5			<5	5.9										
ARSENIC, DISSOLVED	1995-Oct	<5		<5	<5	11.7			<5		<5	<5				
ARSENIC, DISSOLVED	1996-Apr	<1		<1	1	11			<1		<1	<1				
ARSENIC, DISSOLVED	1996-Jan	<1		<1	<1	9			<1			<1				
ARSENIC, DISSOLVED	1996-Jul	<5		<5	<5	15			<5		<5	<5				
ARSENIC, DISSOLVED	1996-Oct					8										
ARSENIC, DISSOLVED	1997-Apr					8.6										
ARSENIC, DISSOLVED	1997-Oct					5.3					<1					
ARSENIC, DISSOLVED	1998-Apr					2.6										
ARSENIC, DISSOLVED	1998-Oct					3.7	<1									
ARSENIC, DISSOLVED	1999-Sep				<1	2.3	3.4									
ARSENIC, DISSOLVED	2000-Sep	<1		<1	<1	2.7	<1		<1		1.3	<1				
ARSENIC, DISSOLVED	2001-Sep	<1		<1 NS	<1	<1	<1		<1		<1	<1				
ARSENIC, DISSOLVED	2002-Sep	<1		<1	<1	<1	<1		<1		<1	<1				
ARSENIC, DISSOLVED	2003-Sep	<1		<1	<1	1.7	<1		<2 R,N,S		<1	<1				
ARSENIC, DISSOLVED	2004-Oct															
ARSENIC, DISSOLVED	2004-Sep	<1		<1	<2 R	<1	<1		<2 R			<2 R				
ARSENIC, DISSOLVED	2005-Sep	<1 WT		<1 WT	<1 WT	1.2 WT	1.1 WT		<1 WT		<1 WT	<1 WT				
ARSENIC, DISSOLVED	2006-Sep	<1		<1	<2 RL1	<1	<1		<1		<1	<1				
ARSENIC, DISSOLVED	2007-Sep	<1		<1	<1	<1	<1		<1			<1				
ARSENIC, DISSOLVED	2008-Sep	<1		<1	<1	<1 pH>2	<1		<1		<1	<1				
ARSENIC, DISSOLVED	2009-Sep	<1		<1	<2	<1	<2		<2		<1	<2				
ARSENIC, DISSOLVED	2010-Aug	<2 RL1														
ARSENIC, DISSOLVED	2010-Sep			<1	<2 RL1	9.36	<4 RL1		<2		<2 RL1	<1				
ARSENIC, DISSOLVED	2011-Sep	<6 RL1		<1	<2 RL1	2.86	<12 RL1		<2 RL1			<2 RL1				
ARSENIC, DISSOLVED	2012-Sep	<3 RL1		<1	<2 RL1	<1	<2 RL1		<2 RL1			<1				
ARSENIC	2013-Sep															
ARSENIC, DISSOLVED	2013-Sep	<1		<1	<1	5.9	<1		<1		<1	<1				
ARSENIC	2014-Sep															
ARSENIC, DISSOLVED	2014-Sep	<0.05		0.071 J	<0.05	2.3	0.48		<0.05		<0.05					
ARSENIC	2015-Dec															
ARSENIC, DISSOLVED	2015-Dec												<4.5	<4.5	<4.5	<4.5
ARSENIC	2015-Sep															
ARSENIC, DISSOLVED	2015-Sep	<4.5		<4.5	<4.5	<4.5		<4.5		<4.5			<4.5	<4.5	6.9	<4.5
ARSENIC	2016-Jun															
ARSENIC, DISSOLVED	2016-Jun												0.21	0.37	1.2	0.93
ARSENIC	2016-Mar															
ARSENIC, DISSOLVED	2016-Mar												<3.9	<3.9	<3.9	<3.9
ARSENIC	2016-Sep															
ARSENIC, DISSOLVED	2016-Sep	0.12		0.46	<0.21 D3	0.4		0.43		0.4	<0.1		0.15	<0.1	0.86	0.5
ARSENIC	2017-Aug	0.2		0.19	0.12	6.9		0.55		0.21	0.052		0.18	0.25	0.61	1.1
ARSENIC	2018-Aug			0.27	0.16	13.7		1		0.35	0.31		0.27	0.44	0.66	1.7
ARSENIC	2019-Apr	<0.75														
ARSENIC	2019-Aug		<0.75	<0.75	<0.75	21		<0.75		<0.75	<0.75		<0.75	<0.75	<0.75	3

GW Standard:
MCL = 10

IPL Ottumwa Midland Landfill
Historic Monitoring Results

ARSENIC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
ARSENIC, DISSOLVED	1995-Aug										<5						
ARSENIC, DISSOLVED	1995-Oct										<5						
ARSENIC, DISSOLVED	1996-Apr						<1		<1		<1						
ARSENIC, DISSOLVED	1996-Jan																
ARSENIC, DISSOLVED	1996-Jul						<5		<5		<5		<5				
ARSENIC, DISSOLVED	1996-Oct																
ARSENIC, DISSOLVED	1997-Apr																
ARSENIC, DISSOLVED	1997-Oct																
ARSENIC, DISSOLVED	1998-Apr						<1		<1				<1				
ARSENIC, DISSOLVED	1998-Oct						1.8		1.7				1				
ARSENIC, DISSOLVED	1999-Sep										1.8		<1				
ARSENIC, DISSOLVED	2000-Sep										<1		<1				
ARSENIC, DISSOLVED	2001-Sep						<1				<1		<1				
ARSENIC, DISSOLVED	2002-Sep										<1		<1				
ARSENIC, DISSOLVED	2003-Sep										<1		<1				
ARSENIC, DISSOLVED	2004-Oct																
ARSENIC, DISSOLVED	2004-Sep						2.2						<1				
ARSENIC, DISSOLVED	2005-Sep										< WT		<1				
ARSENIC, DISSOLVED	2006-Sep										1.45		<1				
ARSENIC, DISSOLVED	2007-Sep						1.72		<1		1.53		1.14				
ARSENIC, DISSOLVED	2008-Sep						1.5		1.25		2.94	2	<1				
ARSENIC, DISSOLVED	2009-Sep						1.14				<1		<1				
ARSENIC, DISSOLVED	2010-Aug																
ARSENIC, DISSOLVED	2010-Sep						1.74		<1		1.35	<1	1.63				
ARSENIC, DISSOLVED	2011-Sep												5.83				
ARSENIC, DISSOLVED	2012-Sep				<2						<1		7.19				
ARSENIC	2013-Sep													21			
ARSENIC, DISSOLVED	2013-Sep										<1	3.3	1.8				<1
ARSENIC	2014-Sep					0.76								2.8	5.8		<0.18
ARSENIC, DISSOLVED	2014-Sep						2	<15	1.3	<15	0.3 J	1.9	0.31 J				
ARSENIC	2015-Dec	<4.5														<4.5	<4.5
ARSENIC, DISSOLVED	2015-Dec	<4.5															
ARSENIC	2015-Sep	<4.5		<4.5							<4.5	4.7	<4.5	<4.5		<4.5	<4.5
ARSENIC, DISSOLVED	2015-Sep	<4.5															
ARSENIC	2016-Jun	0.12														1.6	<0.1
ARSENIC, DISSOLVED	2016-Jun	0.22															
ARSENIC	2016-Mar	<3.9														<3.9	<3.9
ARSENIC, DISSOLVED	2016-Mar	<3.9															
ARSENIC	2016-Sep	<0.1		0.34							1.6		2.8	2.1		2	<0.1
ARSENIC, DISSOLVED	2016-Sep																
ARSENIC	2017-Aug	0.079		0.68							1.7		4.1	2.8		1.4	<0.052
ARSENIC	2018-Aug	0.27		1							<4.9		4.7	3.1		1.8	<0.15
ARSENIC	2019-Apr																<0.75
ARSENIC	2019-Aug	<0.75	<0.75	1.9 J							1.9 J	7.3	1.5 J	4.6		3.5	<0.75

GW Standard:
MCL = 10

IPL Ottumwa Midland Landfill
Historic Monitoring Results

BARIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
BARIUM, DISSOLVED	1995-Aug	184			58	152										
BARIUM, DISSOLVED	1995-Oct	183		37	43	105			104		53	119				
BARIUM, DISSOLVED	1996-Apr	142		40	33	59			77		34	76				
BARIUM, DISSOLVED	1996-Jan	192		60	62	114			74			93				
BARIUM, DISSOLVED	1996-Jul	156		29	32	74			63		120	55				
BARIUM, DISSOLVED	1997-Oct										60					
BARIUM, DISSOLVED	1998-Apr										27					
BARIUM, DISSOLVED	1998-Oct						28									
BARIUM, DISSOLVED	1999-Sep	92		43	21	53	25		42		53	36				
BARIUM, DISSOLVED	2000-Sep	70		33	17	49	24		33		74	34				
BARIUM, DISSOLVED	2001-Sep	59		45	21	42	13		34		64	38				
BARIUM, DISSOLVED	2002-Sep	71		44	23	46	28		33		38	32				
BARIUM, DISSOLVED	2003-Sep	64		39	19	38	24		29		37	34				
BARIUM, DISSOLVED	2004-Oct															
BARIUM, DISSOLVED	2004-Sep	57		36	21	39	22		32			31				
BARIUM, DISSOLVED	2005-Sep	80		23	20	36	25		28		39	29				
BARIUM, DISSOLVED	2006-Sep	62.7		28.2	18.1	39.9	14.3		27.1		33.4	27.8				
BARIUM, DISSOLVED	2007-Sep	60.3		22.3	22.2	29.4	28		22.2			26.3				
BARIUM, DISSOLVED	2008-Sep	86.9		30.3	20.2	34.3 pH>2	21.2		40.9		34.8	25.5				
BARIUM, DISSOLVED	2009-Sep	163		26	19	32.4	16.1		20.7		32.3	22.9				
BARIUM, DISSOLVED	2010-Aug	77.4														
BARIUM, DISSOLVED	2010-Sep			24.7	15.1	21.2	<10		20.9 S3		27	23.9				
BARIUM, DISSOLVED	2011-Sep	73.3		22.6	13.9	26.4	14		22.9			22.1				
BARIUM, DISSOLVED	2012-Sep	70.3		23.6	17.1	38.3	24.5		21.8			26.8				
BARIUM	2013-Sep															
BARIUM, DISSOLVED	2013-Sep	70		23	19	27	31		24		35	25				
BARIUM	2014-Sep															
BARIUM, DISSOLVED	2014-Sep	50		24 B	24 B	36 B	37 B		23 B		32 B					
BARIUM	2015-Dec															
BARIUM, DISSOLVED	2015-Dec												62	66	27	89
BARIUM	2015-Sep															
BARIUM, DISSOLVED	2015-Sep	82.6		31.2	17.9	39.4		37.7		90.5			79.4	74.4	33.9	97.5
BARIUM	2016-Jun															
BARIUM, DISSOLVED	2016-Jun												54.5	49.5	35.3	73.9
BARIUM	2016-Mar															
BARIUM, DISSOLVED	2016-Mar												59	59	38	92
BARIUM	2016-Sep															
BARIUM, DISSOLVED	2016-Sep	69.5		25.7	17.4	35.1		29.5		80.6	23.3		67.2	50.2	30.4	79.3
BARIUM	2017-Aug	61		21	18.2	26.8		40.6		49.7	19.4		54.2	40	22.7	35.4
BARIUM	2018-Aug			15.5	19.9	19.3		80.5		46.4	20.2		58.4	75.9	25.2	37.1
BARIUM	2019-Apr	81														
BARIUM	2019-Aug		75	32	19	12		37		44	47		50	28	24	34

GW Standard:
MCL = 2000

IPL Ottumwa Midland Landfill
Historic Monitoring Results

BARIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
BARIUM, DISSOLVED	1995-Aug										46						
BARIUM, DISSOLVED	1995-Oct										75						
BARIUM, DISSOLVED	1996-Apr						97		64		33						
BARIUM, DISSOLVED	1996-Jan																
BARIUM, DISSOLVED	1996-Jul						124		101		59		59				
BARIUM, DISSOLVED	1997-Oct																
BARIUM, DISSOLVED	1998-Apr						95		67		58		47				
BARIUM, DISSOLVED	1998-Oct						95		78		82		47				
BARIUM, DISSOLVED	1999-Sep										99		81				
BARIUM, DISSOLVED	2000-Sep										133		54				
BARIUM, DISSOLVED	2001-Sep						196				110		147				
BARIUM, DISSOLVED	2002-Sep										92		101				
BARIUM, DISSOLVED	2003-Sep										58		167				
BARIUM, DISSOLVED	2004-Oct										87						
BARIUM, DISSOLVED	2004-Sep						169						114				
BARIUM, DISSOLVED	2005-Sep										83		162				
BARIUM, DISSOLVED	2006-Sep										65.7		109				
BARIUM, DISSOLVED	2007-Sep						160		53.8		80.6		85.4				
BARIUM, DISSOLVED	2008-Sep						196		105		79	105	35.3				
BARIUM, DISSOLVED	2009-Sep						133				95.6		21.7				
BARIUM, DISSOLVED	2010-Aug																
BARIUM, DISSOLVED	2010-Sep						142		64.8		109	106	121				
BARIUM, DISSOLVED	2011-Sep												52.3				
BARIUM, DISSOLVED	2012-Sep				35.9						79.3		25.7				
BARIUM	2013-Sep													34			
BARIUM, DISSOLVED	2013-Sep										43	130	230				<10
BARIUM	2014-Sep					26								46	34		<0.61
BARIUM, DISSOLVED	2014-Sep						100		52		60	56	48				
BARIUM	2015-Dec	42						<15		<15						69	<0.52
BARIUM, DISSOLVED	2015-Dec	49 D9															
BARIUM	2015-Sep	49.2		27							54.7	272	115	69.5		140	<0.52
BARIUM, DISSOLVED	2015-Sep	53 D9															
BARIUM	2016-Jun	61														138	0.31 B
BARIUM, DISSOLVED	2016-Jun	61.5 D9															
BARIUM	2016-Mar	39.7														72.4	<0.58
BARIUM, DISSOLVED	2016-Mar	43															
BARIUM	2016-Sep	41.1		28.3							63.7		44.7	8.8		72.4	<0.14
BARIUM, DISSOLVED	2016-Sep																
BARIUM	2017-Aug	40.1		33.8							54.8		195	12.5		98.5	0.17 B
BARIUM	2018-Aug	38.3		34.2							65.1		116	10.1		77	<0.34
BARIUM	2019-Apr																<0.84
BARIUM	2019-Aug	30	50	37							60	140	120	93		77	<0.84

GW Standard:
MCL = 2000

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

BERYLLIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
BERYLLIUM, DISSOLVED	1999-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2000-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2001-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2002-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2003-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2004-Oct															
BERYLLIUM, DISSOLVED	2004-Sep	<10		<10	<10	<10	<10		<10			<10				
BERYLLIUM, DISSOLVED	2005-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2006-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2007-Sep	<10		<10	<10	<10	<10		<10			<10				
BERYLLIUM, DISSOLVED	2008-Sep	<10		<10	<10	<10 pH>2	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2009-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
BERYLLIUM, DISSOLVED	2010-Aug	11														
BERYLLIUM, DISSOLVED	2010-Sep			<10	<10	<10	34.8		<10 S3		<10	<10				
BERYLLIUM, DISSOLVED	2011-Sep	<10		<10	<10	<10	<10		<10			<10				
BERYLLIUM, DISSOLVED	2012-Sep	<1		<1	<1	1.92	<1		<1			<1				
BERYLLIUM	2013-Sep															
BERYLLIUM, DISSOLVED	2013-Sep	<1		<1	<1	<1	<1		<1		<1	<1				
BERYLLIUM	2014-Sep															
BERYLLIUM, DISSOLVED	2014-Sep	<0.3		<0.3	<0.3	<0.3	<0.3		<0.3		<0.3					
BERYLLIUM	2015-Dec															
BERYLLIUM, DISSOLVED	2015-Dec												<0.17	0.18	<0.17	<0.17
BERYLLIUM	2015-Sep															
BERYLLIUM, DISSOLVED	2015-Sep	0.34		0.74	<0.17	0.18		<0.17		<0.17			<0.17	<0.17	<0.17	<0.17
BERYLLIUM	2016-Jun															
BERYLLIUM, DISSOLVED	2016-Jun												<0.08	<0.08	<0.08	<0.08
BERYLLIUM	2016-Mar															
BERYLLIUM, DISSOLVED	2016-Mar												<0.26	<0.26	<0.26	<0.26
BERYLLIUM	2016-Sep															
BERYLLIUM, DISSOLVED	2016-Sep	<0.08		<0.08	<0.08	<0.08		<0.08		<0.08	<0.08		<0.08	<0.08	<0.16 D3	<0.08
BERYLLIUM	2017-Aug	<0.012		0.019	<0.012	<0.012		<0.012		0.016	<0.012		<0.012	0.02	0.013 M1	0.025
BERYLLIUM	2018-Aug			<0.12	<0.12	<0.12		<0.12		<0.12	<0.12		<0.12	<0.12	<0.12	<0.12
BERYLLIUM	2019-Apr	<0.27														
BERYLLIUM	2019-Aug		<0.27	<0.27	<0.27	<0.27		<0.27		<0.27	<0.27		<0.27	<0.27	<0.27	<0.27

GW Standard:
MCL = 4

IPL Ottumwa Midland Landfill
Historic Monitoring Results

BERYLLIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
BERYLLIUM, DISSOLVED	1999-Sep										<10		<10				
BERYLLIUM, DISSOLVED	2000-Sep										<10		<10				
BERYLLIUM, DISSOLVED	2001-Sep						<10				<10		<10				
BERYLLIUM, DISSOLVED	2002-Sep										<10		<10				
BERYLLIUM, DISSOLVED	2003-Sep										<10		<10				
BERYLLIUM, DISSOLVED	2004-Oct										<10						
BERYLLIUM, DISSOLVED	2004-Sep						<10						<10				
BERYLLIUM, DISSOLVED	2005-Sep										<10		<10				
BERYLLIUM, DISSOLVED	2006-Sep										<10		<10				
BERYLLIUM, DISSOLVED	2007-Sep						<10		<10		<10		<10				
BERYLLIUM, DISSOLVED	2008-Sep						<10		<10		<10	<10	<10				
BERYLLIUM, DISSOLVED	2009-Sep						<10				<10		<10				
BERYLLIUM, DISSOLVED	2010-Aug																
BERYLLIUM, DISSOLVED	2010-Sep						<10		<10		<10	<10	<10				
BERYLLIUM, DISSOLVED	2011-Sep												<10				
BERYLLIUM, DISSOLVED	2012-Sep				1.19						<1		<1				
BERYLLIUM	2013-Sep													<1			
BERYLLIUM, DISSOLVED	2013-Sep										<1	<1	<1				<1
BERYLLIUM	2014-Sep					<0.3								<0.3	<0.3		<0.3
BERYLLIUM, DISSOLVED	2014-Sep						<0.3		<0.3		<0.3	<0.3	<0.3				
BERYLLIUM	2015-Dec	<0.17														<0.17	<0.17
BERYLLIUM, DISSOLVED	2015-Dec	<0.17															
BERYLLIUM	2015-Sep	<0.17		<0.17							<0.17	<0.17	<0.17	<0.17		<0.17	<0.17
BERYLLIUM, DISSOLVED	2015-Sep	<0.17						<15		<15							
BERYLLIUM	2016-Jun	<0.08														<0.08	<0.08
BERYLLIUM, DISSOLVED	2016-Jun	<0.08															
BERYLLIUM	2016-Mar	<0.26														<0.26	<0.26
BERYLLIUM, DISSOLVED	2016-Mar	<0.26															
BERYLLIUM	2016-Sep	<0.08		<0.08							<0.08		<0.08	<0.08		<0.08	<0.08
BERYLLIUM, DISSOLVED	2016-Sep																
BERYLLIUM	2017-Aug	<0.012		<0.012							<0.012		<0.012	<0.012		<0.012	<0.012
BERYLLIUM	2018-Aug	<0.12		<0.12							<0.16		<0.12	<0.12		<0.12	<0.12
BERYLLIUM	2019-Apr																<0.27
BERYLLIUM	2019-Aug	<0.27	<0.27	<0.27							<0.27	<0.27	<0.27	<0.27		<0.27	<0.27

GW Standard:
MCL = 4

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

BORON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-07P	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
BORON, DISSOLVED	2007-Sep	<100			1550	1740	1750	1060		1550			1460				
BORON, DISSOLVED	2008-Sep	100			1670	1950	2070 pH>2	1090		1660		1160	1580				
BORON, DISSOLVED	2009-Sep	<100		866	1470	1860	1840	1070		1520		1130	1460				
BORON, DISSOLVED	2010-Aug	123															
BORON, DISSOLVED	2010-Sep			507	1410	1880	1900	1060		1600		1590	1470				
BORON, DISSOLVED	2011-Sep	<100			1440	1820	1860	1230		1480			1400				
BORON, DISSOLVED	2012-Sep	104		1100	1590	2010	2020	800		1680			1630				
BORON	2013-Sep																
BORON, DISSOLVED	2013-Sep	<100			1400	1800	1800	550		1500		1200	1500				
BORON	2014-Sep																
BORON, DISSOLVED	2014-Sep	120			1400	1800	1800	520		1500		740					
BORON	2015-Dec																
BORON, DISSOLVED	2015-Dec													51	630	2000	470
BORON	2015-Sep																
BORON, DISSOLVED	2015-Sep	75.6			1530	1840	1950		1380		2260			62.5	660	1880	740
BORON	2016-Jun																
BORON, DISSOLVED	2016-Jun													<50	535	1880	384
BORON	2016-Mar																
BORON, DISSOLVED	2016-Mar													<50	580	2000	530
BORON	2016-Sep																
BORON, DISSOLVED	2016-Sep	84			1450	1920	1890		1450		2260	931		56.6	622	1890	484
BORON	2017-Aug	76			1430	2000	2010		1380		2130	1170		51.8	733	1770	302
BORON	2018-Aug				1530	2090	2160		1310		2140	1110		64.2	855	1920	338
BORON	2019-Apr	110 J															
BORON	2019-Aug		110 J,B		1600 B	1700 B	1700 B		1000		1700	580		<110	660	1400 B	310 B
Boron	2-Year Avg.	80		--	1480	2045	2085	--	1345	--	2135	1140	--	58	794	1845	320

GW Standard:
None

Note: Average of previous 2 years (2016-2017) is calculated for parameters that do not have an MCL, SMCL, or HAL. For parameters that were not detected, the detection limit is used in the calculation.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

BORON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2
BORON, DISSOLVED	2007-Sep						<100		178		1220		468			
BORON, DISSOLVED	2008-Sep						<100		<100		1570	<100	1120			
BORON, DISSOLVED	2009-Sep						<100				1120		1270			
BORON, DISSOLVED	2010-Aug															
BORON, DISSOLVED	2010-Sep						<100		<100		857	<100	240			
BORON, DISSOLVED	2011-Sep												1740			
BORON, DISSOLVED	2012-Sep				1860						2180		1570			
BORON	2013-Sep													3700		
BORON, DISSOLVED	2013-Sep										820	250	850			
BORON	2014-Sep					1600								2400	3300	
BORON, DISSOLVED	2014-Sep						<50		<50		510	<50	300			
BORON	2015-Dec	240														460
BORON, DISSOLVED	2015-Dec	250 D9														
BORON	2015-Sep	425		952							846	62.1	802	1350		679
BORON, DISSOLVED	2015-Sep	442 D9														
BORON	2016-Jun	610														455
BORON, DISSOLVED	2016-Jun	629 D9														
BORON	2016-Mar	223														422
BORON, DISSOLVED	2016-Mar	220														
BORON	2016-Sep	520		820							846		597	4550		570
BORON, DISSOLVED	2016-Sep															
BORON	2017-Aug	660		862							1120		852	5330		820
BORON	2018-Aug	1020		867							1010		703	5440		1270
BORON	2019-Apr															
BORON	2019-Aug	260 B	330 B	830 B							530 B	<110	780 B	1900 B		1400 B
Boron	2-Year Avg.	590	--	864.5	--	--	--	--	--	--	1065	--	777.5	5385	--	1045

GW Standard:
None

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

COBALT
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
COBALT, DISSOLVED	1999-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COBALT, DISSOLVED	2000-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COBALT, DISSOLVED	2001-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COBALT, DISSOLVED	2002-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COBALT, DISSOLVED	2003-Sep	<20		<20	<20	<20	<20		<20		24	<20				
COBALT, DISSOLVED	2004-Oct															
COBALT, DISSOLVED	2004-Sep	<20		<20	<20	<20	<20		<20			<20				
COBALT, DISSOLVED	2005-Sep	<20		<20	<20	<20	25		<20		22	<20				
COBALT, DISSOLVED	2006-Sep	<20		<20	<20	<20	<20		<20		31.4	<20				
COBALT, DISSOLVED	2007-Sep	<20		<20	<20	<20	<20		<20			<20				
COBALT, DISSOLVED	2008-Sep	<20		<20	<20	<20 pH>2	<20		<20		<20	<20				
COBALT, DISSOLVED	2009-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COBALT, DISSOLVED	2010-Aug	2.72 J														
COBALT, DISSOLVED	2010-Sep			3.01 J	5.31 J	6.23 J	11.4 J		3.94 J		<1.55	<1.55				
COBALT, DISSOLVED	2011-Sep	<1.55		<1.55	<1.55	<1.55	<1.55		<1.55			<1.55				
COBALT, DISSOLVED	2012-Sep	<1.55			<1.55	2.71 J	<1.55		<1.55			<1.55				
COBALT	2013-Sep															
COBALT, DISSOLVED	2013-Sep	<5		<5	<5	<5	<5		<5		<5	<5				
COBALT	2014-Sep															
COBALT, DISSOLVED	2014-Sep	1.3 J		<0.79	1.2 J	1.4 J	<0.79		1.7 J		0.81 J					
COBALT	2015-Dec															
COBALT, DISSOLVED	2015-Dec												<0.1	0.35	0.46	6.6
COBALT	2015-Sep															
COBALT, DISSOLVED	2015-Sep	0.16		0.39	0.64	1.7		3		1.3			<0.1	0.47	1.1	2.5
COBALT	2016-Jun															
COBALT, DISSOLVED	2016-Jun												<0.5	<0.5	0.91	5.3
COBALT	2016-Mar															
COBALT, DISSOLVED	2016-Mar												<0.5	<0.5	<0.5	2.8
COBALT	2016-Sep															
COBALT, DISSOLVED	2016-Sep	<0.5		<1 D3	1.3	1.9		2.8		<1.5 D3	<0.5		<0.5	<0.5	<1.5 D3	2.6
COBALT	2017-Aug	0.049		0.36	1.3	1.4		2.6		0.92	0.054		0.028	0.26	0.86	11.1
COBALT	2018-Aug			0.19	1.3	0.47		3.6		0.97	0.22		<0.15	1.5	1.1	10.6
COBALT	2019-Apr	0.37 J														
COBALT	2019-Aug		<0.091	1.3	1.1	0.41 J		3.5		0.84	1.4		<0.091	0.13 J	1.3 J	7.9
Cobalt	2-Year Avg.	0.27		0.275	1.3	0.935	--	3.1		0.945	0.137	--	0.09	0.88	0.98	10.85

GW Standard:

None

Note: Average of previous 2 years (2016-2017) is calculated for parameters that do not have an MCL, SMCL, or HAL. For parameters that were not detected, the detection limit is used in the calculation.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

COBALT
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
COBALT, DISSOLVED	1999-Sep										<20		<20				
COBALT, DISSOLVED	2000-Sep										<20		<20				
COBALT, DISSOLVED	2001-Sep						<20				<20		<20				
COBALT, DISSOLVED	2002-Sep										<20		<20				
COBALT, DISSOLVED	2003-Sep										<20		<20				
COBALT, DISSOLVED	2004-Oct										<20						
COBALT, DISSOLVED	2004-Sep						<20						<20				
COBALT, DISSOLVED	2005-Sep										<20		<20				
COBALT, DISSOLVED	2006-Sep										<20		<20				
COBALT, DISSOLVED	2007-Sep						<20		<20		<20		<20				
COBALT, DISSOLVED	2008-Sep						<20		<20		<20	<20	<20				
COBALT, DISSOLVED	2009-Sep						<20				<20		<20				
COBALT, DISSOLVED	2010-Aug																
COBALT, DISSOLVED	2010-Sep						1.61 J		6.22 J		2.25 J	2.24 J	3.47 J				
COBALT, DISSOLVED	2011-Sep												<1.55				
COBALT, DISSOLVED	2012-Sep				2.76 J						<1.55		<1.55				
COBALT	2013-Sep													<5			
COBALT, DISSOLVED	2013-Sep										<5	<5	<5				<5
COBALT	2014-Sep					4.1								<0.79	2.4		<0.79
COBALT, DISSOLVED	2014-Sep						<0.79		<0.79		<0.79	<0.79	<0.79				
COBALT	2015-Dec	0.14														<0.1	<0.1
COBALT, DISSOLVED	2015-Dec	0.24															
COBALT	2015-Sep	4.1		8.8							0.32	3.1	0.45	0.19		0.12	<0.1
COBALT, DISSOLVED	2015-Sep	3.4															
COBALT	2016-Jun	2.7														<0.5	<0.5
COBALT, DISSOLVED	2016-Jun	2.5															
COBALT	2016-Mar	<0.5														<0.5	<0.5
COBALT, DISSOLVED	2016-Mar	<0.5															
COBALT	2016-Sep	4.6		1.1							<0.5		<0.5	<0.5		<0.5	<0.5
COBALT, DISSOLVED	2016-Sep																
COBALT	2017-Aug	10.2		1.3							0.21		0.74	0.18		0.12	<0.014
COBALT	2018-Aug	6.5		2.3							<0.87		0.25	0.2		<0.15	<0.15
COBALT	2019-Apr																<0.091
COBALT	2019-Aug	8.4	16	3.4							0.22 J	1.3	0.26 J	0.23 J		0.37 J	<0.091
Cobalt	2-Year Avg.	7.4	--	1.8	--	--	--	--	--	--	0.54	--	0.495	0.19	--	0.135	0.12

GW Standard:

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

None

IPL Ottumwa Midland Landfill
Historic Monitoring Results

COPPER
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
COPPER, DISSOLVED	1995-Aug	<20			<20	<20										
COPPER, DISSOLVED	1995-Oct	<20		<20	<20	<20			<20		<20	<20				
COPPER, DISSOLVED	1996-Apr	<30		<30	<30	<30			<30		<30	<30				
COPPER, DISSOLVED	1996-Jan	<30		<30	<30	<30			<30			<30				
COPPER, DISSOLVED	1996-Jul	<30		<30	<30	<30			<30		<30	<30				
COPPER, DISSOLVED	1997-Oct										<20					
COPPER, DISSOLVED	1998-Apr															
COPPER, DISSOLVED	1998-Oct						<20									
COPPER, DISSOLVED	1999-Sep						<20									
COPPER, DISSOLVED	2000-Sep						<20									
COPPER, DISSOLVED	2001-Sep						<20									
COPPER, DISSOLVED	2004-Oct															
COPPER, DISSOLVED	2004-Sep	<20		<20	<20	<20	<20		<20			<20				
COPPER, DISSOLVED	2005-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COPPER, DISSOLVED	2006-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COPPER, DISSOLVED	2007-Sep	<20		<20	<20	<20	<20		<20			<20				
COPPER, DISSOLVED	2008-Sep	<20		<20	<20	<20 pH>2	<20		<20		<20	<20				
COPPER, DISSOLVED	2009-Sep	<20		<20	<20	<20	<20		<20		<20	<20				
COPPER, DISSOLVED	2010-Aug	<20														
COPPER, DISSOLVED	2010-Sep			<20	<20	<20	<20		<20		<20	<20				
COPPER, DISSOLVED	2011-Sep	<20		<20	<20	<20	<20		<20			<20				
COPPER, DISSOLVED	2012-Sep	<20		<20	<20	<20	<20		<20			<20				
COPPER	2013-Sep															
COPPER, DISSOLVED	2013-Sep	<10		<10	<10	<10	<10		<10		<10	<10				
COPPER	2014-Sep															
COPPER, DISSOLVED	2014-Sep	15 J,B		4.1 J,B	6.7 J,B	3.9 J,B	4.6 J,B		4.2 J,B		3.6 J,B					
COPPER	2015-Dec															
COPPER, DISSOLVED	2015-Dec												1.4	1	<0.83	<0.83
COPPER	2015-Sep															
COPPER, DISSOLVED	2015-Sep	3.6 B		3.3 B	5.5 B	3.4 B		3 B		3.9 B			3.1 B	3.8 B	3.4 B	4.6 B
COPPER	2016-Jun															
COPPER, DISSOLVED	2016-Jun												2.2	0.94 B	2.1	3.5
COPPER	2016-Mar															
COPPER, DISSOLVED	2016-Mar												<1.1	<1.1	<1.1	<1.1
COPPER	2016-Sep															
COPPER, DISSOLVED	2016-Sep	1.1 B		0.49 B	0.73 B	0.64 B		0.53 B		0.51 B	1.5		0.85 B	1.1 B	1 B	1.2 B
COPPER	2017-Aug	0.99		0.94 B	0.62 B	0.54 B		0.38 B		0.97	0.52 B		0.32 B	0.92 B	0.23 B	0.61 B
COPPER	2018-Aug			<0.48	<0.48	0.6		2.7		<0.48	0.66		0.74	2.6	<0.48	0.57
COPPER	2019-Apr	2.1 J														
COPPER	2019-Aug		<2	<2	<2	<2		<2		<2	<2		<2	<2	<2	<2

GW Standard:
SMCL = 1000

IPL Ottumwa Midland Landfill
Historic Monitoring Results

COPPER
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
COPPER, DISSOLVED	1995-Aug										<20						
COPPER, DISSOLVED	1995-Oct										210						
COPPER, DISSOLVED	1996-Apr						<30		<30		<30						
COPPER, DISSOLVED	1996-Jan																
COPPER, DISSOLVED	1996-Jul						<30		<30		<30		<30				
COPPER, DISSOLVED	1997-Oct																
COPPER, DISSOLVED	1998-Apr						<20		<20		<20		<20				
COPPER, DISSOLVED	1998-Oct						<20		<20		<20		<20				
COPPER, DISSOLVED	1999-Sep										<20		<20				
COPPER, DISSOLVED	2000-Sep																
COPPER, DISSOLVED	2001-Sep																
COPPER, DISSOLVED	2004-Oct										<20						
COPPER, DISSOLVED	2004-Sep						<20						<20				
COPPER, DISSOLVED	2005-Sep										<20		<20				
COPPER, DISSOLVED	2006-Sep										<20		<20				
COPPER, DISSOLVED	2007-Sep						<20		<20		<20		<20				
COPPER, DISSOLVED	2008-Sep						<20		<20		<20	<20	<20				
COPPER, DISSOLVED	2009-Sep						<20				<20		<20				
COPPER, DISSOLVED	2010-Aug																
COPPER, DISSOLVED	2010-Sep						<20		<20		<20	<20	<20				
COPPER, DISSOLVED	2011-Sep												<20				
COPPER, DISSOLVED	2012-Sep				<20						<20		<20				
COPPER	2013-Sep													13			
COPPER, DISSOLVED	2013-Sep										<10	<10	<10				<10
COPPER	2014-Sep					1.5 J,B								8.7 J	8.2 J,B		<0.85
COPPER, DISSOLVED	2014-Sep						4.1 J,B		4.9 J,B		4.3 J,B	3.7 J,B	3.7 J,B				
COPPER	2015-Dec	2														1.7	8.2
COPPER, DISSOLVED	2015-Dec	1.2															
COPPER	2015-Sep	6.8 B		6.2 B							9.2 B	6.7 B	7.3 B	9.1 B		5.4 B	2.2 B
COPPER, DISSOLVED	2015-Sep	6.1 B															
COPPER	2016-Jun	0.37														0.66	<0.11
COPPER, DISSOLVED	2016-Jun	2.6 D9															
COPPER	2016-Mar	<1.1														<1.1	<1.1
COPPER, DISSOLVED	2016-Mar	<1.1															
COPPER	2016-Sep	0.25		0.74							1.1		0.28	1		0.52	<0.11
COPPER, DISSOLVED	2016-Sep																
COPPER	2017-Aug	0.3 B		1							0.55 B		0.64 B	1 B		0.38 B	0.073 B
COPPER	2018-Aug	0.8		1.6							4.5 B		<0.48	1		<0.48	<0.48
COPPER	2019-Apr																<2
COPPER	2019-Aug	<2	<2	<2							<2	<2	<2	<2		<2	<2

GW Standard:
SMCL = 1000

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

FLUORIDE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
FLUORIDE	1995-Aug	0.38			0.7	0.76										
FLUORIDE	1995-Oct	0.4		2.7	0.76	0.86			0.76		0.22	0.7				
FLUORIDE	1996-Apr	<0.2		<0.2	<0.2	<0.2			<0.2		<0.2	<0.2				
FLUORIDE	1996-Jan	<0.2		<0.2	<0.2	<0.2			<0.2			<0.2				
FLUORIDE	1996-Oct	<0.2		<0.2	<0.2	<0.2			<0.2		<0.2	<0.2				
FLUORIDE	2014-Sep	0.67		2.4	0.81	0.81	0.28									
FLUORIDE	2014-Sep								0.88		0.79					
FLUORIDE	2015-Dec												0.44	0.34	0.85	0.47
FLUORIDE	2015-Sep	0.45		2	0.68	0.7		0.22		0.48			0.36	0.26	0.44	0.32
FLUORIDE	2016-Jun												0.38	0.23	0.79	0.51
FLUORIDE	2016-Mar												0.51	0.35	0.75	0.67
FLUORIDE	2016-Sep	0.48		2.4	0.83	0.96		0.4		0.69	0.89		0.53	0.45	0.84	0.59
FLUORIDE	2017-Aug	0.58		2.5	0.71	0.89		0.39		0.58	0.78		0.53	0.44	0.74	0.61
FLUORIDE	2018-Aug			2.8	0.94	0.98		0.32		0.68	0.62		0.49	0.49	0.69	0.68
FLUORIDE	2019-Apr	0.35 J														
FLUORIDE	2019-Aug		0.85	0.76	<0.23	0.64		<0.23		<0.23	0.72	ater than or equal to the		<0.23	<0.23	0.9

GW Standard:
SMCL = 2

IPL Ottumwa Midland Landfill
Historic Monitoring Results

FLUORIDE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
FLUORIDE	1995-Aug																
FLUORIDE	1995-Oct																
FLUORIDE	1996-Apr																
FLUORIDE	1996-Jan																
FLUORIDE	1996-Oct																
FLUORIDE	2014-Sep					0.67	0.32		0.34		0.59	0.3	0.47	0.45	0.64		<0.1
FLUORIDE	2014-Sep																
FLUORIDE	2015-Dec	0.53														0.25	<0.066
FLUORIDE	2015-Sep	0.41		0.68							0.53	0.31	0.56	0.35		0.31	<0.066
FLUORIDE	2016-Jun	0.44														0.21	<0.073
FLUORIDE	2016-Mar	0.54														0.25	<0.073
FLUORIDE	2016-Sep	0.61		0.7							0.49		0.52	0.87		0.19	<0.027
FLUORIDE	2017-Aug	0.61		0.62							0.59		0.78	0.78		0.24	<0.1
FLUORIDE	2018-Aug	0.61		0.55							0.59		0.81	0.65		0.28	<0.063
FLUORIDE	2019-Apr																0.75
FLUORIDE	2019-Aug	0.55	<0.23	<0.23							0.62	<0.23	0.8	<0.23		<0.23	<0.045

GW Standard:
SMCL = 2

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

IRON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
IRON, DISSOLVED	1995-Apr															
IRON, DISSOLVED	1995-Aug	<100			<100	<100										
IRON, DISSOLVED	1995-Oct	<100		110	140	<100			<100		330	<100				
IRON, DISSOLVED	1996-Apr	317		129	406	31			<30		<30	74				
IRON, DISSOLVED	1996-Jan	<30		53	<30	87			40			<30				
IRON, DISSOLVED	1996-Jul	<30		73	322	<30			<30		<30	83				
IRON, DISSOLVED	1996-Oct	<30		157	<30	48			<30		321	<30				
IRON, DISSOLVED	1997-Apr	<100		170	110	<100			190		<100	100				
IRON, DISSOLVED	1997-Oct	<100		180	120	<100			<100		<100	<100				
IRON, DISSOLVED	1998-Apr	<100		<100	120	<100					<100	500				
IRON, DISSOLVED	1998-Oct	<100		730	310	<100	<100		240			590				
IRON, DISSOLVED	1999-Sep	<100		<100	260	<100	<100		<100		140	320				
IRON, DISSOLVED	2000-Sep	<100		<100	270	110	<100		<100		540	<100				
IRON, DISSOLVED	2001-Sep	<100		<100	120	<100	<100		<100		<100	<100				
IRON, DISSOLVED	2002-Sep	<100		160	150	<100	<100		<100		<100	170				
IRON, DISSOLVED	2003-Sep	<100		100	230	<100	<100		100		800	110				
IRON, DISSOLVED	2004-Oct															
IRON, DISSOLVED	2004-Sep	<100		<100	120	<100	<100		180			<100				
IRON, DISSOLVED	2005-Sep	<100		<100	170	<100	160		<100		<100	<100				
IRON, DISSOLVED	2006-Sep	<100		686	<100	<100	<100		<100		<100	<100				
IRON, DISSOLVED	2007-Sep	<100		111	<100	<100	102		<100			<100				
IRON, DISSOLVED	2008-Sep	<100		670	176	<100 pH>2	<100		1040		<100	<100				
IRON, DISSOLVED	2009-Sep	6300		331	<100	<100	<100		<100		<100	<100				
IRON, DISSOLVED	2010-Aug	<100														
IRON, DISSOLVED	2010-Sep			1440	317	131	<100		<100		<100	182				
IRON, DISSOLVED	2011-Sep	<100		<100	156	<100	<100		<100			<100				
IRON, DISSOLVED	2012-Sep	<100		<100	238	<100	<100		<100			<100				
IRON	2013-Sep															
IRON, DISSOLVED	2013-Sep	<50		<50	110	<50	64		<50		<50	120				
IRON	2014-Sep															
IRON, DISSOLVED	2014-Sep	<24		<24	110	81	<24		<24		<24					
IRON	2015-Dec															
IRON, DISSOLVED	2015-Dec												16	20	23000	430
IRON	2015-Sep															
IRON, DISSOLVED	2015-Sep	16.4		20.4	310	32.2		1880		91.7			11.3	<9	5680	158
IRON	2016-Jun															
IRON, DISSOLVED	2016-Jun												<12.8	<12.8	9810	370
IRON	2016-Mar															
IRON, DISSOLVED	2016-Mar												<8.8	<8.8	16300	250
IRON	2016-Sep															
IRON, DISSOLVED	2016-Sep	<12.8		<25.5 D3	300	<25.5 D3		1980		273	20.4		22	231	14900	182
IRON	2017-Aug	12.5		473	324	91.5		2410		365	<9.6		16.2	140	5230	983
IRON	2018-Aug			27.1 B	155 B	81.8 B		5580		266	<14.9		86.3 B	949	5330	1300
IRON	2019-Apr	380														
IRON	2019-Aug		<66	180	290	230		2600		430	160		<66	<66	5200	3500

GW Standard:
SMCL = 300

IPL Ottumwa Midland Landfill
Historic Monitoring Results

IRON
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
IRON, DISSOLVED	1995-Apr										<100						
IRON, DISSOLVED	1995-Aug																
IRON, DISSOLVED	1995-Oct										<100						
IRON, DISSOLVED	1996-Apr						<30		<30		<30						
IRON, DISSOLVED	1996-Jan																
IRON, DISSOLVED	1996-Jul						<30		430		<30		<30				
IRON, DISSOLVED	1996-Oct										123		115				
IRON, DISSOLVED	1997-Apr						<100		<100		<100						
IRON, DISSOLVED	1997-Oct										<100						
IRON, DISSOLVED	1998-Apr						<100		<100		<100		<100				
IRON, DISSOLVED	1998-Oct						170		170		<100		<100				
IRON, DISSOLVED	1999-Sep										<100		<100				
IRON, DISSOLVED	2000-Sep										<100		<100				
IRON, DISSOLVED	2001-Sep						<100				<100		<100				
IRON, DISSOLVED	2002-Sep										<100		<100				
IRON, DISSOLVED	2003-Sep										<100		<100				
IRON, DISSOLVED	2004-Oct										<100						
IRON, DISSOLVED	2004-Sep						<100						<100				
IRON, DISSOLVED	2005-Sep										<100		740				
IRON, DISSOLVED	2006-Sep										<100		<100				
IRON, DISSOLVED	2007-Sep						<100		<100		<100		<100				
IRON, DISSOLVED	2008-Sep						<100		<100		<100	<100	<100				
IRON, DISSOLVED	2009-Sep						<100				<100		101				
IRON, DISSOLVED	2010-Aug																
IRON, DISSOLVED	2010-Sep						<100		<100		<100	<100	<100				
IRON, DISSOLVED	2011-Sep												<100				
IRON, DISSOLVED	2012-Sep				153						<100		<100				
IRON	2013-Sep													140			
IRON, DISSOLVED	2013-Sep										<50	100	<50				<50
IRON	2014-Sep					260								960	2400		<24
IRON, DISSOLVED	2014-Sep						130		170		<24	100	25				
IRON	2015-Dec	13														41	<9
IRON, DISSOLVED	2015-Dec	<9															
IRON	2015-Sep	140		1570							196	806	233	84.5		<9	<9
IRON, DISSOLVED	2015-Sep	37.8															
IRON	2016-Jun	<12.8														42.8	<12.8
IRON, DISSOLVED	2016-Jun	<12.8															
IRON	2016-Mar	<8.8														<8.8	<8.8
IRON, DISSOLVED	2016-Mar	<8.8															
IRON	2016-Sep	<12.8		1570							228		85.9	29.7		49.6	13.5
IRON, DISSOLVED	2016-Sep																
IRON	2017-Aug	<9.6		1370							52.9		581	38.8		<9.6	<9.6
IRON	2018-Aug	<14.9		4690							59.8		186 B	31.3 B,M1		6.2	<14.9
IRON	2019-Apr																<66
IRON	2019-Aug	<66	510	4700							77 J	1300	110	67 J		370	<66

GW Standard:
SMCL = 300

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

LEAD
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
LEAD, DISSOLVED	1995-Aug	<5			<5	<5										
LEAD, DISSOLVED	1995-Oct	<5		<5	<5	<5			<5		<5	<5				
LEAD, DISSOLVED	1996-Apr	<5		<5	<5	<5			<5		<5	<5				
LEAD, DISSOLVED	1996-Jan	<5		<5	<5	<5			<5			<5				
LEAD, DISSOLVED	1996-Jul	<5		<5	<5	<5			<5		<5	<5				
LEAD, DISSOLVED	1997-Oct										<4					
LEAD, DISSOLVED	1998-Apr															
LEAD, DISSOLVED	1998-Oct						<4									
LEAD, DISSOLVED	1999-Sep						<4									
LEAD, DISSOLVED	2000-Sep						<4									
LEAD, DISSOLVED	2001-Sep						<4									
LEAD, DISSOLVED	2004-Oct															
LEAD, DISSOLVED	2004-Sep	<4		<4	<4	<4	<4		<4			<4				
LEAD, DISSOLVED	2005-Sep	<4 WT		<4 WT	<4 WT	<4 WT	<4 WT		<4 WT		<4 WT	<4 WT				
LEAD, DISSOLVED	2006-Sep	<4		<4	<4	<4	<4		<4		<4	<4				
LEAD, DISSOLVED	2007-Sep	<4		<4	<4	<4	<4		<4			<4				
LEAD, DISSOLVED	2008-Sep	<4		<4	<4	<4 pH>2	<4		<4		<4	<4				
LEAD, DISSOLVED	2009-Sep	<4		<4	<4	<4	<4		<4		<4	<4				
LEAD, DISSOLVED	2010-Aug	<4														
LEAD, DISSOLVED	2010-Sep			<4	<4	<4	<4		<4		<4	<4				
LEAD, DISSOLVED	2011-Sep	<4		<4	<4	<4	<4		<4			<4				
LEAD, DISSOLVED	2012-Sep	<4		<4	<4	<4	<4		<4			<4				
LEAD	2013-Sep															
LEAD, DISSOLVED	2013-Sep	<1		<1	<1	<1	<1		<1		<1	<1				
LEAD	2014-Sep															
LEAD, DISSOLVED	2014-Sep	0.19 J,B		0.18 J,B	0.22 J,B	0.2 J,B	0.17 J,B		0.17 J,B		0.17 J,B					
LEAD	2015-Dec															
LEAD, DISSOLVED	2015-Dec												2	<1.9	<1.9	<1.9
LEAD	2015-Sep															
LEAD, DISSOLVED	2015-Sep	<1.9		<1.9	<1.9	<1.9		<1.9		<1.9			2.4	<1.9	<1.9	<1.9
LEAD	2016-Jun															
LEAD, DISSOLVED	2016-Jun												<0.19	<0.19	<0.19	<0.19
LEAD	2016-Mar															
LEAD, DISSOLVED	2016-Mar												<2.5	<2.5	<2.5	<2.5
LEAD	2016-Sep															
LEAD, DISSOLVED	2016-Sep	<0.19		<0.19	<0.19	<0.19		<0.19		<0.39 D3	<0.19		<0.19	0.2	<0.39 D3	<0.19
LEAD	2017-Aug	0.18		0.38	<0.033	0.22		0.24		0.4	<0.033		0.039	0.41	0.036	0.041
LEAD	2018-Aug			<0.12	<0.12	0.12		0.63		<0.12	<0.12		<0.12	0.6	<0.12	<0.12
LEAD	2019-Apr	0.71														
LEAD	2019-Aug		<0.27	0.31 J	<0.27	<0.27		<0.27		<0.27	<0.27		<0.27	<0.27	<1.1	<0.27

GW Standard:
Action Level: 15

IPL Ottumwa Midland Landfill
Historic Monitoring Results

LEAD
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
LEAD, DISSOLVED	1995-Aug										<5						
LEAD, DISSOLVED	1995-Oct										<5						
LEAD, DISSOLVED	1996-Apr						<5		<5		<5						
LEAD, DISSOLVED	1996-Jan																
LEAD, DISSOLVED	1996-Jul						<5		<5		<5		<5				
LEAD, DISSOLVED	1997-Oct																
LEAD, DISSOLVED	1998-Apr						<4		<4				<4				
LEAD, DISSOLVED	1998-Oct						<4		<4				<4				
LEAD, DISSOLVED	1999-Sep												<4				
LEAD, DISSOLVED	2000-Sep												<4				
LEAD, DISSOLVED	2001-Sep												<4				
LEAD, DISSOLVED	2004-Oct										<4						
LEAD, DISSOLVED	2004-Sep						<4						<4				
LEAD, DISSOLVED	2005-Sep										<4 WT		<4				
LEAD, DISSOLVED	2006-Sep										<4		<4				
LEAD, DISSOLVED	2007-Sep						<4		<4		<4		<4				
LEAD, DISSOLVED	2008-Sep						<4		<4		<4	<4	<4				
LEAD, DISSOLVED	2009-Sep						<4				<4		<4				
LEAD, DISSOLVED	2010-Aug																
LEAD, DISSOLVED	2010-Sep						<4		<4		<4	<4	<4				
LEAD, DISSOLVED	2011-Sep												<4				
LEAD, DISSOLVED	2012-Sep				<4						<4		<4				
LEAD	2013-Sep													<2 D3			
LEAD, DISSOLVED	2013-Sep										<1	<1	<1				<1
LEAD	2014-Sep					0.16 J,B								0.78 J,B	6.2		0.12 J,B
LEAD, DISSOLVED	2014-Sep						0.22 J,B		0.32 J,B		0.17 J,B	0.22 J,B	0.18 J,B				
LEAD	2015-Dec	<1.9														<1.9	<1.9
LEAD, DISSOLVED	2015-Dec	<1.9															
LEAD	2015-Sep	3.8 B		3.3 B							<1.9	<1.9	3.2 B	3.2 B		<1.9	<1.9
LEAD, DISSOLVED	2015-Sep	2.6															
LEAD	2016-Jun	<0.19														<0.19	<0.19
LEAD, DISSOLVED	2016-Jun	<0.19															
LEAD	2016-Mar	<2.5														<2.5	<2.5
LEAD, DISSOLVED	2016-Mar	<2.5															
LEAD	2016-Sep	<0.19		<0.19							0.23		<0.19	<0.19		<0.19	<0.19
LEAD, DISSOLVED	2016-Sep																
LEAD	2017-Aug	<0.033		0.33							0.1		0.33	<0.066 D3		<0.033	<0.033
LEAD	2018-Aug	<0.12		0.66							<3		<0.12	<0.24 D3		<0.12	<0.12
LEAD	2019-Apr																<0.27
LEAD	2019-Aug	<1.1	0.34 J	<0.27							<0.27	<0.27	<0.27	<0.27		0.42 J	<0.27

GW Standard:
Action Level: 15

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

MAGNESIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
MAGNESIUM, DISSOLVED	1995-Aug	58000			87000	31000										
MAGNESIUM, DISSOLVED	1995-Oct	56000		7800	82000	29000			33000		140000	43000				
MAGNESIUM, DISSOLVED	1996-Apr	50300		8230	76400	28200			35700		97000	43100				
MAGNESIUM, DISSOLVED	1996-Jan	60100		10300	83100	32300			29300			31200				
MAGNESIUM, DISSOLVED	1996-Jul	57300		6790	73000	29800			29400		<100	39700				
MAGNESIUM, DISSOLVED	1996-Oct					30600										
MAGNESIUM, DISSOLVED	1997-Apr	51000			62000	29000			31000		78000	36000				
MAGNESIUM, DISSOLVED	1997-Oct	56000			59000	30000			29000		62000	39000				
MAGNESIUM, DISSOLVED	1998-Apr	62000			54000	29000					42000	37000				
MAGNESIUM, DISSOLVED	1998-Oct	59000			55000	29000	200000		25000			39000				
MAGNESIUM, DISSOLVED	1999-Sep	60000		9500	50000	29000	190000		29000		47000	36000				
MAGNESIUM, DISSOLVED	2000-Sep	47000		9600	50000	31000	200000		29000		25000	34000				
MAGNESIUM, DISSOLVED	2001-Sep	35000		14800	49400	31400	186000		29500		40600	31900 *MSO				
MAGNESIUM, DISSOLVED	2002-Sep	40000		24000	47000	31000	200000		27000		48000	36000				
MAGNESIUM, DISSOLVED	2003-Sep	41300		22700	47800	30700	203000		32100		86600	31600				
MAGNESIUM, DISSOLVED	2004-Oct															
MAGNESIUM, DISSOLVED	2004-Sep	29000		19000 N*	46000	32000	200000		31000			31000				
MAGNESIUM, DISSOLVED	2005-Sep	41000		11000	50000 N*	33000	210000		31000		69000	35000				
MAGNESIUM, DISSOLVED	2006-Sep	29500		11300	44900	34800	200000		30600		104000	32000				
MAGNESIUM, DISSOLVED	2007-Sep	28700		9990	44400	30600	199000		33900			28600				
MAGNESIUM, DISSOLVED	2008-Sep	45400		10900 MHA	50600	35100 pH>	204000		30600		29300	30700				
MAGNESIUM, DISSOLVED	2009-Sep	50100		9170	48900	34200	208000		34200		17600	29900				
MAGNESIUM, DISSOLVED	2010-Aug	64300														
MAGNESIUM, DISSOLVED	2010-Sep			7430	51400	31700	211000		33000		21400	26900				
MAGNESIUM, DISSOLVED	2011-Sep	61800		9310	50300	34300	237000		32000			26400				
MAGNESIUM, DISSOLVED	2012-Sep	52600		9420	52400	36100	121000		35400			28500				
MAGNESIUM	2013-Sep															
MAGNESIUM, DISSOLVED	2013-Sep	44600		8100	45200	31000	106000		32800		66000	28600				
MAGNESIUM	2014-Sep															
MAGNESIUM, DISSOLVED	2014-Sep	25600		7900	41700	30300	104000		22600		32800					
MAGNESIUM	2015-Dec															
MAGNESIUM, DISSOLVED	2015-Dec												39100	116000	242000	25000
MAGNESIUM	2015-Sep															
MAGNESIUM, DISSOLVED	2015-Sep	46300		7320	47000	31300		150000		71000			35300	92900	171000	22500
MAGNESIUM	2016-Jun															
MAGNESIUM, DISSOLVED	2016-Jun												33900 M1	88700	174000	18900
MAGNESIUM	2016-Mar															
MAGNESIUM, DISSOLVED	2016-Mar												37200	101000	205000	23400
MAGNESIUM	2016-Sep															
MAGNESIUM, DISSOLVED	2016-Sep	49500		8300	65400	32300		146000		85500	49200		36000	92600	198000	21500
MAGNESIUM	2017-Aug	48100		7830	61700	30400		139000		41700	58100		37000	72300	157000	17700
MAGNESIUM	2018-Aug			7230	60700	34200		146000		40400	84000		39600	70400	170000	20100
MAGNESIUM, DISSOLVED	2018-Aug															
MAGNESIUM	2019-Apr	31000														
MAGNESIUM	2019-Aug		14000	17000	60000	30000		140000		35000	24000		35000	59000	170000	14000
Magnesium	2-Year Avg.	48800		7530	61200	32300	--	142500	--	41050	71050	--	38300	71350	163500	18900

GW Standard:
None

Note: Average of previous 2 years (2016-2017) is calculated for parameters that do not have an MCL, SMCL, or HAL. For parameters that were not detected, the detection limit is used in the calculation.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

MAGNESIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
MAGNESIUM, DISSOLVED	1995-Aug										36000						
MAGNESIUM, DISSOLVED	1995-Oct										32000						
MAGNESIUM, DISSOLVED	1996-Apr						24000		34400		20900						
MAGNESIUM, DISSOLVED	1996-Jan																
MAGNESIUM, DISSOLVED	1996-Jul						18500		34200		14800		29500				
MAGNESIUM, DISSOLVED	1996-Oct																
MAGNESIUM, DISSOLVED	1997-Apr						18000		18000		28000						
MAGNESIUM, DISSOLVED	1997-Oct										27000						
MAGNESIUM, DISSOLVED	1998-Apr						17000		17000		26000		33000				
MAGNESIUM, DISSOLVED	1998-Oct						14000		14000		13000		23000				
MAGNESIUM, DISSOLVED	1999-Sep										25000		37000				
MAGNESIUM, DISSOLVED	2000-Sep										17000		27000				
MAGNESIUM, DISSOLVED	2001-Sep						29300				13800		18800				
MAGNESIUM, DISSOLVED	2002-Sep										22000 N*		28000				
MAGNESIUM, DISSOLVED	2003-Sep										42500		42600				
MAGNESIUM, DISSOLVED	2004-Oct										22900						
MAGNESIUM, DISSOLVED	2004-Sep						27000						26000				
MAGNESIUM, DISSOLVED	2005-Sep										36000		48000				
MAGNESIUM, DISSOLVED	2006-Sep										37900		49200				
MAGNESIUM, DISSOLVED	2007-Sep						28600		28200		23300		27800				
MAGNESIUM, DISSOLVED	2008-Sep						23800		21800 MHA		20400	12400	34300				
MAGNESIUM, DISSOLVED	2009-Sep						27000				16300 S3		25900				
MAGNESIUM, DISSOLVED	2010-Aug																
MAGNESIUM, DISSOLVED	2010-Sep						24900		12700		8710	14900	15200				
MAGNESIUM, DISSOLVED	2011-Sep												28400				
MAGNESIUM, DISSOLVED	2012-Sep				67400						47000		46500				
MAGNESIUM	2013-Sep													74400 M1			
MAGNESIUM, DISSOLVED	2013-Sep										26200	18500	30400				<50
MAGNESIUM	2014-Sep					73700								45600	54200		<17
MAGNESIUM, DISSOLVED	2014-Sep						9300		7700		17200	5200	13900				
MAGNESIUM	2015-Dec	42500														8500	14
MAGNESIUM, DISSOLVED	2015-Dec	45800 D9															
MAGNESIUM	2015-Sep	58800		38600							35000	31200	36200	29800		8460	<13.3
MAGNESIUM, DISSOLVED	2015-Sep	58700															
MAGNESIUM	2016-Jun	72500														9930	<15.8
MAGNESIUM, DISSOLVED	2016-Jun	67000															
MAGNESIUM	2016-Mar	44200														9740	<15.8
MAGNESIUM, DISSOLVED	2016-Mar	44600															
MAGNESIUM	2016-Sep	63600		82600							38300		33500	89200		9160	<15.8
MAGNESIUM, DISSOLVED	2016-Sep																
MAGNESIUM	2017-Aug	76100		81400							47800		47900	82600		14700	<15.4
MAGNESIUM	2018-Aug	114000		103000							36500		51400	88700		22400	<14
MAGNESIUM, DISSOLVED	2018-Aug															20200	
MAGNESIUM	2019-Apr																120 J
MAGNESIUM	2019-Aug	51000	64000	33000							22000	18000	32000	25000		12000	<29
Magnesium	2-Year Avg.	69850	--	92200	--	--	--	--	--	--	42150	--	49650	85650	--	21300	15.6

GW Standard:
None

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

MANGANESE
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
MANGANESE, DISSOLVED	1999-Sep	<10		546	234	286	3400		267		3700	166				
MANGANESE, DISSOLVED	2000-Sep	<10		329	177	338	3400		180		5900	170				
MANGANESE, DISSOLVED	2001-Sep	<10		529	278	238	1700		186		7070	192				
MANGANESE, DISSOLVED	2002-Sep	31		697	255	319	1000		212		8300	178				
MANGANESE, DISSOLVED	2003-Sep	<10		588	187	227	1400		156		8610	185				
MANGANESE, DISSOLVED	2004-Oct															
MANGANESE, DISSOLVED	2004-Sep	<10		555	215	207	967		170			109				
MANGANESE, DISSOLVED	2005-Sep	18		280	182	230	1900		226		8400	173				
MANGANESE, DISSOLVED	2006-Sep	15		387 S	191	246	1080		235		12900	171				
MANGANESE, DISSOLVED	2007-Sep	15.1		249	157	142	2880		173			103				
MANGANESE, DISSOLVED	2008-Sep	<10		273	164	219 pH>2	1130		220		411	102				
MANGANESE, DISSOLVED	2009-Sep	515		249	215	243	1180		142		15.9	83.1				
MANGANESE, DISSOLVED	2010-Aug	<10														
MANGANESE, DISSOLVED	2010-Sep			170	137	165	930		93.8 S3		<10	127				
MANGANESE, DISSOLVED	2011-Sep	<10		347	144	192	343		153			91				
MANGANESE, DISSOLVED	2012-Sep	30.1		66.1	140	316	305		118			120				
MANGANESE	2013-Sep															
MANGANESE, DISSOLVED	2013-Sep	6.6		250	140	180	240		140		1600	160				
MANGANESE	2014-Sep															
MANGANESE, DISSOLVED	2014-Sep	18		55	130	280	270		270		280					
MANGANESE	2015-Dec															
MANGANESE, DISSOLVED	2015-Dec												<2.4	390	1600	1100
MANGANESE	2015-Sep															
MANGANESE, DISSOLVED	2015-Sep	11.1		362	104	435		4570		777			8.8	658	714	1100
MANGANESE	2016-Jun															
MANGANESE, DISSOLVED	2016-Jun												3.4 B	120	986	965
MANGANESE	2016-Mar															
MANGANESE, DISSOLVED	2016-Mar												7.2	310	1300	990
MANGANESE	2016-Sep															
MANGANESE, DISSOLVED	2016-Sep	10.7		319	136	408		3160		583	28.6		4.9	48	1250	880
MANGANESE	2017-Aug	2		176	170	213		2990		415	10.8		0.9 B	74.1	558 M1	1150
MANGANESE	2018-Aug			114	178	93.7		3010		329	170		5.6	210	574	1100
MANGANESE	2019-Apr	20														
MANGANESE	2019-Aug		2.8 J	370	180	87		2600		330	440		<2.5	44	550	970

GW Standard:
SMCL = 50

IPL Ottumwa Midland Landfill
Historic Monitoring Results

MANGANESE
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
MANGANESE, DISSOLVED	1999-Sep										<10		42				
MANGANESE, DISSOLVED	2000-Sep										<10		281				
MANGANESE, DISSOLVED	2001-Sep						1870				<10		50				
MANGANESE, DISSOLVED	2002-Sep										<10		62				
MANGANESE, DISSOLVED	2003-Sep										<10		52				
MANGANESE, DISSOLVED	2004-Oct										<10						
MANGANESE, DISSOLVED	2004-Sep						2300						135				
MANGANESE, DISSOLVED	2005-Sep										11		335				
MANGANESE, DISSOLVED	2006-Sep										11.3		66.8				
MANGANESE, DISSOLVED	2007-Sep						1370		<10		30.3		49.8				
MANGANESE, DISSOLVED	2008-Sep						350		35.6		<10	55	118				
MANGANESE, DISSOLVED	2009-Sep						646				<10		36.8				
MANGANESE, DISSOLVED	2010-Aug																
MANGANESE, DISSOLVED	2010-Sep						1150		69.3		<10	185	86.9				
MANGANESE, DISSOLVED	2011-Sep												<10				
MANGANESE, DISSOLVED	2012-Sep				192						<10		10.8				
MANGANESE	2013-Sep													160			
MANGANESE, DISSOLVED	2013-Sep										84	310	38				<5
MANGANESE	2014-Sep					470								53	270		<2.5
MANGANESE, DISSOLVED	2014-Sep						85		84		14	24	49				
MANGANESE	2015-Dec	38														<2.4	<2.4
MANGANESE, DISSOLVED	2015-Dec	54 1e															
MANGANESE	2015-Sep	2950		1030							36.9	4020	330	56.8		<2.4	<2.4
MANGANESE, DISSOLVED	2015-Sep	2570															
MANGANESE	2016-Jun	2590														4.2	<0.19
MANGANESE, DISSOLVED	2016-Jun	2530															
MANGANESE	2016-Mar	503														<0.25	<0.25
MANGANESE, DISSOLVED	2016-Mar	500															
MANGANESE	2016-Sep	2740		156							54.3		295	110		6.4	0.2
MANGANESE, DISSOLVED	2016-Sep																
MANGANESE	2017-Aug	3260		104							27.3		477	9 B		5.3 B	0.31 B
MANGANESE	2018-Aug	5540		219							24		583	3.9 M1		7.5	<0.33
MANGANESE	2019-Apr																23
MANGANESE	2019-Aug	4700	3900	340							8.2 J	2000	170	13		23	<2.5

GW Standard:
SMCL = 50

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

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IPL Ottumwa Midland Landfill
Historic Monitoring Results

SELENIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
SELENIUM, DISSOLVED	1995-Aug	<5			<5	<5										
SELENIUM, DISSOLVED	1995-Oct	<5		<5	<5	<5			<5		<5	<5				
SELENIUM, DISSOLVED	1996-Apr	<5		<5	<5	<5			<5		11	<5				
SELENIUM, DISSOLVED	1996-Jan	<5		<5	<5	<5			<5			<5				
SELENIUM, DISSOLVED	1996-Jul	<5		<5	<5	<5			<5		<5	<5				
SELENIUM, DISSOLVED	1996-Oct															
SELENIUM, DISSOLVED	1997-Apr										13.3					
SELENIUM, DISSOLVED	1997-Oct										<5					
SELENIUM, DISSOLVED	1998-Apr										<5					
SELENIUM, DISSOLVED	1998-Oct						<5									
SELENIUM, DISSOLVED	1999-Sep						<5				<5					
SELENIUM, DISSOLVED	2000-Sep	<5		<5	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2001-Sep	<5		<5 NS+	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2002-Sep	<5		<5	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2003-Sep	<5		<5	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2004-Oct															
SELENIUM, DISSOLVED	2004-Sep	<10 R		<5	<5	<5	<5		<5			<5				
SELENIUM, DISSOLVED	2005-Sep	<5		<5 NS	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2006-Sep	<5		<5	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2007-Sep	<5		<5	<5	<5	<20 RL1		<5			<5				
SELENIUM, DISSOLVED	2008-Sep	<5		<5 S	<5	<5 pH>2	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2009-Sep	<5		<5	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2010-Aug	<5														
SELENIUM, DISSOLVED	2010-Sep			<5 S, S3	<5	<5	<5		<5		<5	<5				
SELENIUM, DISSOLVED	2011-Sep	<5		<5	<5	<5 S S3	<5		<5			<5				
SELENIUM, DISSOLVED	2012-Sep	<5		<5	<5	<5	<5		<5 S,S3			<5				
SELENIUM	2013-Sep															
SELENIUM, DISSOLVED	2013-Sep	1		<1	<1	<1	<1		<1		<1	<1				
SELENIUM	2014-Sep															
SELENIUM, DISSOLVED	2014-Sep	0.41		<0.14	<0.14	<0.14	0.41 J		<0.14		0.52 J					
SELENIUM	2015-Dec															
SELENIUM, DISSOLVED	2015-Dec												<5.8	<5.8	<5.8	<5.8
SELENIUM	2015-Sep															
SELENIUM, DISSOLVED	2015-Sep	<5.8		<5.8	<5.8	<5.8		<5.8		<5.8			<5.8	7.2	<5.8	<5.8
SELENIUM	2016-Jun															
SELENIUM, DISSOLVED	2016-Jun												0.95	4.8	<0.18	0.21
SELENIUM	2016-Mar															
SELENIUM, DISSOLVED	2016-Mar												<5.4	<5.4	<5.4	<5.4
SELENIUM	2016-Sep															
SELENIUM, DISSOLVED	2016-Sep	1.1		<0.37 D3	<0.37 D3	<0.37 D3		<0.18		<0.55 D3	<0.18		0.68	6.1	<0.55 D3	<0.18
SELENIUM	2017-Aug	1.1		<0.086	<0.086	0.16		<0.086		0.099	0.25		0.95	4	<0.086	0.089
SELENIUM	2018-Aug			<0.16	<0.16	<0.16		0.4		<0.16	<0.16		0.95	3.7	<0.16	<0.16
SELENIUM	2019-Apr	<1														
SELENIUM	2019-Aug		1.4 J	<1	<1	<1		<1		<1	<1		<1	qual to the M	<1	<1

GW Standard:
MCL = 50

IPL Ottumwa Midland Landfill
Historic Monitoring Results

SELENIUM
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
SELENIUM, DISSOLVED	1995-Aug										<5						
SELENIUM, DISSOLVED	1995-Oct										<5						
SELENIUM, DISSOLVED	1996-Apr						<5		<5		26						
SELENIUM, DISSOLVED	1996-Jan																
SELENIUM, DISSOLVED	1996-Jul						<5		<5		13		<5				
SELENIUM, DISSOLVED	1996-Oct										6						
SELENIUM, DISSOLVED	1997-Apr										13						
SELENIUM, DISSOLVED	1997-Oct										10.5						
SELENIUM, DISSOLVED	1998-Apr						<5		<5		7		55				
SELENIUM, DISSOLVED	1998-Oct						<5		<5		<5		<5				
SELENIUM, DISSOLVED	1999-Sep										<5		<5				
SELENIUM, DISSOLVED	2000-Sep										<5		<5				
SELENIUM, DISSOLVED	2001-Sep						<5				<5		<5				
SELENIUM, DISSOLVED	2002-Sep										<5		<5 NS				
SELENIUM, DISSOLVED	2003-Sep										<5		<5				
SELENIUM, DISSOLVED	2004-Oct										<5						
SELENIUM, DISSOLVED	2004-Sep						<5						<5				
SELENIUM, DISSOLVED	2005-Sep										<5		<5				
SELENIUM, DISSOLVED	2006-Sep										<5		<5				
SELENIUM, DISSOLVED	2007-Sep						<5		<5		<5		<5				
SELENIUM, DISSOLVED	2008-Sep						<5		<5		5.96	<5	<5				
SELENIUM, DISSOLVED	2009-Sep						<5				<5		<5				
SELENIUM, DISSOLVED	2010-Aug																
SELENIUM, DISSOLVED	2010-Sep						<5		<5		<5	<5	<5				
SELENIUM, DISSOLVED	2011-Sep												<5				
SELENIUM, DISSOLVED	2012-Sep				<5 S S3						<5		<5				
SELENIUM	2013-Sep													39			
SELENIUM, DISSOLVED	2013-Sep										3.4	<1	<1				<1
SELENIUM	2014-Sep					3.6								13	16		<0.23
SELENIUM, DISSOLVED	2014-Sep						0.69 J		0.92 J		3.9	0.43 J	0.55 J				
SELENIUM	2015-Dec	<5.8														<5.8	<5.8
SELENIUM, DISSOLVED	2015-Dec	<5.8															
SELENIUM	2015-Sep	<5.8		<5.8							<5.8	<5.8	<5.8	9.9		<5.8	<5.8
SELENIUM, DISSOLVED	2015-Sep	<5.8															
SELENIUM	2016-Jun	1.3														1.8	<0.18
SELENIUM, DISSOLVED	2016-Jun	1.3															
SELENIUM	2016-Mar	<5.4														<5.4	<5.4
SELENIUM, DISSOLVED	2016-Mar	<5.4															
SELENIUM	2016-Sep	1.3		2.6							2.8		0.38	37.6		1.7	<0.18
SELENIUM, DISSOLVED	2016-Sep																
SELENIUM	2017-Aug	0.77		2.4							1.6		0.56	52		0.9	<0.086
SELENIUM	2018-Aug	0.85		2.1							<6.1		0.55	70.7		1.6	<0.16
SELENIUM	2019-Apr																1 J
SELENIUM	2019-Aug	<1	<1	2.1 J							1.1 J	<1	<1	52		2.3 J	<1

GW Standard:
MCL = 50

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

ZINC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
ZINC, DISSOLVED	1995-Aug	<20			<20	<20										
ZINC, DISSOLVED	1995-Oct	<20		<20	<20	<20			<20		<20	<20				
ZINC, DISSOLVED	1996-Apr	<30		<30	<30	<30			<30		<30	<30				
ZINC, DISSOLVED	1996-Jan	<20		<20	<20	<20			<20			<20				
ZINC, DISSOLVED	1996-Jul	<30		<30	<30	<30			<30		<30	<30				
ZINC, DISSOLVED	1997-Oct										<20					
ZINC, DISSOLVED	1998-Apr															
ZINC, DISSOLVED	1998-Oct						<20									
ZINC, DISSOLVED	1999-Sep						32									
ZINC, DISSOLVED	2000-Sep						<20									
ZINC, DISSOLVED	2001-Sep						<20									
ZINC, DISSOLVED	2002-Sep						<20									
ZINC, DISSOLVED	2003-Sep						<20									
ZINC, DISSOLVED	2004-Oct															
ZINC, DISSOLVED	2004-Sep	<20		<40 IE	<40 IE	<40 IE	<20		<40 IE			<20				
ZINC, DISSOLVED	2005-Sep	29		<100 IE	<100 IE	<100 IE	87		<100 IE		41	<100 IE				
ZINC, DISSOLVED	2006-Sep	25.4		<60	118	<60 IE	29.1		<60 IE		45.1	<60 IE				
ZINC, DISSOLVED	2007-Sep	29.1		<100 IE,MI	<100 IE	<100 IE	183		<40 IE			<40 IE				
ZINC, DISSOLVED	2008-Sep	22.2		<100 IE	<100 IE	<100 IEpH>	91.3		<100 IE		28.3	<100 IE				
ZINC, DISSOLVED	2009-Sep	45.5		<60 IE	<60 IE	<60 IE	183		<60 IE		25.4	<60 IE				
ZINC, DISSOLVED	2010-Aug	<20														
ZINC, DISSOLVED	2010-Sep			<60 IE	<60 IE	<60 IE	<20		<60 IE		<20	<20				
ZINC, DISSOLVED	2011-Sep	<20		<100 IE	<100 IE	<100 IE	<20		<60 IE			<60 IE				
ZINC, DISSOLVED	2012-Sep	<20		<60 IE	<60 IE	<60 IE	<20		133			<60 IE				
ZINC	2013-Sep															
ZINC, DISSOLVED	2013-Sep	<50		<50	<50	<50	<50		<50		100	<50				
ZINC	2014-Sep															
ZINC, DISSOLVED	2014-Sep	22		<12	15	<12	<12		<12		28					
ZINC	2015-Dec															
ZINC, DISSOLVED	2015-Dec												2.8	<2.6	11	35
ZINC	2015-Sep															
ZINC, DISSOLVED	2015-Sep	<2.6		<2.6	5.9	3.3		<2.6		4.1			<2.6	<2.6	5.9	7.6
ZINC	2016-Jun															
ZINC, DISSOLVED	2016-Jun												3.3 B	4.1 B	14.6 B	22.7
ZINC	2016-Mar															
ZINC, DISSOLVED	2016-Mar												<7.1	<7.1	<7.1	<7.1
ZINC	2016-Sep															
ZINC, DISSOLVED	2016-Sep	3.7 B		2.7 B	4.2 B	2.8 B		3.2 B		3.2 B	11.6		6.2 B	3.9 B	28.5 B	6.3 B
ZINC	2017-Aug	2.4		3.7	2 B	1.7 B		1.5 B		1 B	10.4		0.88	1.8	3.6 M1	87.8
ZINC	2018-Aug			<3.7	<3.7	<3.7		6		<3.7	31.4		<3.7	6.7	4.3	88.1
ZINC	2019-Apr	<10														
ZINC	2019-Aug		<10	<10	<10	<10	ter than or equal to the MDL and the			<10	<10		<10	<10	<10	86

GW Standard:
SMCL = 5000

IPL Ottumwa Midland Landfill
Historic Monitoring Results

ZINC
UNITS: UG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
ZINC, DISSOLVED	1995-Aug										<20						
ZINC, DISSOLVED	1995-Oct										<20						
ZINC, DISSOLVED	1996-Apr						<30		<30		<30						
ZINC, DISSOLVED	1996-Jan																
ZINC, DISSOLVED	1996-Jul						<30		33		<30						
ZINC, DISSOLVED	1997-Oct																
ZINC, DISSOLVED	1998-Apr						<20		<20				<20				
ZINC, DISSOLVED	1998-Oct						<20		<20				<20				
ZINC, DISSOLVED	1999-Sep												<20				
ZINC, DISSOLVED	2000-Sep												<20				
ZINC, DISSOLVED	2001-Sep												<20				
ZINC, DISSOLVED	2002-Sep																
ZINC, DISSOLVED	2003-Sep																
ZINC, DISSOLVED	2004-Oct										<20						
ZINC, DISSOLVED	2004-Sep						<20						<20				
ZINC, DISSOLVED	2005-Sep										24		<20				
ZINC, DISSOLVED	2006-Sep										25.5		23.7				
ZINC, DISSOLVED	2007-Sep						33.2		62.6		26.7		31.1				
ZINC, DISSOLVED	2008-Sep						<20		<20		<20	35.7	<20				
ZINC, DISSOLVED	2009-Sep						38.9				21.9		25.5				
ZINC, DISSOLVED	2010-Aug																
ZINC, DISSOLVED	2010-Sep						<20		<20		<20	34.3	<20				
ZINC, DISSOLVED	2011-Sep												<20				
ZINC, DISSOLVED	2012-Sep				37.8						<20		<20				
ZINC	2013-Sep													<50			
ZINC, DISSOLVED	2013-Sep										<50	<50	<50				<50
ZINC	2014-Sep					27								<12	<12		<12
ZINC, DISSOLVED	2014-Sep						<12		<12		<12	<12	<12				
ZINC	2015-Dec	4.9														<2.6	4.7
ZINC, DISSOLVED	2015-Dec	7.1															
ZINC	2015-Sep	21.8		21.9							6.2	14.7	6.5	4.6		3.1	<2.6
ZINC, DISSOLVED	2015-Sep	22.5															
ZINC	2016-Jun	23.8														1.7	1.5
ZINC, DISSOLVED	2016-Jun	25.6 D9															
ZINC	2016-Mar	<7.1														<7.1	<7.1
ZINC, DISSOLVED	2016-Mar	<7.1															
ZINC	2016-Sep	17.2		15.9							2.9		2.6	2		10.1	4.1
ZINC, DISSOLVED	2016-Sep																
ZINC	2017-Aug	26.2		14.5							1.4 B		2.5 B	1.8 B		1.2 B	2 B
ZINC	2018-Aug	166		23.6							<3.5		<3.7	<3.7		<3.7	<3.7
ZINC	2019-Apr																<10
ZINC	2019-Aug	36	91	15 J							<10	<10	<10	<10		<10	<10

GW Standard:
SMCL = 5000

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

CHLORIDE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
CHLORIDE	1995-Aug	170			14	13										
CHLORIDE	1995-Oct	150		48	<5	<5			16		66	<5				
CHLORIDE	1996-Apr	121		48	17	18			16		19	22				
CHLORIDE	1996-Jan	174		54	32	35			21			20				
CHLORIDE	1996-Jul	138.3		46.6	17.5	18.1			16.2		9.9	21.7				
CHLORIDE	1996-Oct	106		53	27	25			26		21	31				
CHLORIDE	1997-Apr	98		49	19	19			18		9.5	22				
CHLORIDE	1997-Oct	120		50	18	19			18		8.9	23				
CHLORIDE	1998-Apr	120		51	19	23			19		6	24				
CHLORIDE	1998-Oct	580		50	18	20	8.6		18			22				
CHLORIDE	1999-Sep	110		49	17	22			20		5.6	24				
CHLORIDE	2000-Sep	89.6		52.1	16.8	24.4	7.4		20.2		<5	22.1				
CHLORIDE	2001-Sep	53.3		59.7	15.6	21	8.7		18.6		5.6	19.7				
CHLORIDE	2002-Sep	59.5		76.9	14.3	25	7.6		19.3		<5	22.9				
CHLORIDE	2003-Sep	64.8		71.8	13.6	21.6	7.5		18.3		5.6	20.4				
CHLORIDE	2004-Oct															
CHLORIDE	2004-Sep	37.9		63.9	13.5	21.7	7.7		18.9			18.5				
CHLORIDE	2005-Sep	60		55	13.4	21.6	6.9		18.8		5.8	20.2				
CHLORIDE	2006-Sep	35.9		55.3	14.1	22.6	7.08		19		5.88	20.5				
CHLORIDE	2007-Sep	34.5		53.5	13.6	22	7.49		17.9			17.2				
CHLORIDE	2008-Sep	70.4		56.9	13	20.5	6.51		17.8		5.51	16.2				
CHLORIDE	2009-Sep	84.9		53.2	14.2	21.6	6.92		17.9		<5	16.3				
CHLORIDE	2010-Aug	164														
CHLORIDE	2010-Sep			49.2	11.5	19.5	<10 RL1		17		4.73	16.5				
CHLORIDE	2011-Sep	113		51	13.1	21.8	5.98		17			16.5				
CHLORIDE	2012-Sep	74.4			12.7	22.4	<5 RL1		18.1			17.1				
CHLORIDE	2013-Sep	54.7		46.1	11.5	18.9	3.9		16.4		3.2	14.8				
CHLORIDE	2014-Sep	26.6		47.8	11.5	20.9	4		18.9		2.8					
CHLORIDE	2015-Dec												21.1	4.3	8.6	1.9
CHLORIDE	2015-Sep	62.4		47.7	11.2	19.4		10.9		28.5			26.5	3.8	8.6	2.3
CHLORIDE	2016-Jun												24.8	4.7	8.5	1.8
CHLORIDE	2016-Mar												22.7	4.6	9.3	1.9
CHLORIDE	2016-Sep	64.9		44.5	12.1	19.3		7.4		19.2	6.7		27.4	4.3	8.8	2
CHLORIDE	2017-Aug	60.6		47.4	11.5	17.7		5.6		20.7	7		26.4	5.3	8.6	2.1
CHLORIDE	2018-Aug			47.2	11.9	18.9		5.5		20.4	8		26.4	5.3	8.8	2.1
CHLORIDE	2019-Apr	24														
CHLORIDE	2019-Aug		25	50	13	18		6.3		22	qual to the MDL and the		27	6.7	9.1	2.7 J

GW Standard:
SMCL = 250

IPL Ottumwa Midland Landfill
Historic Monitoring Results

CHLORIDE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
CHLORIDE	1995-Aug										30						
CHLORIDE	1995-Oct										36						
CHLORIDE	1996-Apr						20		20		17						
CHLORIDE	1996-Jan																
CHLORIDE	1996-Jul						30.4		7.5		9		35.6				
CHLORIDE	1996-Oct										18		106				
CHLORIDE	1997-Apr						56		23		12						
CHLORIDE	1997-Oct										8.1						
CHLORIDE	1998-Apr						13		14		5.8		6.4				
CHLORIDE	1998-Oct						8.8		10		<5		<5				
CHLORIDE	1999-Sep										4.3		6.2				
CHLORIDE	2000-Sep										<5		<5				
CHLORIDE	2001-Sep						23.4				5.4		5.5				
CHLORIDE	2002-Sep										<5		<5				
CHLORIDE	2003-Sep										7		33.1				
CHLORIDE	2004-Oct										<5 MSO						
CHLORIDE	2004-Sep						18.5						<5				
CHLORIDE	2005-Sep										5.2		16.2				
CHLORIDE	2006-Sep										6.18		13.7				
CHLORIDE	2007-Sep						23.1		16.8		6.3		8.33				
CHLORIDE	2008-Sep						20.7		18.6		<5	10.2	9.39				
CHLORIDE	2009-Sep						17.2				<5		5.19				
CHLORIDE	2010-Aug																
CHLORIDE	2010-Sep						16.2		9.25		3.31	6.24	5.07				
CHLORIDE	2011-Sep												16.1				
CHLORIDE	2012-Sep				16.5						10.1		30.6				
CHLORIDE	2013-Sep										2.8	6.3	6.4	123			<1
CHLORIDE	2014-Sep					15.4	8.4		6.3		2.7	3.6	4.9	29.7	31.6		<0.5
CHLORIDE	2015-Dec	17.5														5	<0.5
CHLORIDE	2015-Sep	17.5		5.8							5.3	19.6	8.5	24		10.2	<0.5
CHLORIDE	2016-Jun	16														5.8	<0.5
CHLORIDE	2016-Mar	18.8														4.9	<0.5
CHLORIDE	2016-Sep	17.2		19.4							9.2		14.1	127		5.6	<0.5
CHLORIDE	2017-Aug	16.7		14.8							7		32.9	138		8.5	0.67
CHLORIDE	2018-Aug	12.8		16.4							11		38.8	147		8.1	<0.46
CHLORIDE	2019-Apr																25
CHLORIDE	2019-Aug	18	19	10							3.7 J	16	8.1	180		18	<0.29

GW Standard:
SMCL = 250

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

SULFATE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-07P	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
SULFATE	1999-Sep	350			440	640	510			550		390	440				
SULFATE	2000-Sep	340			740	840	610	2400		680		370	530				
SULFATE	2001-Sep	210 SA			880 SA	1100 SA	540 SA	1700 SA		570 SA		430 SA	450 SA				
SULFATE	2002-Sep	320 SA			710 SA	1000 SA	660 SA	2200 SA		690 SA		600 SA	600 SA				
SULFATE	2003-Sep	260 SA			760 SA	1000 SA	640 SA	1700 SA		820 SA		1300 SA	490 SA				
SULFATE	2004-Oct																
SULFATE	2004-Sep	160 SA			770 SA	920 SA	630 SA	2300 SA		850 SA			530 SA				
SULFATE	2005-Sep	260			840	1000	740	2100		810		900	590				
SULFATE	2006-Sep	157			930	645	970	3440		960		542	656				
SULFATE	2007-Sep	138			814	1040	694	1910		784			552				
SULFATE	2008-Sep	291			724	929	657	1850		716		561	493				
SULFATE	2009-Sep	298		845	726	921	638	1820		688		296	476				
SULFATE	2010-Aug	403															
SULFATE	2010-Sep			293	713	942	648	1820		697		381	481				
SULFATE	2011-Sep	374			733	1070	602	1830		642			431				
SULFATE	2012-Sep	318		705	752	961	692	762		734			507				
SULFATE	2013-Sep	264			680	966	646	707		783		1110	507				
SULFATE	2014-Sep	97.8			747	922	728	607		719		568					
SULFATE	2015-Dec													151	1020	2070	192
SULFATE	2015-Sep	312			759	982	667		1280		1170			154	931	1690	193
SULFATE	2016-Jun													153	942	1840	179
SULFATE	2016-Mar													146	922	1860	173
SULFATE	2016-Sep	323			821	1150	764 M1		1020		1470	881		170	883	1920	175
SULFATE	2017-Aug	346			710	1240	628		874		850	1060		176	607	1540	140
SULFATE	2018-Aug				782	1210	684		990		786	1360		169	526	1690	155
SULFATE	2019-Apr	190															
SULFATE	2019-Aug		60		810	1200	710		980		800	260		160	440	1600	99

GW Standard:
SMCL = 250

IPL Ottumwa Midland Landfill
Historic Monitoring Results

SULFATE
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2
SULFATE	1999-Sep										460		390			
SULFATE	2000-Sep										300		310			
SULFATE	2001-Sep						40 SA				330 SA		380 SA			
SULFATE	2002-Sep										460 SA		310 SA			
SULFATE	2003-Sep										880 SA		380 SA			
SULFATE	2004-Oct										390					
SULFATE	2004-Sep						20 SA						390 SA			
SULFATE	2005-Sep										610		400			
SULFATE	2006-Sep										644		428			
SULFATE	2007-Sep						36		328		403		283			
SULFATE	2008-Sep						23.4		35.6		457	21.8	463			
SULFATE	2009-Sep						30.6				289		447			
SULFATE	2010-Aug															
SULFATE	2010-Sep						30.8		37.6		221	45.1	104			
SULFATE	2011-Sep												489			
SULFATE	2012-Sep				948						901		598			
SULFATE	2013-Sep										380	36.3	276	4060		
SULFATE	2014-Sep					1170	14.1		17.1		298	10.3	175	1390	1360	
SULFATE	2015-Dec	249														242
SULFATE	2015-Sep	432		691							576	162	527	1060		287
SULFATE	2016-Jun	622														223
SULFATE	2016-Mar	241														229
SULFATE	2016-Sep	514		905							688		356	5000		240
SULFATE	2017-Aug	561		771							631		362	5290		411
SULFATE	2018-Aug	959		962							624		363	5920		549
SULFATE	2019-Apr															
SULFATE	2019-Aug	350	450	520							260	5.6	180	1800		750

GW Standard:
SMCL = 250

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

TOTAL DISSOLVED SOLIDS
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-12	MW-13	MW-14	MW-15R	MW-16R	MW-17	MW-100R	MW-101R	MW-102P	MW-108
TOTAL DISSOLVED SOLIDS	2015-Sep	929		1930	1940	2000	2480	2830		637	1900	3560	520
TOTAL DISSOLVED SOLIDS	2015-Dec									589	1880	3140	484
TOTAL DISSOLVED SOLIDS	2016-Mar									606	1760	3380	490
TOTAL DISSOLVED SOLIDS	2016-Jun									622	1780	2990	476
TOTAL DISSOLVED SOLIDS	2016-Sep	808		1560	2100	1850	2050	2830	1440	601	1510	2890	432
TOTAL DISSOLVED SOLIDS	2017-Aug	887		1700	2170	1820	2050	2340	1560	633	1290	2760	420
TOTAL DISSOLVED SOLIDS	2018-Aug			1860	2430	2090	2030	2320	2160	644	1160	2730	448
TOTAL DISSOLVED SOLIDS	2019-Apr	640											
TOTAL DISSOLVED SOLIDS	2019-Aug		530	1800	2400	2000	2300	2300	600	630	1100	3100	430

GW Standard:
SMCL = 500 mg/L

IPL Ottumwa Midland Landfill
Historic Monitoring Results

TOTAL DISSOLVED SOLIDS
UNITS: MG/L

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2	FIELD BLANK
TOTAL DISSOLVED SOLIDS	2015-Sep	1150		1170							939	558	927	1750		471	<5
TOTAL DISSOLVED SOLIDS	2015-Dec	792														423	10
TOTAL DISSOLVED SOLIDS	2016-Mar	828														383	16
TOTAL DISSOLVED SOLIDS	2016-Jun	1420														391	7
TOTAL DISSOLVED SOLIDS	2016-Sep	1110		1550							964		544	6730		334	<5
TOTAL DISSOLVED SOLIDS	2017-Aug	1270		1480							973		682	8340		611	<5
TOTAL DISSOLVED SOLIDS	2018-Aug	1710		1630							937		725	8850		791	10 H1
TOTAL DISSOLVED SOLIDS	2019-Apr																370
TOTAL DISSOLVED SOLIDS	2019-Aug	1100	1200	970							460	320	720	3100		1200	24 J

GW Standard:
SMCL = 500 mg/L

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

PH, LAB
UNITS: STD. UNITS

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-07M	MW-07P	MW-08	MW-09M	MW-09P	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
PH, LAB	2018-Aug																				
PH, FIELD	1995-Aug	7.15								7.03	7.17										
PH, FIELD	1995-Oct	6.95							6.43	6.9	6.96			6.67		6.94	7.29				
PH, FIELD	1996-Jan	7.88							8.28	8.18	7.47			7.94			7.83				
PH, FIELD	1996-Apr	7.5							8	7.3	7.4			7.7		7.2	7.1				
PH, FIELD	1996-Jul	7.3							8.1	7.2	7.5			7.8		7.4	7.3				
PH, FIELD	1996-Oct	7							8.1	6.9	7.1			7.5		6.8	7.2				
PH, FIELD	1997-Apr	7.4							8	7.2	7.4			7.4		7.4	7.3				
PH, FIELD	1997-Oct	7.4							8.2	7.3	7.5			7.7		7.5	7.3				
PH, FIELD	1998-Apr	6.82							7.47	6.79	7.09			7.11		6.9	7.07				
PH, FIELD	1998-Oct	6.7							7.4	7	6.7	6.4		7			6.5				
PH, FIELD	1999-Sep	7.1							7.6	6.8	6.7	6.4		7.2		6.9	6.9				
PH, FIELD	2000-Sep	7.11							7.87	7.13	7.47	6.53		7.4		7.03	7.03				
PH, FIELD	2001-Sep	7.33							7.82	7.07	7.23	6.67		7.4		7.04	7.04				
PH, FIELD	2002-Sep	7.15							7.5	7.03	7.12	6.83		7.16		7.35	6.98				
PH, FIELD	2003-Sep	7.33							7.31	7	7.3	5.83		6.97		7.06	7.29				
PH, FIELD	2004-Sep	7.23							7.68	7.11	7.4	6.48		7.25			7.1				
PH, FIELD	2004-Oct																				
PH, FIELD	2005-Sep	6.59							7.65	6.89	7.06	6.4		6.82		6.91	6.94				
PH, FIELD	2006-Sep	7.61							7.8	6.67	7.06	6.63		6.8		6.73	7.35				
PH, FIELD	2007-Sep	6.08							7.44	6.58	7.03			6.53			6.43				
PH, FIELD	2008-Sep	6.98							7.65	6.71	7.09	6.8		7.4		7.46	7.07				
PH, FIELD	2009-Sep	7			6.82				7.54	6.85	7.02	6.41		6.75		6.77	6.9				
PH, FIELD	2010-Aug	7.24																			
PH, FIELD	2010-Sep				6.79				7.71	7.16	7.15	6.76		7.31		7.19	7.26				
PH, FIELD	2011-Sep	8.5							8.09	7.57	7.73	6.84		7.24			7.55				
PH, FIELD	2012-Sep	8.23			7.53				6.72	6.94	7.23	5.47		7.41			7.27				
PH, FIELD	2013-Sep																				
PH, FIELD	2013-Sep	7.44		7.45		7.12			7.75	7.32	7.48	7		7.53		7	7.46				
PH, FIELD	2014-Sep	7.56			7.94	6.85	7.08	5.35	8.15	7.23	7.37	6.65		7.36		7.2					
PH, FIELD	2015-Sep	7.38							7.9	7.16	7.28		6.74		6.95				7.07	6.55	
PH, FIELD	2015-Dec																	6.78	6.84	6.12	6.87
PH, FIELD	2016-Mar																	7.27	6.93	6.5	7.09
PH, FIELD	2016-Jun																	7.17	7.29	7.01	7.25
PH, FIELD	2016-Sep	7.76							7.91	7.63	7.14		7.05		7.11	6.97		7.83	7.19	6.38	7.09
PH, FIELD	2017-Aug	7.27							7.7	6.97	7.18		6.44		6.84	6.87		7.07	6.73	6.26	6.62
PH, FIELD	2018-Aug								8.18	7.33	7.45		6.8		7.2	6.89		7.47	7.22	6.63	6.95
PH, FIELD	2019-Apr	7.36																			
PH, FIELD	2019-Aug		7.65						7.61	6.98	7.04		6.41		6.74	7.15		7.28	7.33	6.39	6.37

GW Standard:
SMCL = 8.5

IPL Ottumwa Midland Landfill
Historic Monitoring Results

PH, LAB
UNITS: STD. UNITS

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2
PH, LAB	2018-Aug															8.4 H6
PH, FIELD	1995-Aug										9.13					
PH, FIELD	1995-Oct										6.05					
PH, FIELD	1996-Jan															
PH, FIELD	1996-Apr						8.2		8		8.8					
PH, FIELD	1996-Jul						8.3		7.1		8.5		9			
PH, FIELD	1996-Oct										8.1		8.1			
PH, FIELD	1997-Apr						7.8		8.2		8.8					
PH, FIELD	1997-Oct										8.7					
PH, FIELD	1998-Apr						7.96		8.19		7.41		7.48			
PH, FIELD	1998-Oct						7.1		7.4		6.9		7.1			
PH, FIELD	1999-Sep										8.1		8.1			
PH, FIELD	2000-Sep										7.7		7.67			
PH, FIELD	2001-Sep						7.6				7.31		7.47			
PH, FIELD	2002-Sep										8.34		7.5			
PH, FIELD	2003-Sep										8.02		7.2			
PH, FIELD	2004-Sep						8.15						7.87			
PH, FIELD	2004-Oct										6.8					
PH, FIELD	2005-Sep										7.97		7.72			
PH, FIELD	2006-Sep										7.53		7.59			
PH, FIELD	2007-Sep						7.88		7.36		7.68		8.05			
PH, FIELD	2008-Sep						7.7		7.84		8.34	7.92	7.66			
PH, FIELD	2009-Sep						7.82				7.02		8.48			
PH, FIELD	2010-Aug															
PH, FIELD	2010-Sep						7.37		8.4		8.1	7.9	8.11			
PH, FIELD	2011-Sep												9.11			
PH, FIELD	2012-Sep										8.62		8.55			
PH, FIELD	2013-Sep													7.56		
PH, FIELD	2013-Sep										8.01	7.48	7.49			
PH, FIELD	2014-Sep					6.89	7.59		8.02		7.81	7.68	8.09	7.68	6.98	
PH, FIELD	2015-Sep	6.85		6.91					7.81		8.23	7.57	7.54	7.39		
PH, FIELD	2015-Dec	6.94														7.28
PH, FIELD	2016-Mar	6.43														8.48
PH, FIELD	2016-Jun	7.09														7.92
PH, FIELD	2016-Sep	8.1		6.8							7.61		8.23	7.13		8.89
PH, FIELD	2017-Aug	7.13		7.09							8.32		8.33	6.71		7.8
PH, FIELD	2018-Aug	6.94		7.15							7.5		7.99	8.1		8.81
PH, FIELD	2019-Apr															
PH, FIELD	2019-Aug			7.94							8.03	7.59	7.64	8.43		9.22

GW Standard:
SMCL = 8.5

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

TEMPERATURE
UNITS: DEG C

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-07M	MW-07P	MW-08	MW-09M	MW-09P	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
TEMPERATURE	1995-Aug	27.8								20.9	21.1										
TEMPERATURE	1995-Oct	11.3							8.5	8.6	8.6			10.4		13.7	8.8				
TEMPERATURE	1996-Jan	6.47							6.1	6.31	6.9			5.36			5				
TEMPERATURE	1996-Apr	8.5							11.5	9.5	10.5			11.7		6	9				
TEMPERATURE	1996-Jul	17							16	18.7	14			20.5		20.1	13.5				
TEMPERATURE	1996-Oct	14.4							12.8	12.2	12.8			12.2		14.4	11.7				
TEMPERATURE	1997-Apr	10							13	13	13			13		9	12				
TEMPERATURE	1997-Oct	17							15	14	13			15		20	14				
TEMPERATURE	1998-Apr	12							13	12	9			9		13.5	13.5				
TEMPERATURE	1998-Oct	14.4							12.5	15	13.2	12		12.6			12.5				
TEMPERATURE	1999-Sep	14							12.5	14.1	12	13		12.5		14.5	12.4				
TEMPERATURE	2000-Sep	21.5							16.1	15.1	16.7	16.8		12.8		22.7	12.9				
TEMPERATURE	2001-Sep	16.7							16.1	15.1	14.2	16.8		14.2		19.2	12.9				
TEMPERATURE	2002-Sep	17.2							24.1	17.6	16.5	15.2		16.1		21.1	19.4				
TEMPERATURE	2003-Sep	17.1							15.9	15.4	23.2	13.4		16.7		22.3	15.9				
TEMPERATURE	2004-Sep	16.8							15.9	16.7	16.1	15.8		17.5			15.8				
TEMPERATURE	2004-Oct																				
TEMPERATURE	2005-Sep	15.3							13.3	15.2	15.1	15.8		14.5		21.4	14.6				
TEMPERATURE	2006-Sep	17.4							18	16.6	19.2	16.3		17.2		21.5	14.5				
TEMPERATURE	2007-Sep	15.1							13.8	14.6	14.3			13			12.7				
TEMPERATURE	2008-Sep	18							17.1	14.8	14.8	21.1		16		25.4	15				
TEMPERATURE	2009-Sep	15.4			14				13.9	16.4	15.8	15.1		17.1		21.3	16.4				
TEMPERATURE	2010-Aug	17.6																			
TEMPERATURE	2010-Sep				16.8				16.6	15.8	16.1	18		15.9		21.4	15.2				
TEMPERATURE	2011-Sep	18.1							12.6	15.5	15.8	12.3		12.8			12.4				
TEMPERATURE	2012-Sep	16.8			15.1				15.2	12.5	11.8	10.5		14.3							
TEMPERATURE	2013-Sep	16.5		15.9		14.7			14.7	15.5	16.3	14.7		17.3		22.3	15.6				
TEMPERATURE	2014-Sep	17.6			13.1	14.3	16.3	14.5	15.8	14.6	15.3	13.5		14.4		24.5					
TEMPERATURE	2015-Sep	17							14.5	13.6	14		14.1		13.9				12.5	13.2	
TEMPERATURE	2015-Dec																	12.7	12.4	13.8	12.1
TEMPERATURE	2016-Mar																	11.5	12.2	13.8	12.8
TEMPERATURE	2016-Jun																	11.3	12	14.8	13.1
TEMPERATURE	2016-Sep	15.8							13.9	13.9	13.6		12.9		13.8	21		12.7	12.6	14.5	12.8
TEMPERATURE	2017-Aug	19.5							15.2	14.2	16.3		17.7		14.3	19.8		13.6	15	13.3	13.2
TEMPERATURE	2018-Aug								13.9	14.6	13.7		16.6		14	19.2		13.2	12.3	14.1	13.9
TEMPERATURE	2019-Apr	8.87																			
TEMPERATURE	2019-Aug		13.8						15.6	14.3	15.5		16.7		15	25.9		12.7	11.8	13.5	13.7

GW Standard:
None

IPL Ottumwa Midland Landfill
Historic Monitoring Results

TEMPERATURE
UNITS: DEG C

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	Leachate Basin	LEACHATE LIFT STATION	TCB-1/2
TEMPERATURE	1995-Aug										35.5					
TEMPERATURE	1995-Oct										11.4					
TEMPERATURE	1996-Jan										8.6					
TEMPERATURE	1996-Apr						13		12.2		9					
TEMPERATURE	1996-Jul						24.5		29.5		28.3		36			
TEMPERATURE	1996-Oct										12.2		13.3			
TEMPERATURE	1997-Apr						9		9		17					
TEMPERATURE	1997-Oct										23					
TEMPERATURE	1998-Apr						18.5		18.5		17		17			
TEMPERATURE	1998-Oct						14		13.2		15.5		15.5			
TEMPERATURE	1999-Sep										18		19			
TEMPERATURE	2000-Sep										17.5		22.5			
TEMPERATURE	2001-Sep						16.8				17.9		17.9			
TEMPERATURE	2002-Sep										26		25.1			
TEMPERATURE	2003-Sep										23.2		21.5			
TEMPERATURE	2004-Sep						21.4						23.5			
TEMPERATURE	2004-Oct										13.8					
TEMPERATURE	2005-Sep										22.2		19.7			
TEMPERATURE	2006-Sep										20.7		21.9			
TEMPERATURE	2007-Sep						16.5		15		22.4		22.1			
TEMPERATURE	2008-Sep						20.9		21.4		21.8	19.4	19.2			
TEMPERATURE	2009-Sep						19.5				21.9		23.6			
TEMPERATURE	2010-Aug															
TEMPERATURE	2010-Sep						25.1		22.5		24.6	23.8	26.9			
TEMPERATURE	2011-Sep						12.4						24.1			
TEMPERATURE	2012-Sep				16.33						18.44		21.13			
TEMPERATURE	2013-Sep										24.2	24.6	19.9	21.2		
TEMPERATURE	2014-Sep					18.1	20.3		21.7		23.1	20.8	22.5	21.6	18.7	
TEMPERATURE	2015-Sep	16.8		22					21		25.6	21.7	25.1	23.1		
TEMPERATURE	2015-Dec	9.8														1
TEMPERATURE	2016-Mar	11														10.5
TEMPERATURE	2016-Jun	15.6														29
TEMPERATURE	2016-Sep	17.2		15							26.9		27	18		27.2
TEMPERATURE	2017-Aug	18.5		15.4							23.4		21.7	18		22.8
TEMPERATURE	2018-Aug	19.9		13.8							24.7		25.3	22		28
TEMPERATURE	2019-Apr															
TEMPERATURE	2019-Aug										27.8	21.8	25.4	23.8		25.2

GW Standard:
None

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

IPL Ottumwa Midland Landfill
Historic Monitoring Results

CONDUCTANCE, SPECIFIC
UNITS: UMHOS/CM

CHEMICAL PARAMETER	EVENT	MW-01	MW-01R	MW-07M	MW-07P	MW-08	MW-09M	MW-09P	MW-12	MW-13	MW-14	MW-15	MW-15R	MW-16	MW-16R	MW-17	MW-18	MW-100R	MW-101R	MW-102P	MW-108
CONDUCTANCE, SPECIFIC	1995-Aug	1510								3990	2660										
CONDUCTANCE, SPECIFIC	1995-Oct	2180							4140	6460	4320			3200		4920	4880				
CONDUCTANCE, SPECIFIC	1996-Jan	1950							2880	4290	3040			2380			2160				
CONDUCTANCE, SPECIFIC	1996-Apr	1540							2700	3900	2800			2000		2300	2500				
CONDUCTANCE, SPECIFIC	1996-Jul	1340							2000	3200	2000			1700		1240	2000				
CONDUCTANCE, SPECIFIC	1996-Oct	1770							2600	3500	2600			2000		1490	2500				
CONDUCTANCE, SPECIFIC	1997-Apr	1570							2600	3200	2400			2100		1700	2400				
CONDUCTANCE, SPECIFIC	1997-Oct	1790							2400	2900	2600			2000		1940	2300				
CONDUCTANCE, SPECIFIC	1998-Apr	1460							2460	2860	2590			2090		1280	2370				
CONDUCTANCE, SPECIFIC	1998-Oct	1440							2370	2780	2390	2790		1900			2300				
CONDUCTANCE, SPECIFIC	1999-Sep	1520							2370	2840	2660	3180		2100		1630	2570				
CONDUCTANCE, SPECIFIC	2000-Sep	1374							2700	3030	2850	3530		2420		1042	2390				
CONDUCTANCE, SPECIFIC	2001-Sep	1015							2610	2970	2860	2610		2280		1366	2150				
CONDUCTANCE, SPECIFIC	2002-Sep	1179							2650	2990	3030	3490		2490		1564	2540				
CONDUCTANCE, SPECIFIC	2003-Sep	993							2310	2570	2970	3160		2070		2410	2380				
CONDUCTANCE, SPECIFIC	2004-Sep	830							1168	2610	3050	3470		2460			2100				
CONDUCTANCE, SPECIFIC	2004-Oct																				
CONDUCTANCE, SPECIFIC	2005-Sep	1531							2650	2850	2900	3480		2210		2050	2340				
CONDUCTANCE, SPECIFIC	2006-Sep	827							2540	2560	2600	3510		2380		2620	2340				
CONDUCTANCE, SPECIFIC	2007-Sep	834							2590	2580	2970			2290			2020				
CONDUCTANCE, SPECIFIC	2008-Sep	1297							2640	2910	3050	3520		2510		1353	1971				
CONDUCTANCE, SPECIFIC	2009-Sep	1340			2320				2740	2960	3020	3510		2300		830	1935				
CONDUCTANCE, SPECIFIC	2010-Aug	1618																			
CONDUCTANCE, SPECIFIC	2010-Sep				1409				2680	2840	3020	3380		2230		1103	1896				
CONDUCTANCE, SPECIFIC	2011-Sep	1507							2690	2520	2540	3780		2350			1917				
CONDUCTANCE, SPECIFIC	2012-Sep	1332			2117				2696	2813	3063	2372		2260			2045				
CONDUCTANCE, SPECIFIC	2013-Sep	923		2970		1893			2580	2680	2810	1657		1879		1411	1495				
CONDUCTANCE, SPECIFIC	2014-Sep	470			2520	2890	7440	7420	2890	3050	3240	1259		2600		1204					
CONDUCTANCE, SPECIFIC	2015-Sep	1139							2790	2830	3040		2530		3460				1804	3450	
CONDUCTANCE, SPECIFIC	2015-Dec																	880	2310	4480	739
CONDUCTANCE, SPECIFIC	2016-Mar																	815	1775	3860	652
CONDUCTANCE, SPECIFIC	2016-Jun																	865	1952	3602	715.9
CONDUCTANCE, SPECIFIC	2016-Sep	1263							2920	3330	3240		2590		4290	1677		933	1874	3980	714
CONDUCTANCE, SPECIFIC	2017-Aug	1663							3380	4121	3734		3360		4198	2482		1221	2087	4362	857
CONDUCTANCE, SPECIFIC	2018-Aug								2617	3149	2778		2633		3155	2394		907	1438	3291	673
CONDUCTANCE, SPECIFIC	2019-Apr	951																			
CONDUCTANCE, SPECIFIC	2019-Aug		791						2577	3103	2741		2640		3152	806		927	1425	3558	517

GW Standard:
None

IPL Ottumwa Midland Landfill
Historic Monitoring Results

CONDUCTANCE, SPECIFIC
UNITS: UMHOS/CM

CHEMICAL PARAMETER	EVENT	GU-1 TEMP	GU-2	GU-EX	GW GCS	UNDERDRAIN LIFT STATION	SW-1	SW-1R	SW-2	SW-2R	SW-3	SW-4	SW-5	LEACHATE BASIN	LEACHATE LIFT STATION	TCB-1/2
CONDUCTANCE, SPECIFIC	1995-Aug										900					
CONDUCTANCE, SPECIFIC	1995-Oct										1350					
CONDUCTANCE, SPECIFIC	1996-Jan															
CONDUCTANCE, SPECIFIC	1996-Apr						650		1180		880					
CONDUCTANCE, SPECIFIC	1996-Jul						650		1170		620		950			
CONDUCTANCE, SPECIFIC	1996-Oct										750		1480			
CONDUCTANCE, SPECIFIC	1997-Apr						680		730		1110					
CONDUCTANCE, SPECIFIC	1997-Oct										1150					
CONDUCTANCE, SPECIFIC	1998-Apr						410		440		890		1000			
CONDUCTANCE, SPECIFIC	1998-Oct						320		370		510		730			
CONDUCTANCE, SPECIFIC	1999-Sep										980		900			
CONDUCTANCE, SPECIFIC	2000-Sep										782		901			
CONDUCTANCE, SPECIFIC	2001-Sep						783				904		911			
CONDUCTANCE, SPECIFIC	2002-Sep										978		922			
CONDUCTANCE, SPECIFIC	2003-Sep										1550		1126			
CONDUCTANCE, SPECIFIC	2004-Sep						721						959			
CONDUCTANCE, SPECIFIC	2004-Oct										896					
CONDUCTANCE, SPECIFIC	2005-Sep										1220		997			
CONDUCTANCE, SPECIFIC	2006-Sep										1335		1168			
CONDUCTANCE, SPECIFIC	2007-Sep						704		891		1000		841			
CONDUCTANCE, SPECIFIC	2008-Sep						536		549		1027	363	1180			
CONDUCTANCE, SPECIFIC	2009-Sep						678				738		1063			
CONDUCTANCE, SPECIFIC	2010-Aug															
CONDUCTANCE, SPECIFIC	2010-Sep						606		374		569	410	431			
CONDUCTANCE, SPECIFIC	2011-Sep						1917						1194			
CONDUCTANCE, SPECIFIC	2012-Sep				2088						1699		810			
CONDUCTANCE, SPECIFIC	2013-Sep										669	505	667	6240		
CONDUCTANCE, SPECIFIC	2014-Sep					2630	278		242		649	713	513	2970	3360	
CONDUCTANCE, SPECIFIC	2015-Sep	1324		1268					813		1021	738	1051	2280		
CONDUCTANCE, SPECIFIC	2015-Dec	1144														660
CONDUCTANCE, SPECIFIC	2016-Mar	1093														532
CONDUCTANCE, SPECIFIC	2016-Jun	1627														550
CONDUCTANCE, SPECIFIC	2016-Sep	1461		1660							1156		802	7800		550
CONDUCTANCE, SPECIFIC	2017-Aug	2258		2437							1672		1324	12257		1126
CONDUCTANCE, SPECIFIC	2018-Aug	2144		2450							1172		1024	9518		1070
CONDUCTANCE, SPECIFIC	2019-Apr															
CONDUCTANCE, SPECIFIC	2019-Aug			1735							624	533	1123	3933		1546

GW Standard:
None

Note: August 2018 data for GU-1 Temp were listed under GU-2 in previous AWQR appendices.

Appendix D

Statistical Evaluation of Groundwater Monitoring Results

SCS ENGINEERS Environmental Consultants & Contractors

November 30, 2023
File No. 25223073.00

TECHNICAL MEMORANDUM

SUBJECT: Statistical Evaluation of Groundwater Monitoring Results
Ottumwa Midland Landfill, Shallow and Pennsylvanian Units, August 2023 Monitoring 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 Ottumwa Midland Landfill (OML) monitoring data are evaluated in two well groups, representing the shallow (water table) and mid-depth (Pennsylvanian) hydrogeologic units. For the shallow hydrogeologic unit, monitoring well MW-1/MW-1R is used as the background well. Monitoring well MW-1R replaced MW-1 beginning with the August 2019 sampling event. The combined historical results for MW-1 and MW-1R are shown under the MW-1R label in the Sanitas™ output. For the mid-depth hydrogeologic unit, piezometer MW-102P 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 D1** (shallow) and **D2** (Pennsylvanian). For metals, the time series plots only show monitoring results since August 2017, when the monitoring program transitioned from dissolved metals to total metals analysis. For sulfate, which is not typically affected by filtering, older historical results for background wells are included in the time series plots and are used in the determination of background for the statistical evaluation.

OUTLIER ANALYSIS

An outlier analysis is performed for background monitoring results at upgradient wells. 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.

For the August 2023 sampling event, the following background values were identified as potential outliers and handled as described:

Shallow Hydrogeologic Unit

- **Magnesium (MW-1/MW-1R).** One high result from the August 2017 event was flagged 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 Magnesium concentrations.

- **Manganese (MW-1/MW-1R).** One high result from the April 2019 event was flagged 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 manganese concentrations. Iron was also high for this event, but not flagged as an outlier, suggesting that the high result could be due to a change in redox conditions or in suspended solids.

Pennsylvanian Unit

- **Iron (MW-102P).** Two low results from the August 2022 and August 2023 events were flagged as statistical outliers. These results were kept in the dataset because there was no known explanation for the lower results, and they appeared to be within the range of potential natural variation relative to the other observed iron concentrations.

- **Field Temperature (MW-102P).** One high result from the August 2022 event was flagged 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 temperature measurements.

- **Total Dissolved Solids (MW-102P).** One low result from the August 2021 event was flagged as a statistical outlier. The result was removed from the dataset during the 2021 data analysis because it appeared likely to represent a laboratory error. The result was approximately 10 percent of previous values, suggesting a possible calculation error. The total dissolved solids (TDS) result was approximately 20 percent of the sulfate value, which also suggested an erroneous result since the TDS should be greater than the sulfate result.

Outlier analysis results are included in **Attachments D3** (Shallow) and **D4** (Pennsylvanian).

INTERWELL PREDICTION LIMITS

Interwell prediction limits for each hydrogeologic unit are calculated using background data from the upgradient monitoring wells (MW-1/1R and MW-102P) for each monitored constituent, with outliers removed as noted above. The prediction limit analysis performed in Sanitas™ includes the following steps:

1) If 100 percent of the background values are non-detect, the Double Quantification rule applies and no prediction limit is calculated.

2) If 50 percent or more of results are non-detect, then a non-parametric prediction limit is calculated.

3) 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).

4) If normal or transformed normal, calculate parametric prediction limit.

5) If not normal or transformed normal, calculate non-parametric prediction limit.

Consistent with the Unified Guidance, parametric prediction limits are calculated based on a 1-of-2 retesting protocol and a 10 percent 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	August event
Constituents analyzed	15	Shallow: 20 constituents sampled. Beryllium not counted because all but one background results were non-detect. Calcium, lithium, molybdenum, and total suspended solids were added to program in 2023 and do not meet the minimum requirement of 4 samples for prediction limit statistical analysis. Pennsylvanian: 20 constituents, selenium not counted because all background results were non-detect. Calcium, lithium, molybdenum, and total suspended solids were added to program in 2023 and do not meet the minimum requirement of 4 samples for prediction limit statistical analysis.
Compliance wells	9	5 Shallow, 4 Pennsylvanian

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 statistically significant increase (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.

Interwell prediction limit analysis results for 2023 are included in **Attachments D5** (Shallow) and **D6** (Pennsylvanian).

RM/REO/

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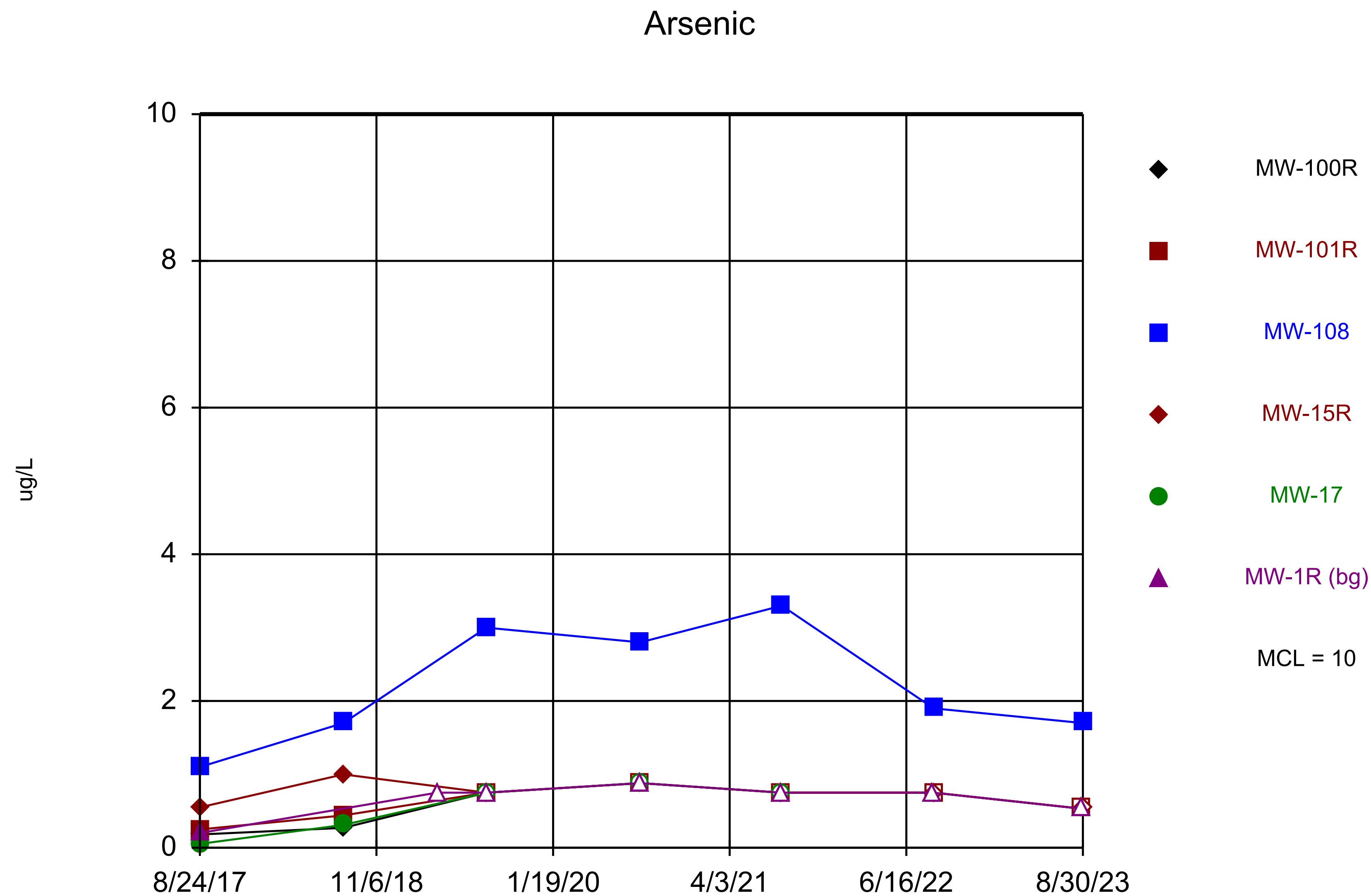
Attachment D1

Times Series Graphs - Shallow

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series   Analysis Run 10/6/2023 11:20 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

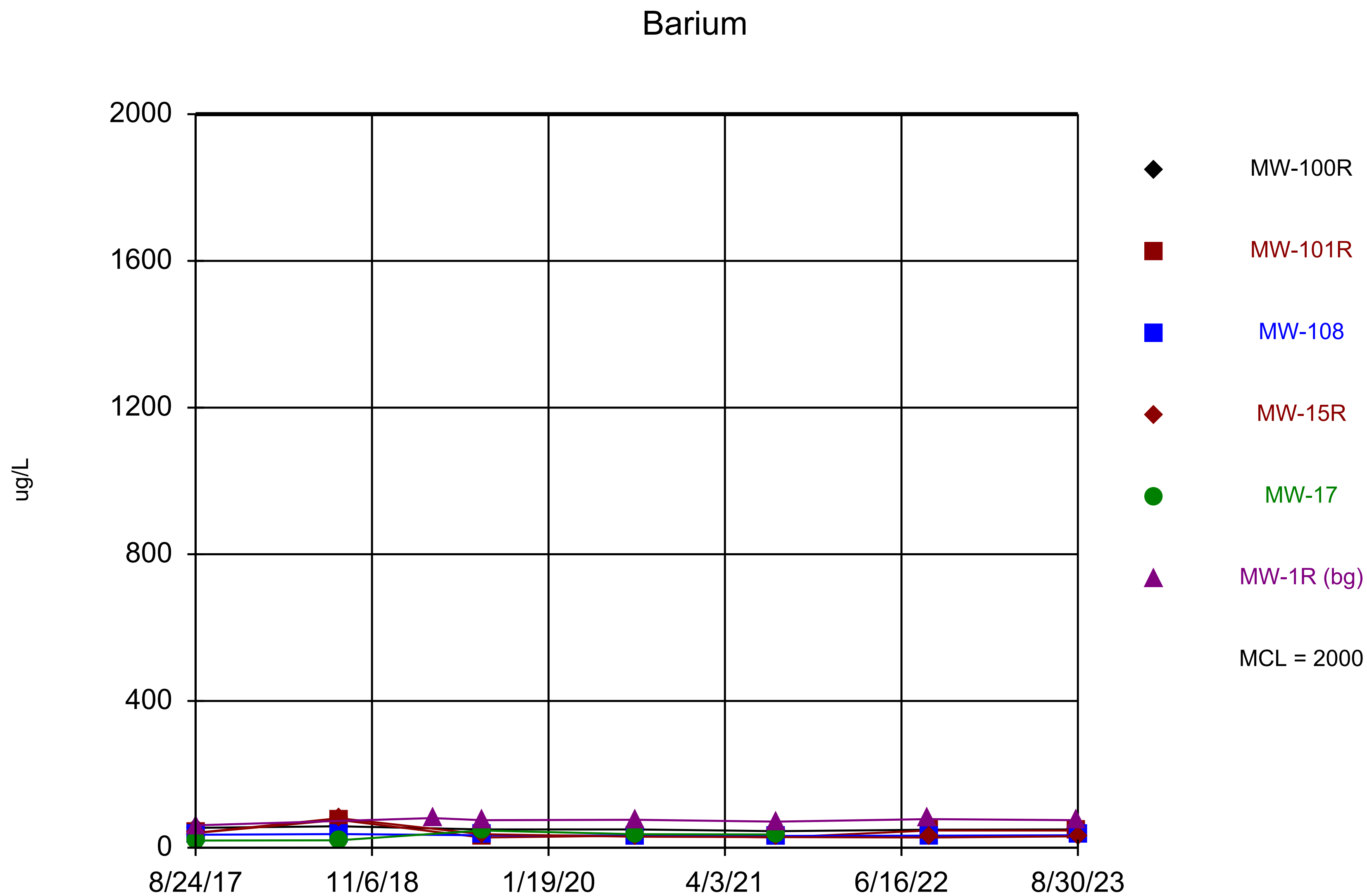
Time Series

Constituent: Arsenic (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.18 (J)	0.25 (J)	1.1	0.55 (J)	0.052 (J)	0.2 (J)
8/16/2018	0.27 (J)	0.44 (J)	1.7	1	0.31 (J)	
4/6/2019						<0.75
8/7/2019	<0.75	<0.75	3	<0.75	<0.75	<0.75
8/24/2020	<0.88	<0.88	2.8		<0.88	<0.88
8/25/2020				<0.88		
8/10/2021					<0.75	<0.75
8/11/2021	<0.75	<0.75	3.3			
8/12/2021				<0.75		
8/23/2022						<0.75 (U)
8/24/2022	<0.75 (U)	<0.75 (U)	1.9 (J)	<0.75 (U)		
8/29/2023	<0.53 (U)	<0.53 (U)				<0.53 (U)
8/30/2023			1.7 (J)	<0.53 (U)		

ND substitution: RL or RL/2 if <15% NDs.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Barium (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	54.2	40	35.4	40.6	19.4	61
8/16/2018	58.4	75.9	37.1	80.5	20.2	
4/6/2019						81
8/7/2019	50	28	34	37	47	75
8/24/2020	50	33	33		37	76
8/25/2020				30		
8/10/2021					36 (B)	71 (B)
8/11/2021	45 (B)	28 (B)	32 (B)			
8/12/2021				29 (B)		
8/23/2022						78
8/24/2022	49	47	33	28		
8/29/2023	50	47				75
8/30/2023			34	31		

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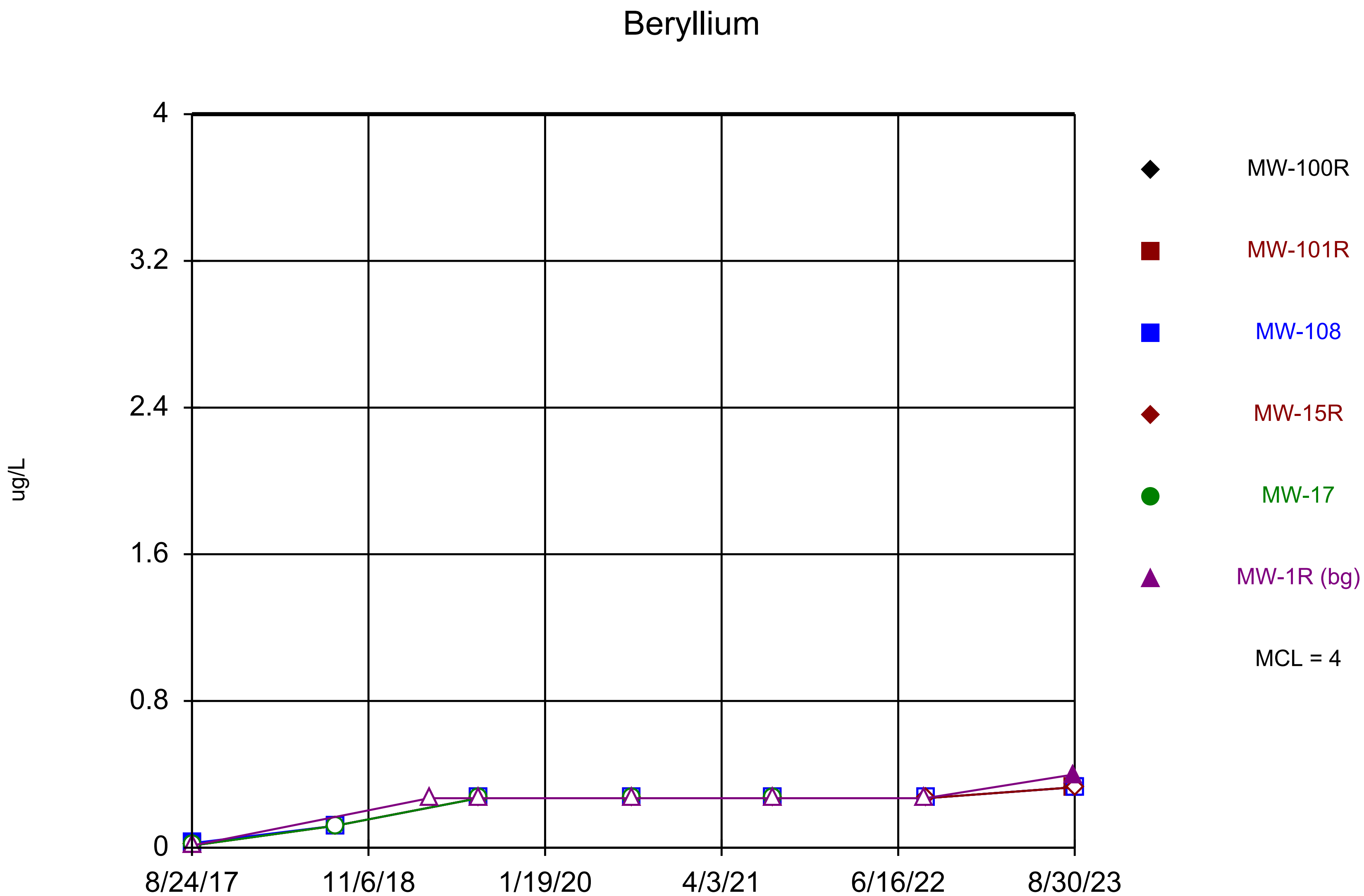
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Beryllium (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	<0.012	0.02 (J)	0.025 (J)	<0.012	<0.012	<0.012
8/16/2018	<0.12	<0.12	<0.12	<0.12	<0.12	
4/6/2019						<0.27
8/7/2019	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
8/24/2020	<0.27	<0.27	<0.27		<0.27	<0.27
8/25/2020				<0.27		
8/10/2021					<0.27	<0.27
8/11/2021	<0.27	<0.27	<0.27			
8/12/2021				<0.27		
8/23/2022						<0.27 (U)
8/24/2022	<0.27 (U)	<0.27 (U)	<0.27 (U)	<0.27 (U)		
8/29/2023	<0.33 (U)	<0.33 (U)				0.4 (J)
8/30/2023			<0.33 (U)	<0.33 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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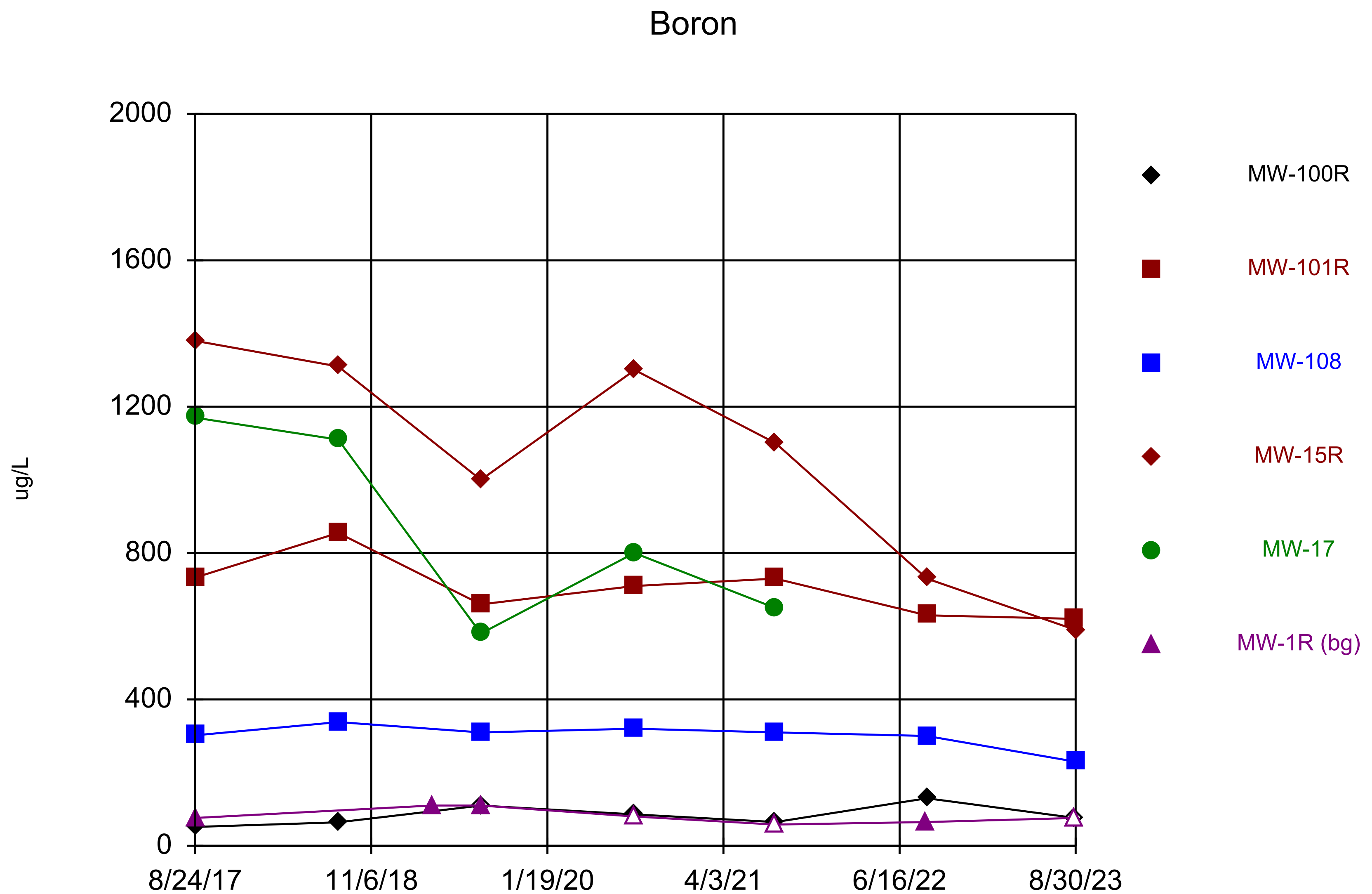
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Boron (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	51.8 (J)	733	302	1380	1170	76 (J)
8/16/2018	64.2 (J)	855	338	1310	1110	
4/6/2019						110 (J)
8/7/2019	<110	660 (B)	310 (B)	1000 (B)	580 (B)	110 (J,B)
8/24/2020	86 (J)	710	320		800	<80
8/25/2020				1300		
8/10/2021					650	<58
8/11/2021	65 (J)	730	310			
8/12/2021				1100		
8/23/2022						65 (J)
8/24/2022	130	630	300	730		
8/29/2023	<76 (U)	620				<76 (U)
8/30/2023			230	590		

ND substitution: RL or RL/2 if <15% NDs.

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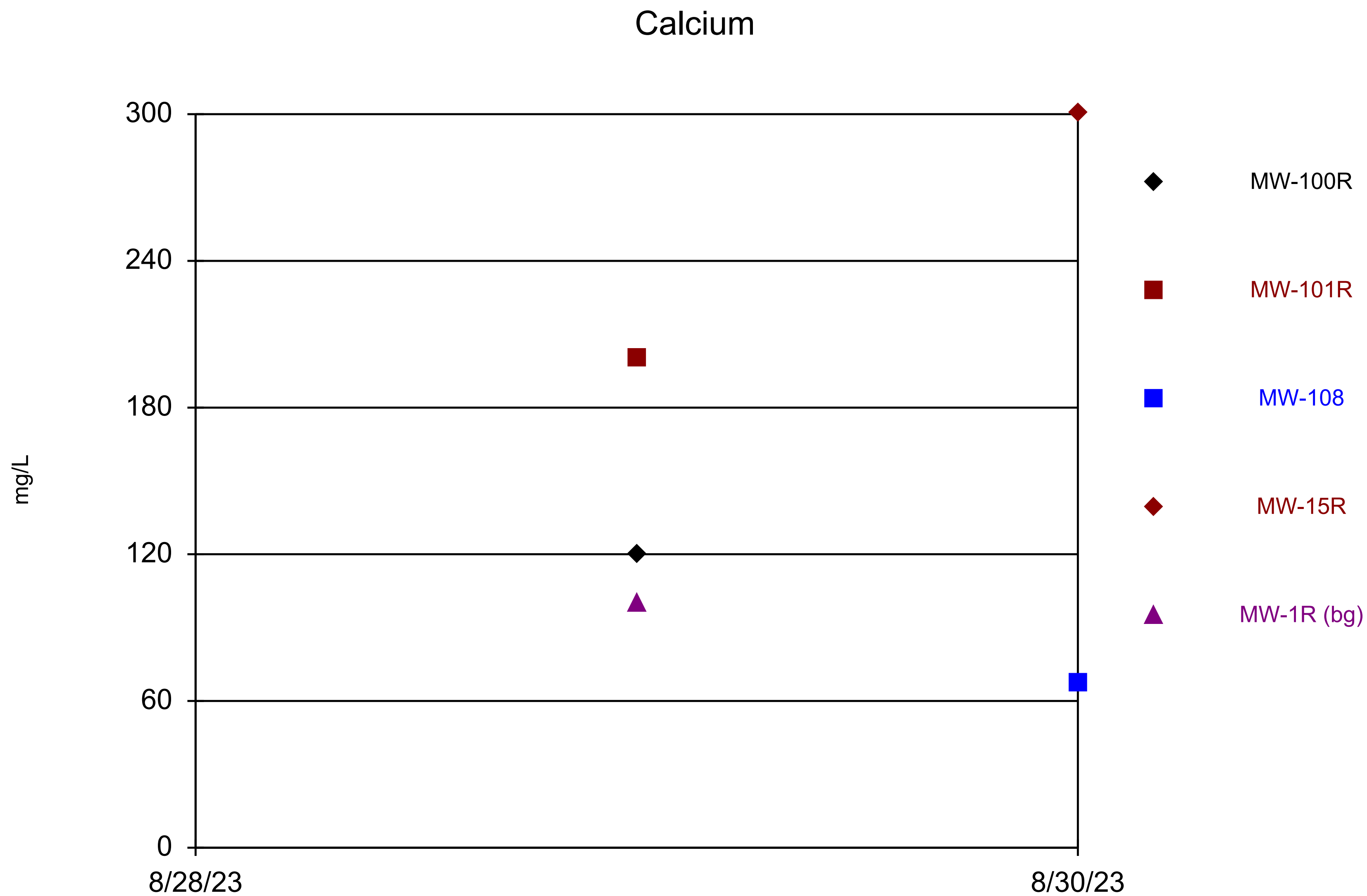

Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Calcium (mg/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-1R (bg)
8/29/2023	120	200			100
8/30/2023			67	300	

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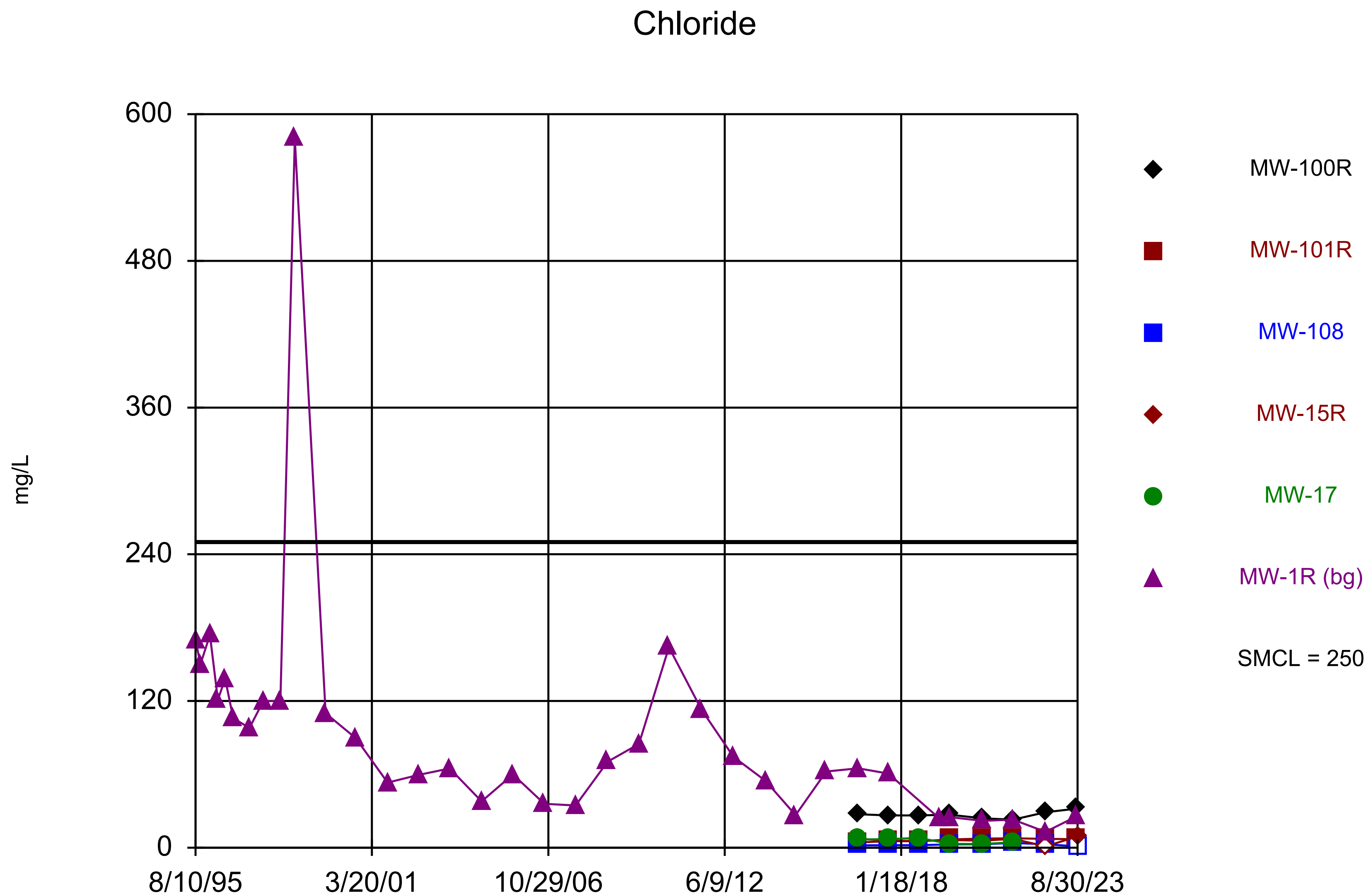
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/10/1995						170
10/6/1995						150
1/25/1996						174
4/26/1996						121
7/19/1996						138.3
10/21/1996						106
4/28/1997						98
10/6/1997						120
4/22/1998						120
10/7/1998						580 (X)
9/29/1999						110
9/13/2000						89.6
9/19/2001						53.3
9/11/2002						59.5
9/10/2003						64.8
9/15/2004						37.9
9/14/2005						60
9/13/2006						35.9
9/12/2007						34.5
9/17/2008						70.4
9/16/2009						84.9
8/31/2010						164
9/13/2011						113
9/18/2012						74.4
9/27/2013						54.7
9/10/2014						26.6
9/2/2015						62.4
9/7/2016	27.4	4.3	2	7.4	6.7	64.9
8/24/2017	26.4	5.3	2.1	5.6	7	60.6
8/16/2018	26.4	5.3	2.1	5.5	8	
4/6/2019						24
8/7/2019	27	6.7	2.7 (J)	6.3	3.2 (J)	25
8/24/2020	24	7.5	2.8 (J)		3.1 (J)	22
8/25/2020				5.7		
8/10/2021					4.4 (J)	23
8/11/2021	23	7.7	3.9 (J)			
8/12/2021				7.3		
8/23/2022						13
8/24/2022	29	7.3	2.8 (J)	<2.3 (U)		
8/29/2023	32	6.9				26
8/30/2023			<2.3 (U)	9.2		

ND substitution: RL or RL/2 if <15% NDs.

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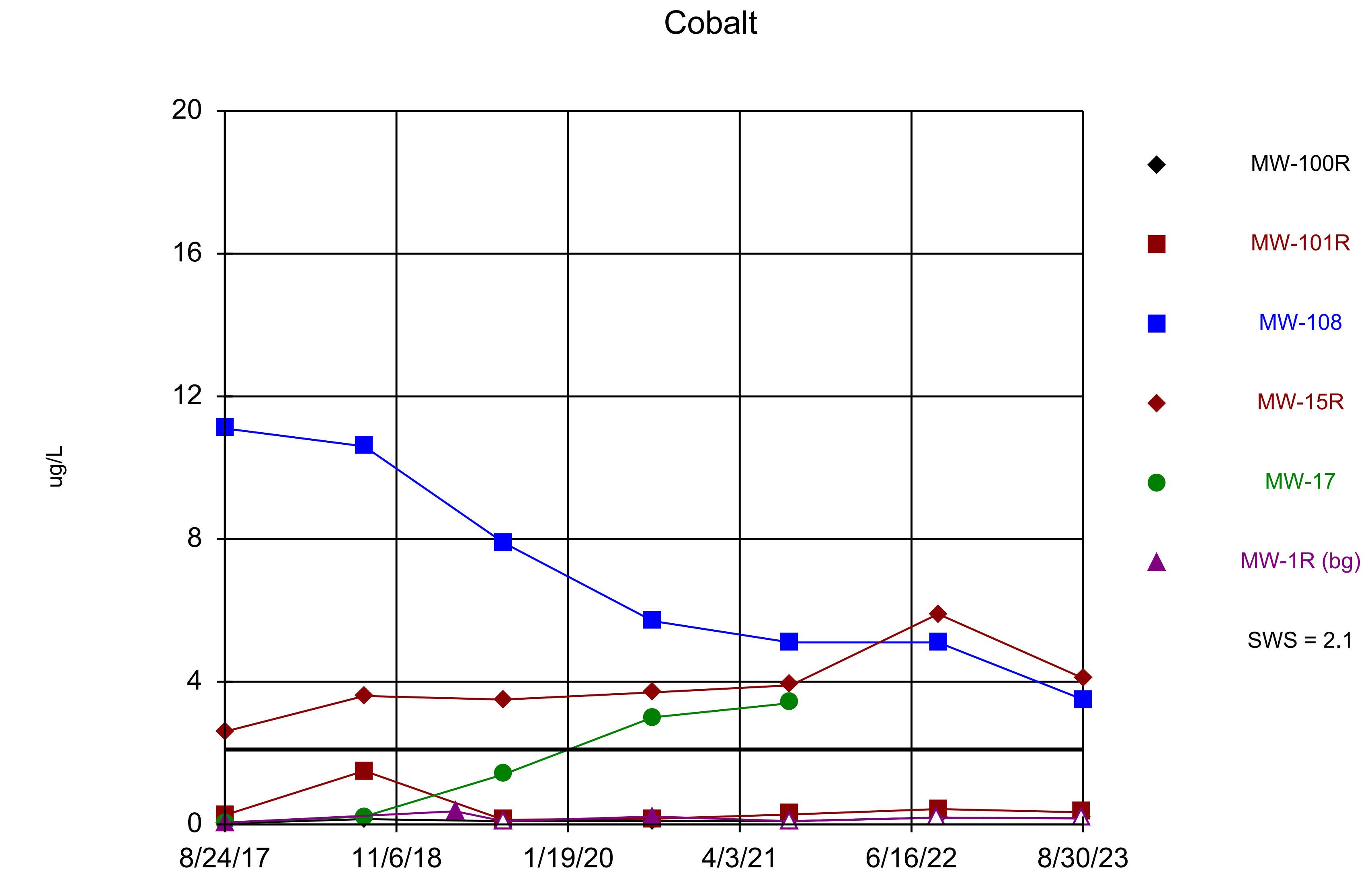
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

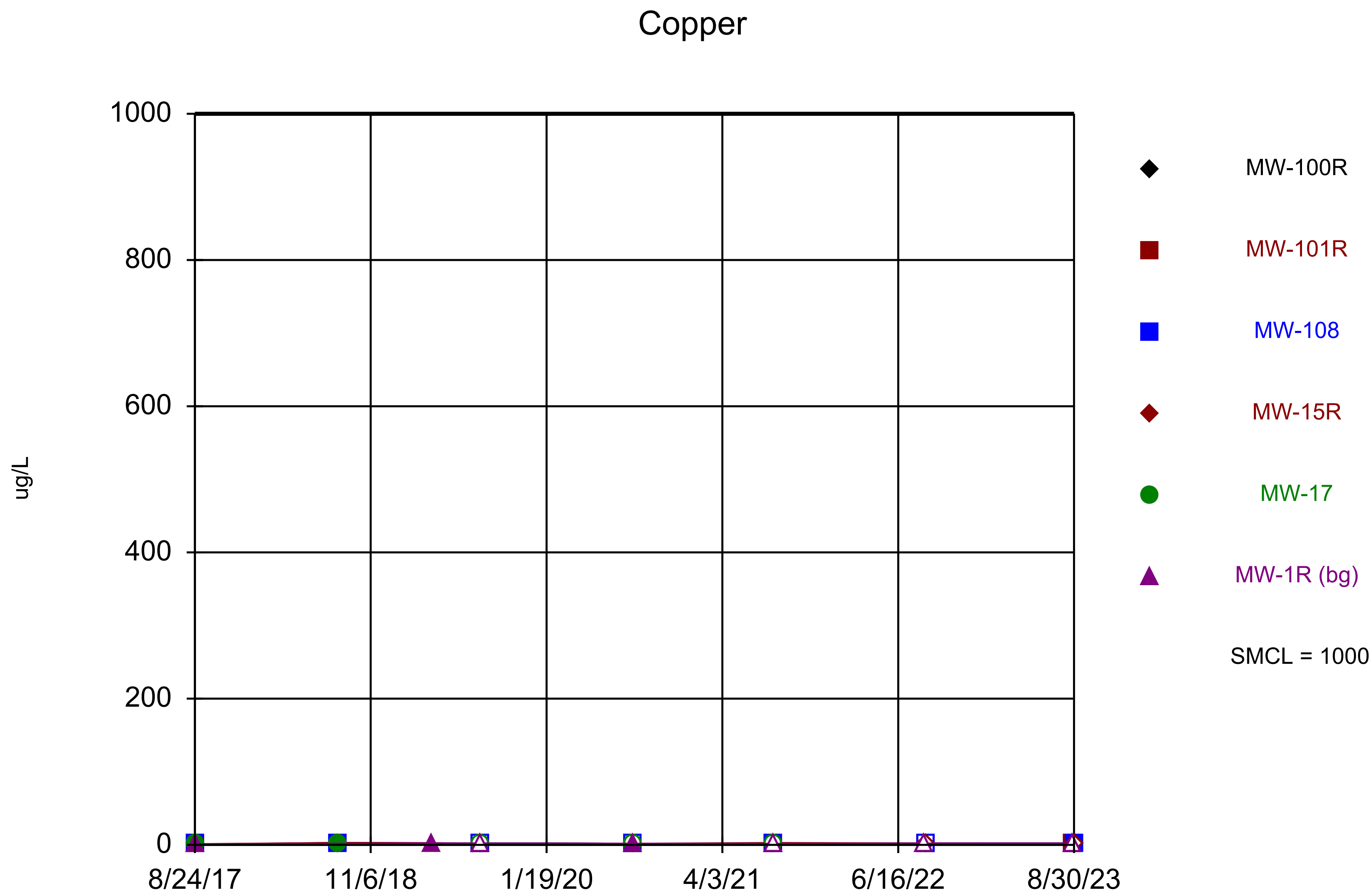
Constituent: Cobalt (ug/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.028 (J)	0.26 (J)	11.1	2.6	0.054 (J)	0.049 (J)
8/16/2018	<0.15	1.5	10.6	3.6	0.22 (J)	
4/6/2019						0.37 (J)
8/7/2019	<0.091	0.13 (J)	7.9	3.5	1.4	<0.091
8/24/2020	<0.091	0.16 (J)	5.7		3	0.22 (J)
8/25/2020				3.7		
8/10/2021					3.4	<0.091
8/11/2021	<0.091	0.28 (J)	5.1			
8/12/2021				3.9		
8/23/2022						<0.19 (U)
8/24/2022	<0.19 (U)	0.43 (J)	5.1	5.9		
8/29/2023	<0.17 (U)	0.34 (J)				<0.17 (U)
8/30/2023			3.5	4.1		

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 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

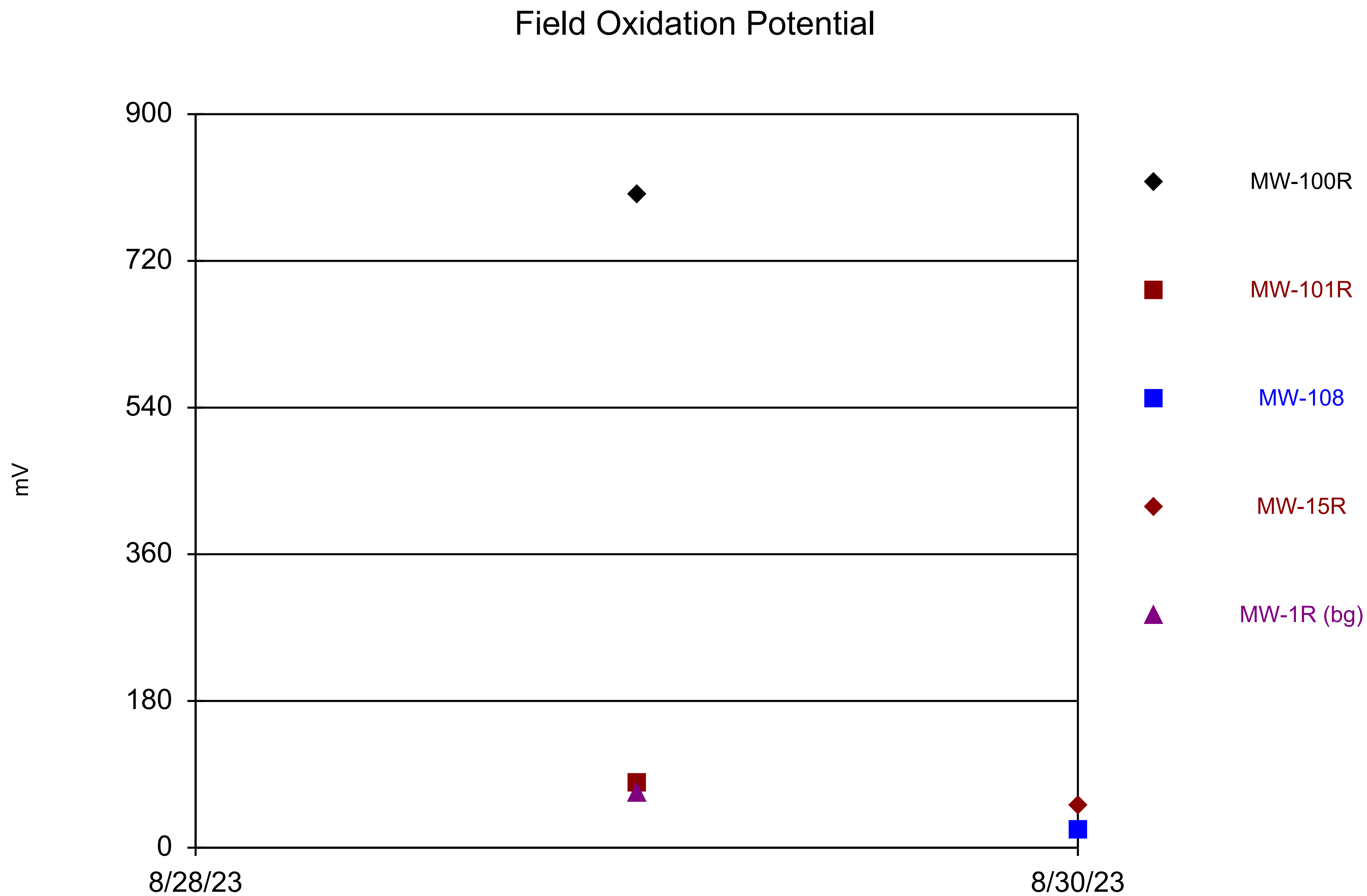
Time Series

Constituent: Copper (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.32 (J)	0.92 (J)	0.61 (J)	0.38 (J)	0.52 (J)	0.99 (J)
8/16/2018	0.74 (J)	2.6	0.57 (J)	2.7	0.66 (J)	
4/6/2019						2.1 (J)
8/7/2019	<2	<2	<2	<2	<2	<2
8/24/2020	<1.5	<1.5	<1.5		<1.5	1.6 (J)
8/25/2020				<1.5		
8/10/2021					<1.4	<1.4
8/11/2021	<1.4	<1.4	1.7 (J)			
8/12/2021				2.5 (J)		
8/23/2022						<1.8 (U)
8/24/2022	<1.8 (U)	<1.8 (U)	<1.8 (U)	<1.8 (U)		
8/29/2023	1.8 (J)	<1.8 (U)				<1.8 (U)
8/30/2023			2 (J)	<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 10/6/2023 11:20 AM View: Shallow

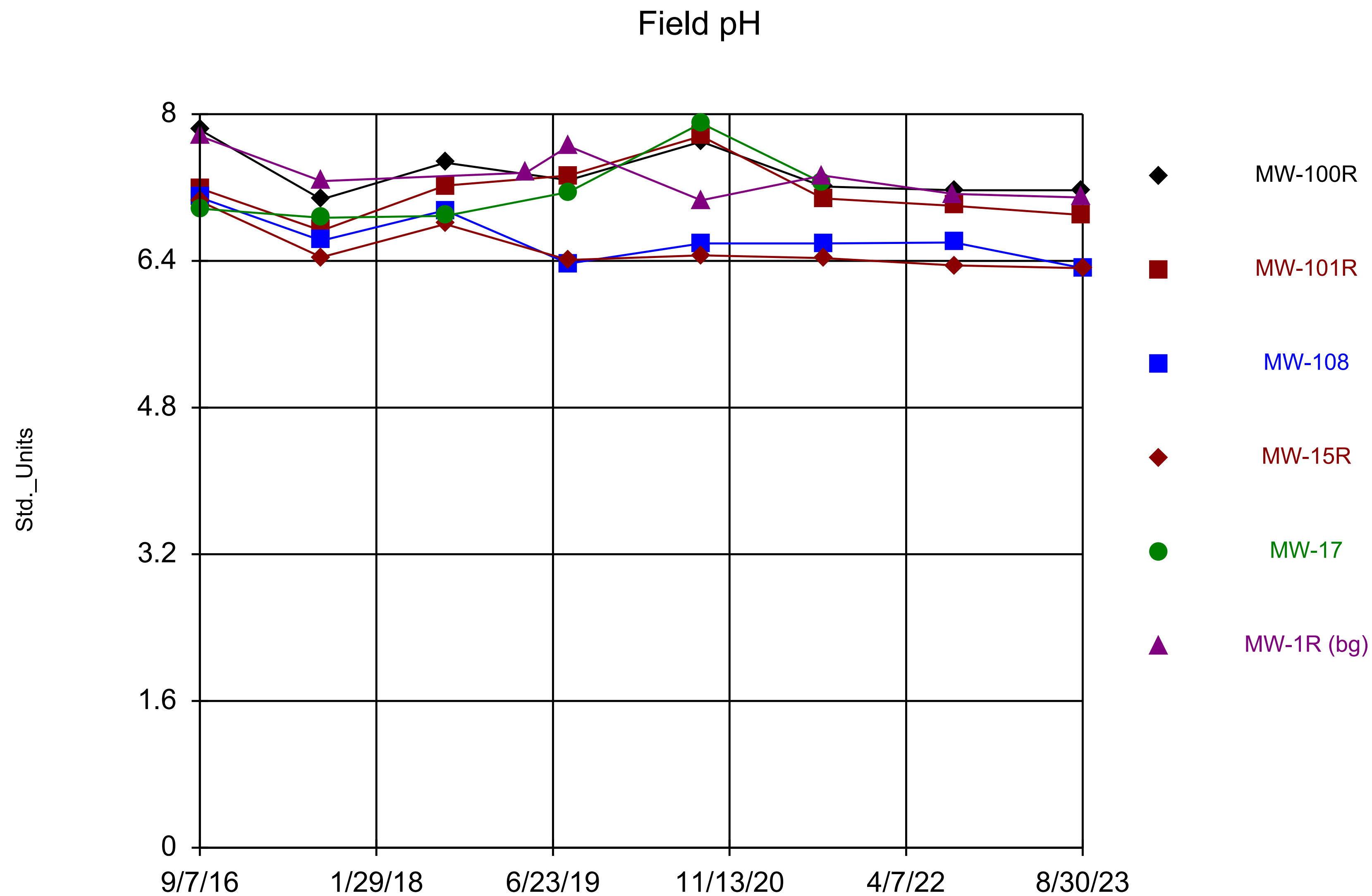
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Field Oxidation Potential (mV) Analysis Run 10/6/2023 11:29 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-1R (bg)
8/29/2023	802	80.1			66.7
8/30/2023			20.6	50.9	

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

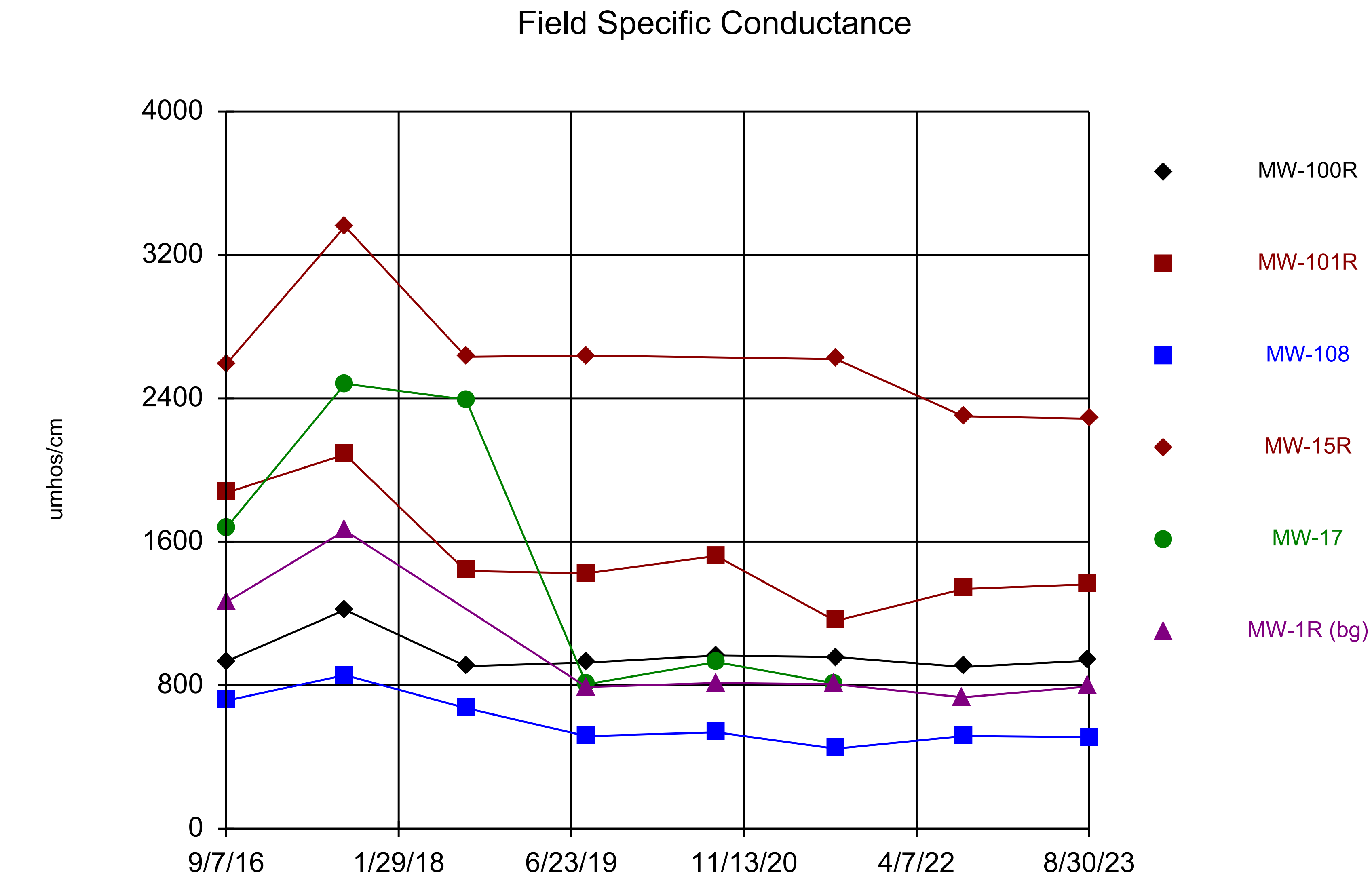
Time Series

Constituent: Field pH (Std._Units)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	7.83	7.19	7.09	7.05	6.97	7.76
8/24/2017	7.07	6.73	6.62	6.44	6.87	7.27
8/16/2018	7.47	7.22	6.95	6.8	6.89	
4/6/2019						7.36
8/7/2019	7.28	7.33	6.37	6.41	7.15	7.65
8/24/2020	7.7	7.76	6.59		7.9	7.06
8/25/2020				6.46		
8/10/2021					7.25	7.33
8/11/2021	7.21	7.08	6.59			
8/12/2021				6.43		
8/23/2022						7.13
8/24/2022	7.17	7	6.6	6.35		
8/29/2023	7.17	6.9				7.09
8/30/2023			6.32	6.32		

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

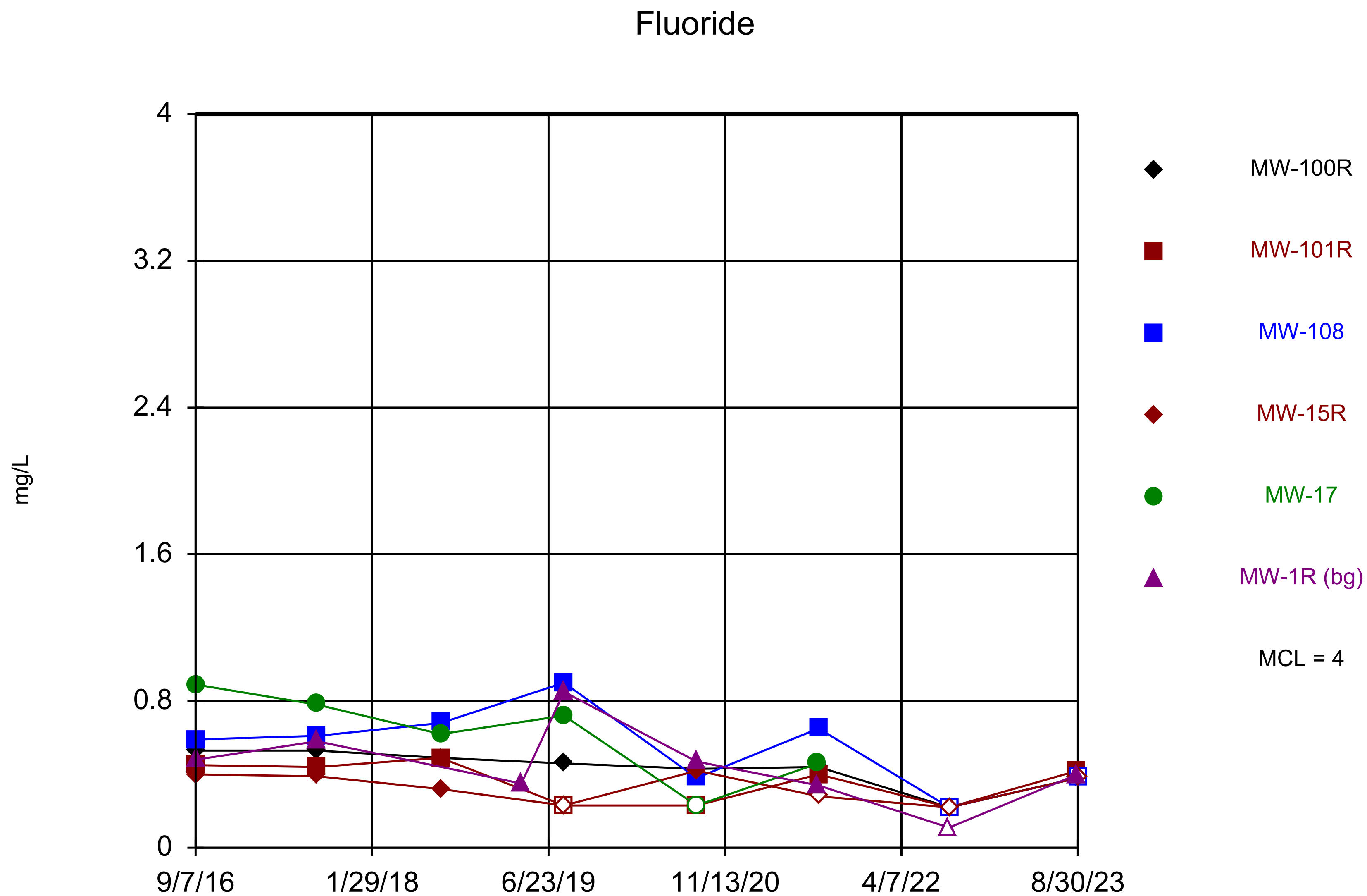
Time Series

Constituent: Field Specific Conductance (umhos/cm) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	933	1874	714	2590	1677	1263
8/24/2017	1221	2087	857	3360	2482	1663
8/16/2018	907	1438	673	2633	2394	
8/7/2019	927	1425	517	2640	806	791
8/24/2020	966	1522	538		930	813
8/10/2021					810	806
8/11/2021	958	1159	447			
8/12/2021				2620		
8/23/2022						733
8/24/2022	903	1338	517.7	2301		
8/29/2023	938	1364				794
8/30/2023			511	2287		

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Fluoride (mg/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	0.53	0.45	0.59	0.4	0.89	0.48
8/24/2017	0.53	0.44	0.61	0.39	0.78	0.58
8/16/2018	0.49	0.49	0.68	0.32	0.62	
4/6/2019						0.35 (J)
8/7/2019	0.46 (J)	<0.23	0.9	<0.23	0.72	0.85
8/24/2020	0.43 (J)	<0.23	0.38 (J)		<0.23	0.47 (J)
8/25/2020				0.42 (J)		
8/10/2021					0.46 (J)	0.34 (J)
8/11/2021	0.44 (J)	0.4 (J)	0.65			
8/12/2021				<0.28		
8/23/2022						<0.22 (U)
8/24/2022	<0.22 (U)	<0.22 (U)	<0.22 (U)	<0.22 (U)		
8/29/2023	<0.38 (U)	0.42 (J)				0.4 (J)
8/30/2023			<0.38 (U)	<0.38 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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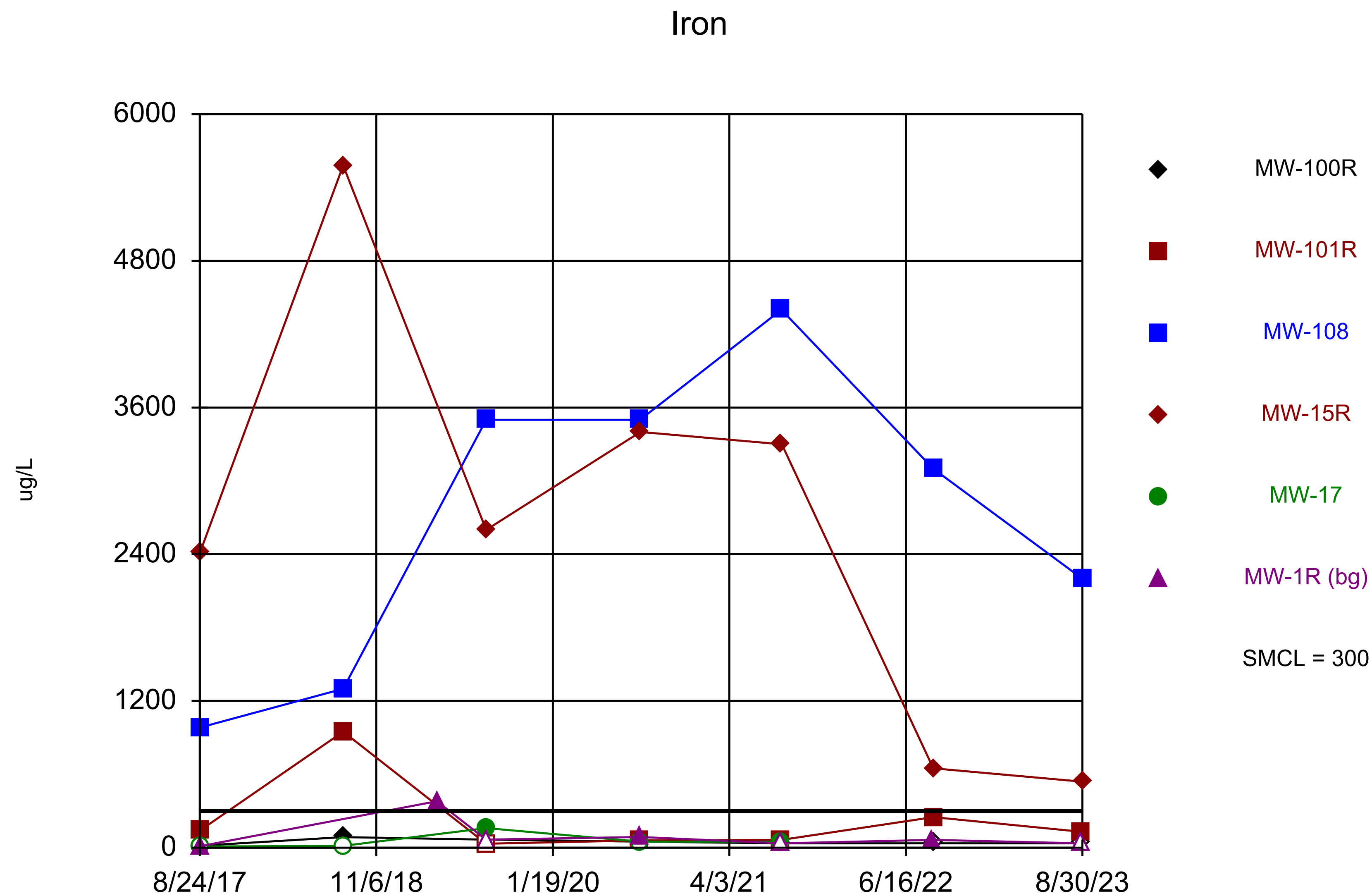
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Iron (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	16.2 (J)	140	983	2410	<9.6	12.5 (J)
8/16/2018	86.3	949	1300	5580	<14.9	
4/6/2019						380
8/7/2019	<66	<66	3500	2600	160	<66
8/24/2020	<50	60 (J)	3500		<50	88 (J)
8/25/2020				3400		
8/10/2021					48 (J)	<36
8/11/2021	<36	64 (J)	4400			
8/12/2021				3300		
8/23/2022						64 (J)
8/24/2022	<36 (U)	250	3100	650		
8/29/2023	<36 (U)	130				<36 (U)
8/30/2023			2200	540		

ND substitution: RL or RL/2 if <15% NDs.

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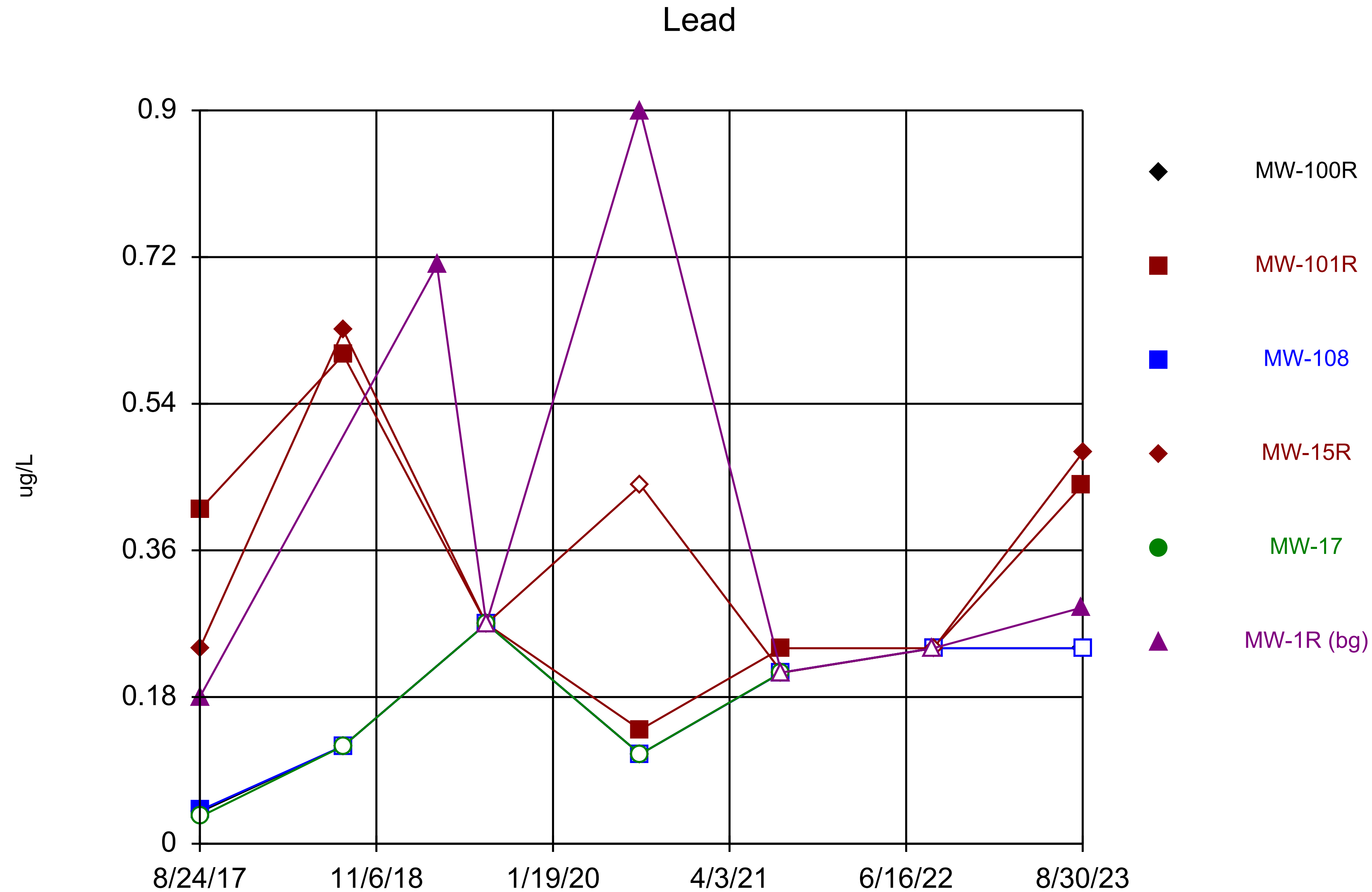
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Lead (ug/L) Analysis Run 10/6/2023 11:29 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.039 (J)	0.41 (J)	0.041 (J)	0.24 (J)	<0.033	0.18 (J)
8/16/2018	<0.12	0.6 (J)	<0.12	0.63 (J)	<0.12	
4/6/2019						0.71
8/7/2019	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
8/24/2020	<0.11	0.14 (J)	<0.11		<0.11	0.9
8/25/2020				<0.44		
8/10/2021					<0.21	<0.21
8/11/2021	<0.21	0.24 (J)	<0.21			
8/12/2021				<0.21		
8/23/2022						<0.24 (U)
8/24/2022	<0.24 (U)	<0.24 (U)	<0.24 (U)	<0.24 (U)		
8/29/2023	0.24 (JB)	0.44 (JB)				0.29 (JB)
8/30/2023			<0.24 (U)	0.48 (JB)		

ND substitution: RL or RL/2 if <15% NDs.

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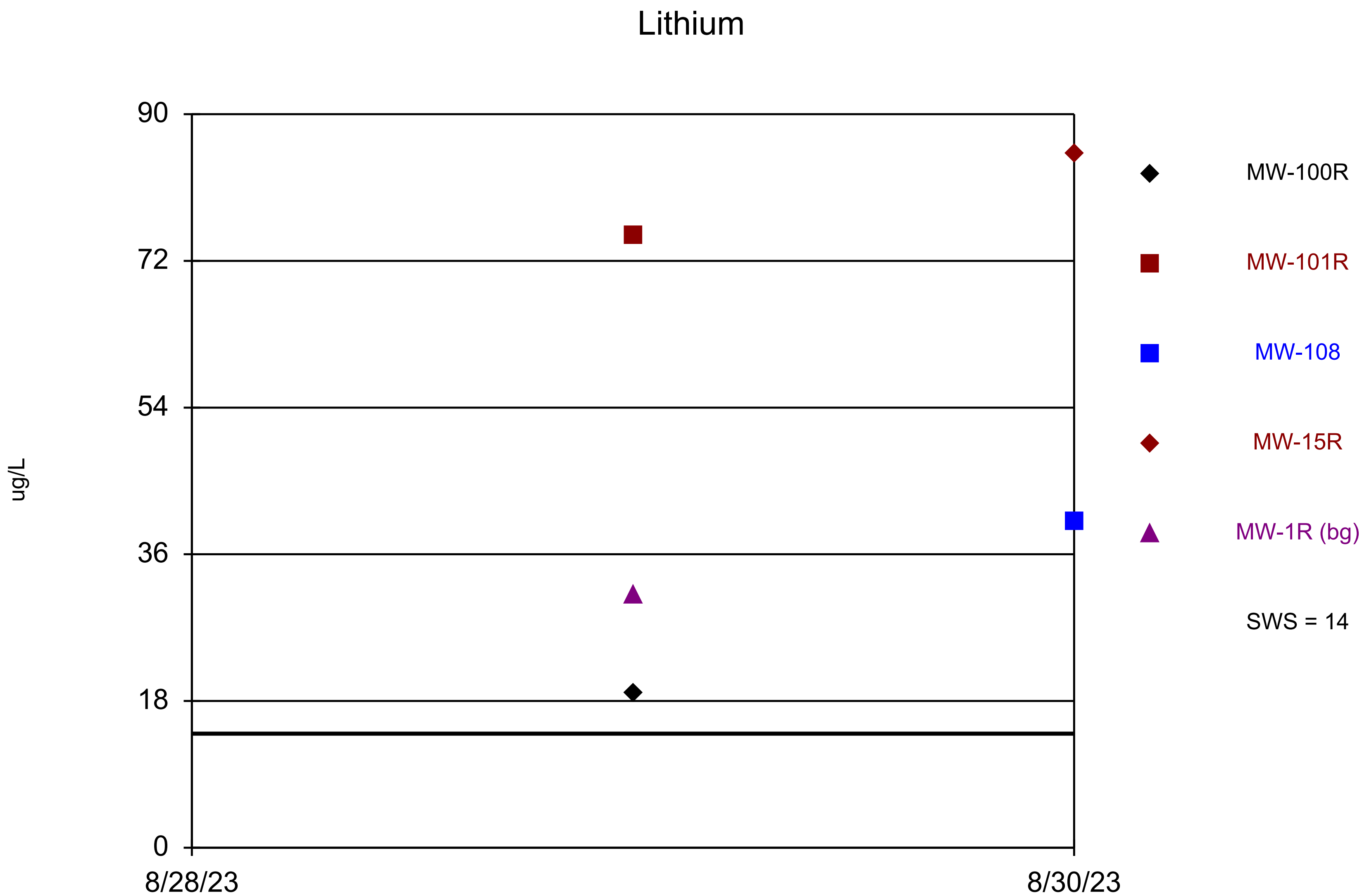

Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Lithium (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-1R (bg)
8/29/2023	19	75			31
8/30/2023			40	85	

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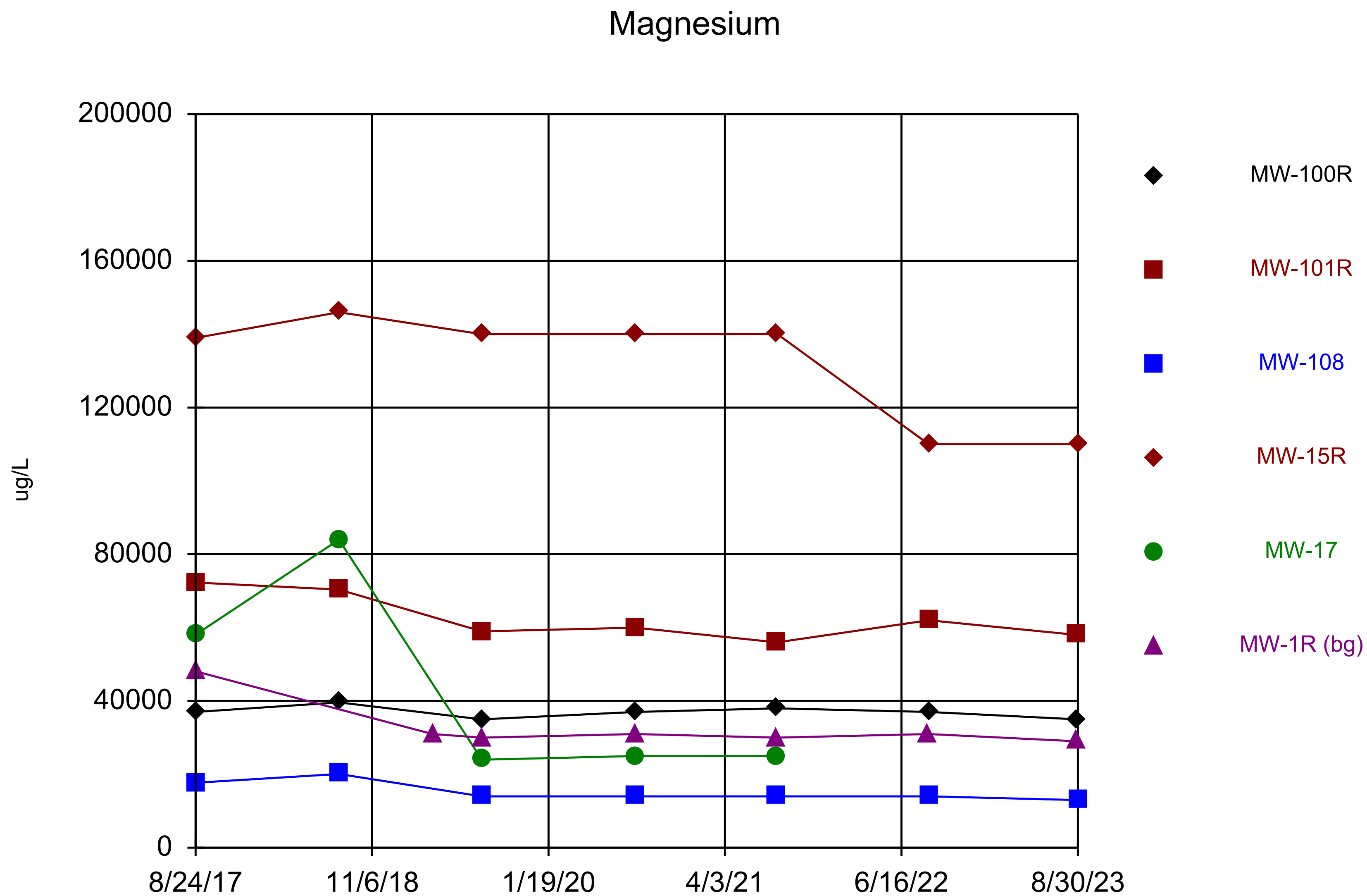

Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Magnesium (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	37000	72300	17700	139000	58100	48100
8/16/2018	39600	70400	20100	146000	84000	
4/6/2019						31000
8/7/2019	35000	59000	14000	140000	24000	30000
8/24/2020	37000	60000	14000		25000	31000
8/25/2020				140000		
8/10/2021					25000	30000
8/11/2021	38000	56000	14000			
8/12/2021				140000		
8/23/2022						31000
8/24/2022	37000	62000	14000	110000		
8/29/2023	35000	58000				29000
8/30/2023			13000	110000		

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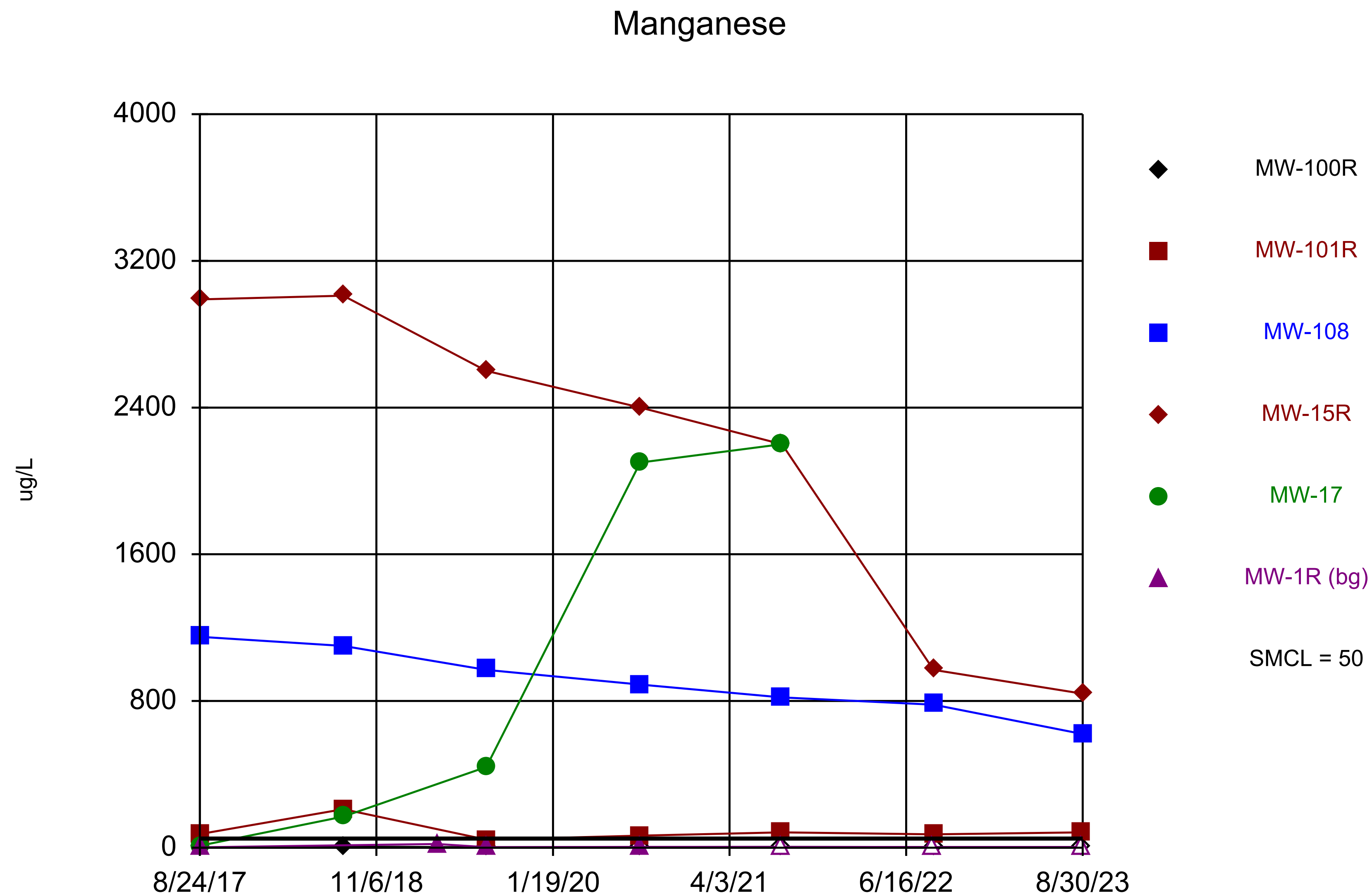
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:20 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Manganese (ug/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.9 (J)	74.1	1150	2990	10.8	2
8/16/2018	5.6	210	1100	3010	170	
4/6/2019						20
8/7/2019	<2.5	44	970	2600	440	2.8 (J)
8/24/2020	<4	66	890		2100	4.7 (J)
8/25/2020				2400		
8/10/2021					2200	<4.4
8/11/2021	<4.4	84	820			
8/12/2021				2200		
8/23/2022						<3.6 (U)
8/24/2022	<3.6 (U)	73	780	970		
8/29/2023	<3.6 (U)	84				<3.6 (U)
8/30/2023			620	840		

ND substitution: RL or RL/2 if <15% NDs.

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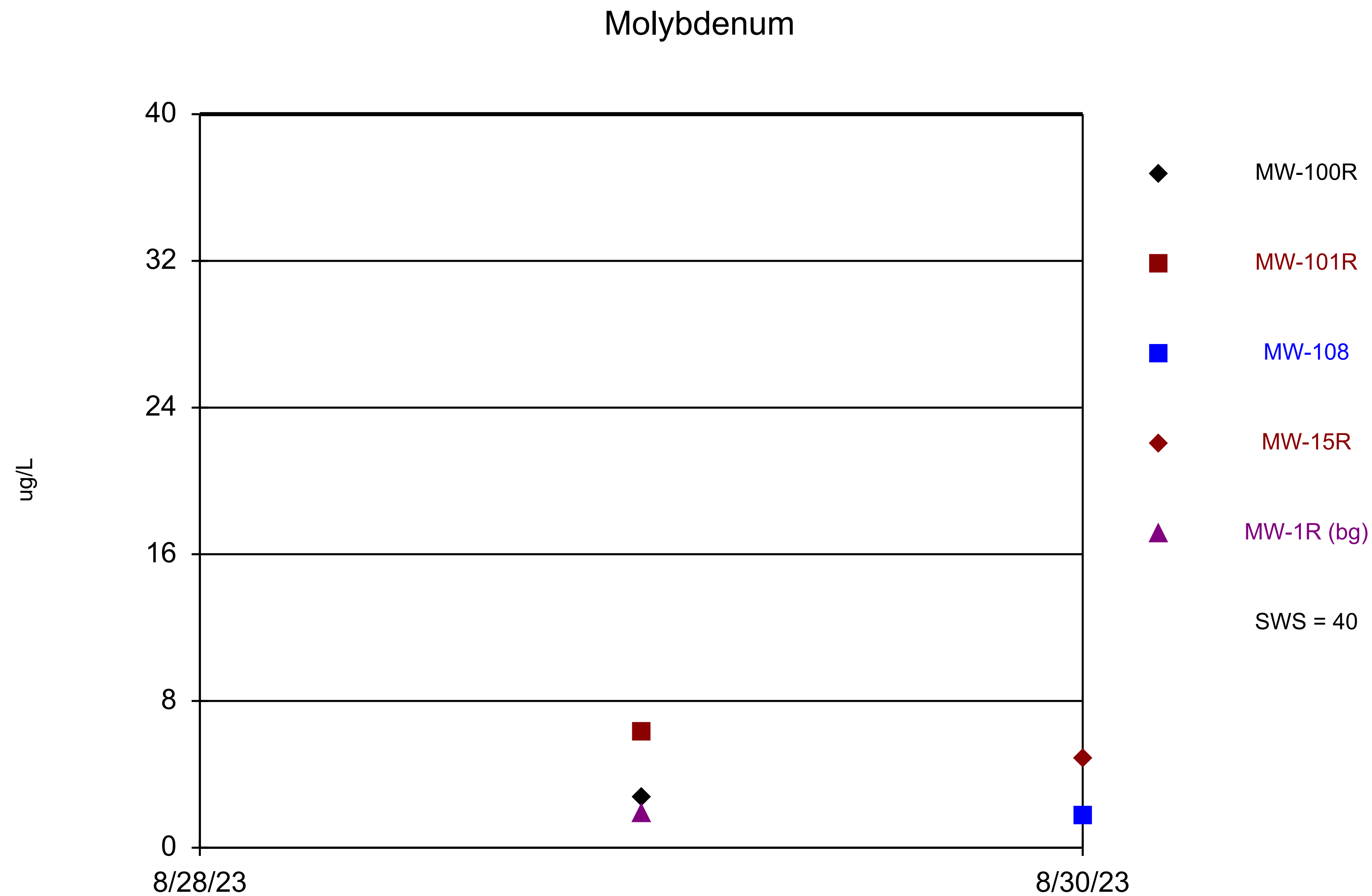

Time Series   Analysis Run 10/6/2023 11:20 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Time Series

Constituent: Molybdenum (ug/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-1R (bg)
8/29/2023	2.7	6.3			1.8 (J)
8/30/2023			1.7 (J)	4.9	

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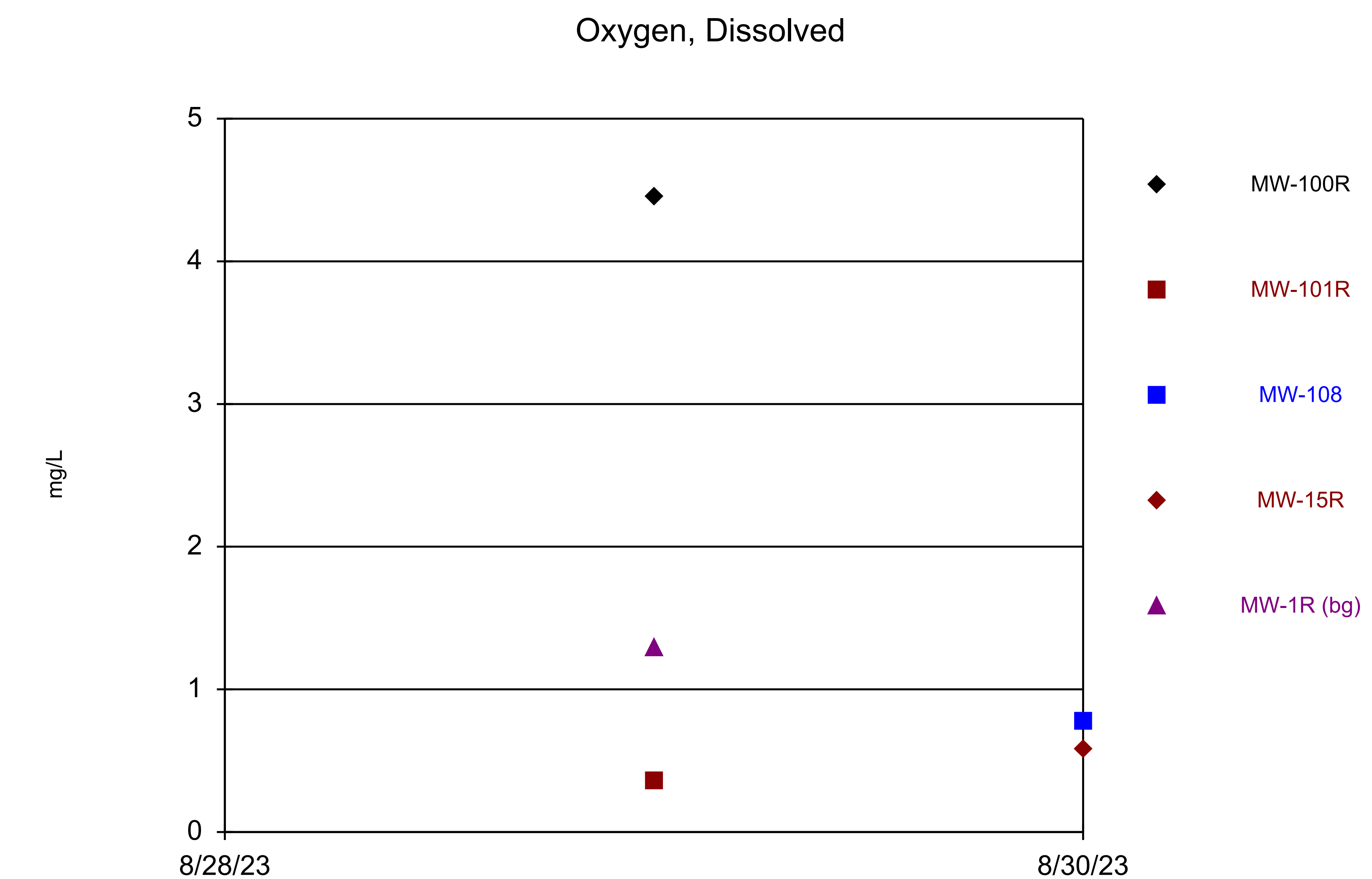

Time Series Analysis Run 10/6/2023 11:21 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Oxygen, Dissolved (mg/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-1R (bg)
8/29/2023	4.45	0.36			1.29
8/30/2023			0.77	0.58	

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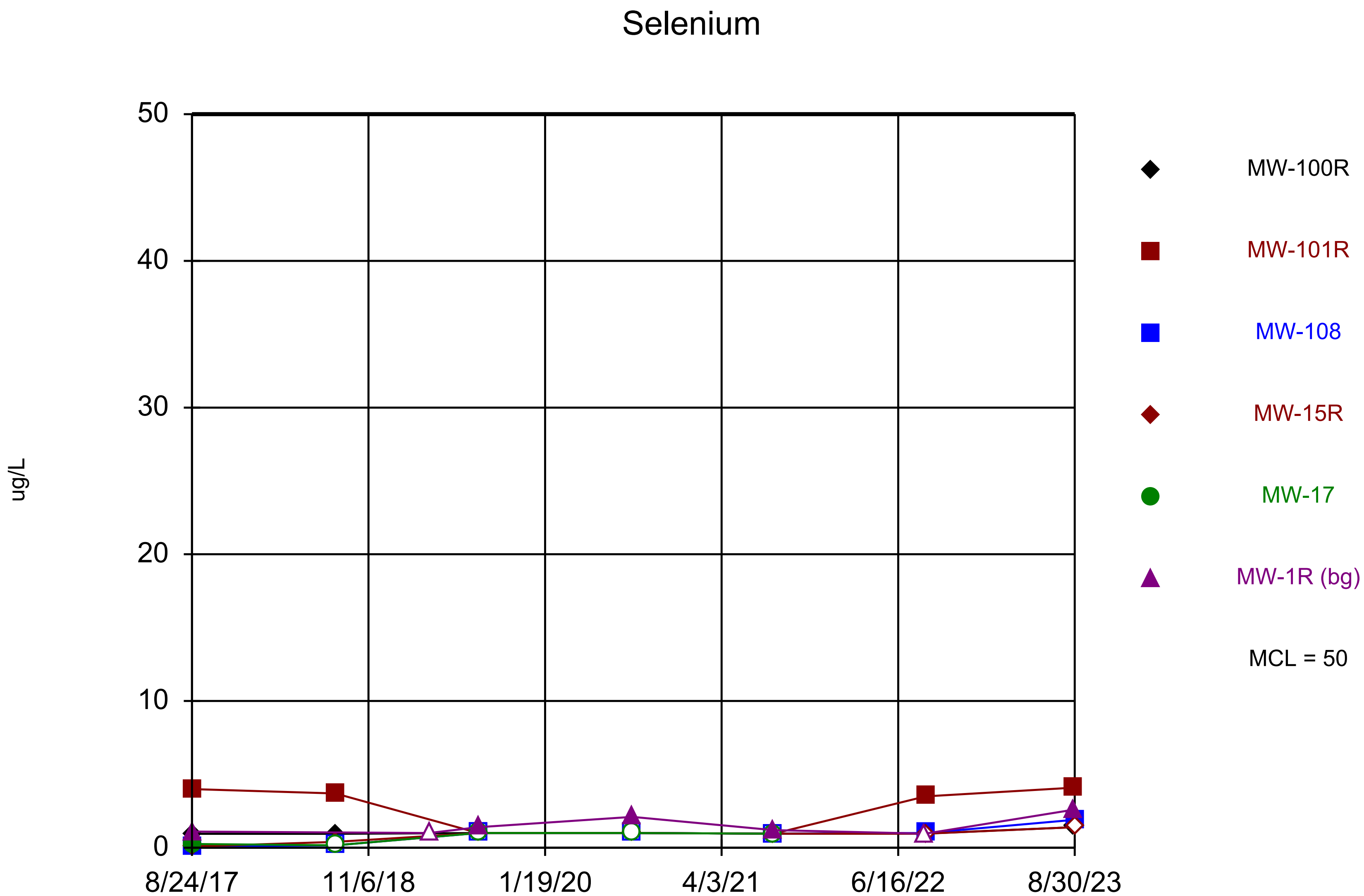
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:21 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Selenium (ug/L) Analysis Run 10/6/2023 11:29 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.95 (J)	4	0.089 (J)	<0.086	0.25 (J)	1.1
8/16/2018	0.95 (J)	3.7	<0.16	0.4 (J)	<0.16	
4/6/2019						<1
8/7/2019	<1	1 (J)	<1	<1	<1	1.4 (J)
8/24/2020	<1	<1	<1		<1	2.1 (J)
8/25/2020				<1		
8/10/2021					<0.96	1.2 (J)
8/11/2021	<0.96	<0.96	<0.96			
8/12/2021				<0.96		
8/23/2022						<0.96 (U)
8/24/2022	0.97 (J)	3.5 (J)	1 (J)	<0.96 (U)		
8/29/2023	1.4 (J)	4.1 (J)				2.6 (J)
8/30/2023			1.9 (J)	<1.4 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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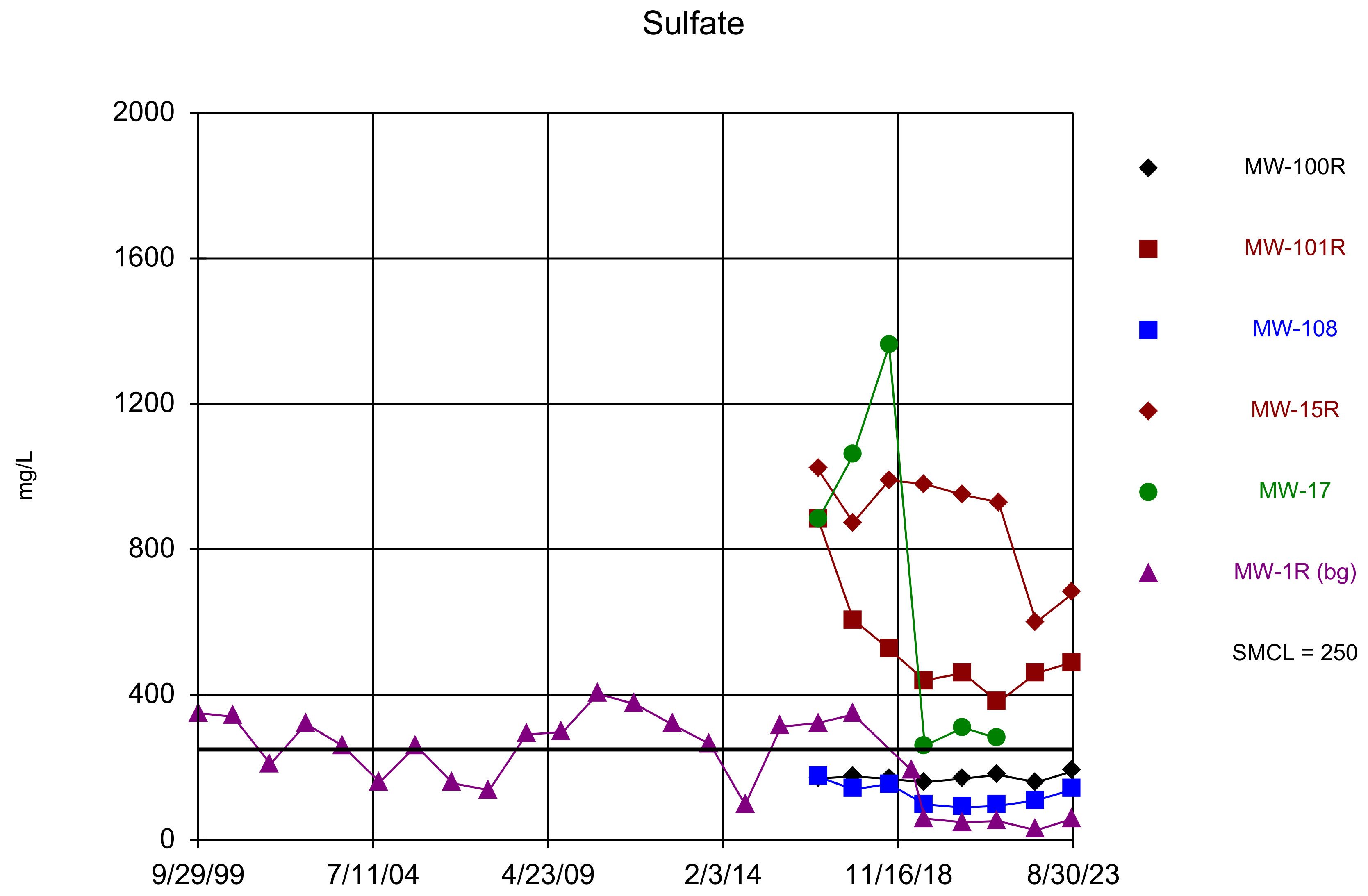


Time Series   Analysis Run 10/6/2023 11:21 AM   View: Shallow

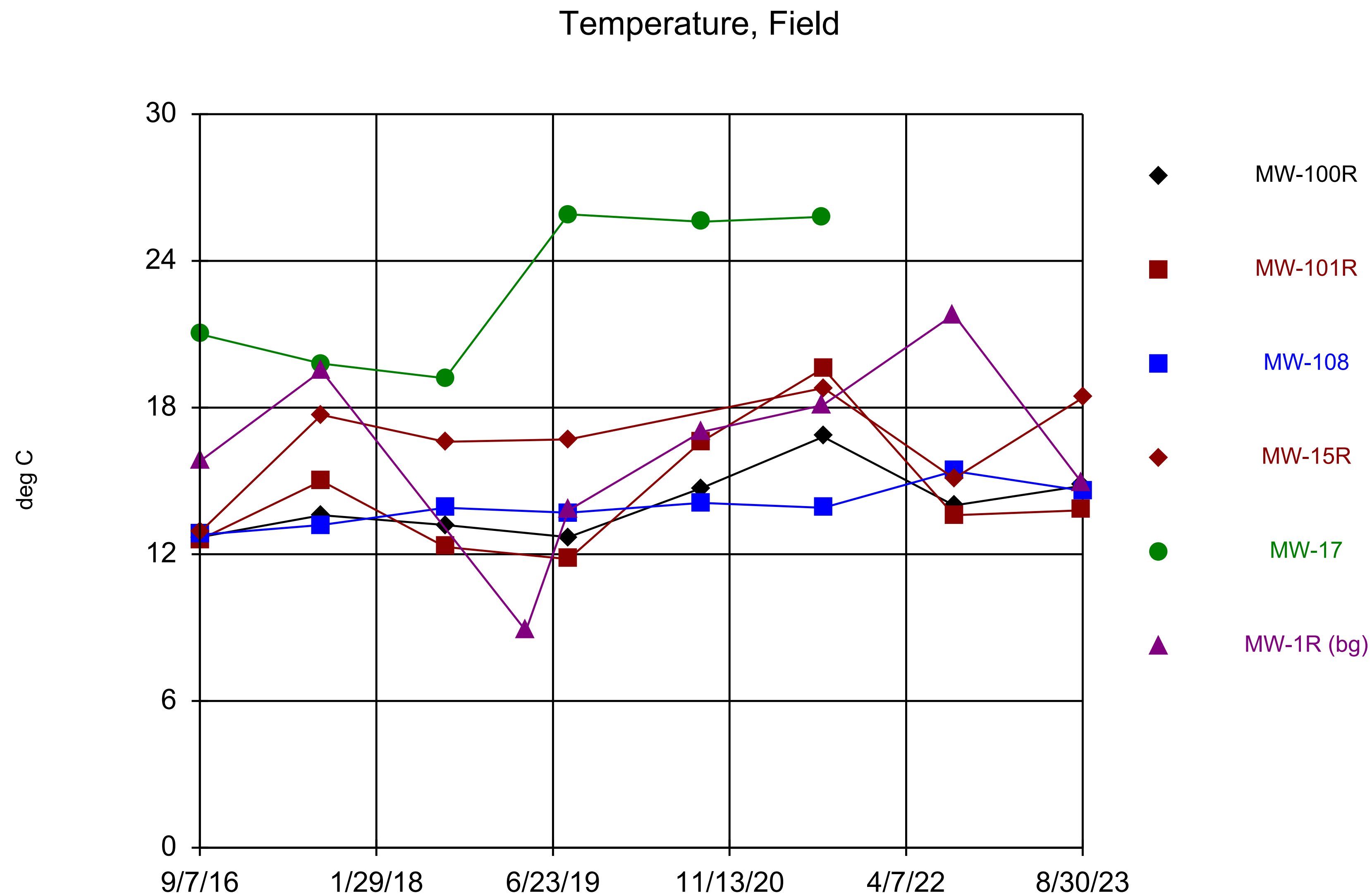
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Time Series

Constituent: Sulfate (mg/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/29/1999						350
9/13/2000						340
9/19/2001						210
9/11/2002						320
9/10/2003						260
9/15/2004						160
9/14/2005						260
9/13/2006						157
9/12/2007						138
9/17/2008						291
9/16/2009						298
8/31/2010						403
9/13/2011						374
9/18/2012						318
9/27/2013						264
9/10/2014						97.8
9/2/2015						312
9/7/2016	170	883	175	1020	881	323
8/24/2017	176	607	140	874	1060	346
8/16/2018	169	526	155	990	1360	
4/6/2019						190
8/7/2019	160	440	99	980	260	60
8/24/2020	170	460	90		310	50
8/25/2020				950		
8/10/2021					280	53
8/11/2021	180	380	95			
8/12/2021				930		
8/23/2022						28
8/24/2022	160	460	110	600		
8/29/2023	190	490				60
8/30/2023			140	680		



Time Series Analysis Run 10/6/2023 11:21 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Temperature, Field (deg C)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	12.7	12.6	12.8	12.9	21	15.8
8/24/2017	13.6	15	13.2	17.7	19.8	19.5
8/16/2018	13.2	12.3	13.9	16.6	19.2	
4/6/2019						8.87
8/7/2019	12.7	11.8	13.7	16.7	25.9	13.8
8/24/2020	14.7	16.6	14.1		25.6	17
8/10/2021					25.8	18.1
8/11/2021	16.8	19.6	13.9			
8/12/2021				18.8		
8/23/2022						21.8
8/24/2022	14	13.6	15.4	15.1		
8/29/2023	14.8	13.8				14.9
8/30/2023			14.6	18.4		

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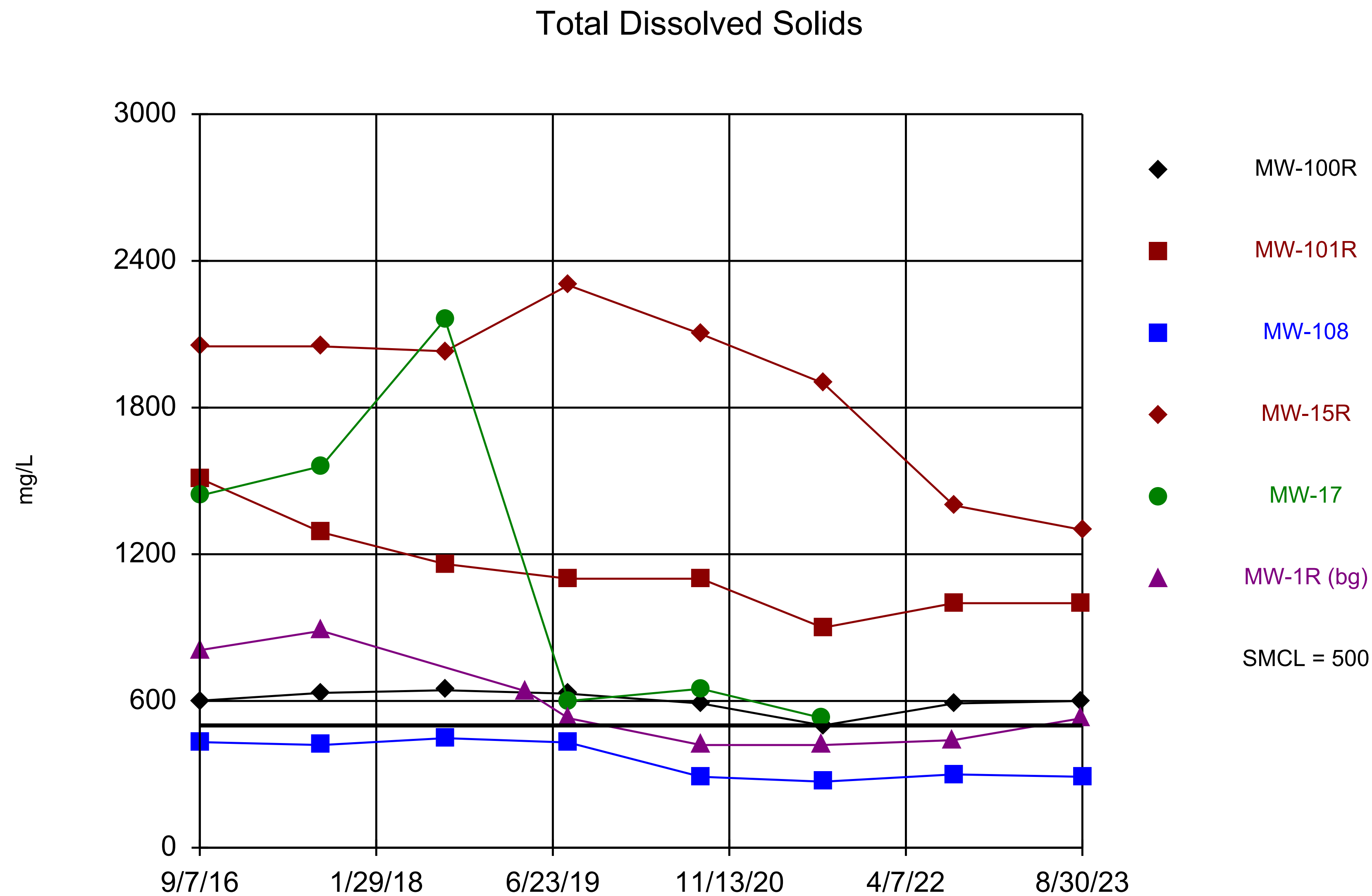


Time Series   Analysis Run 10/6/2023 11:21 AM   View: Shallow

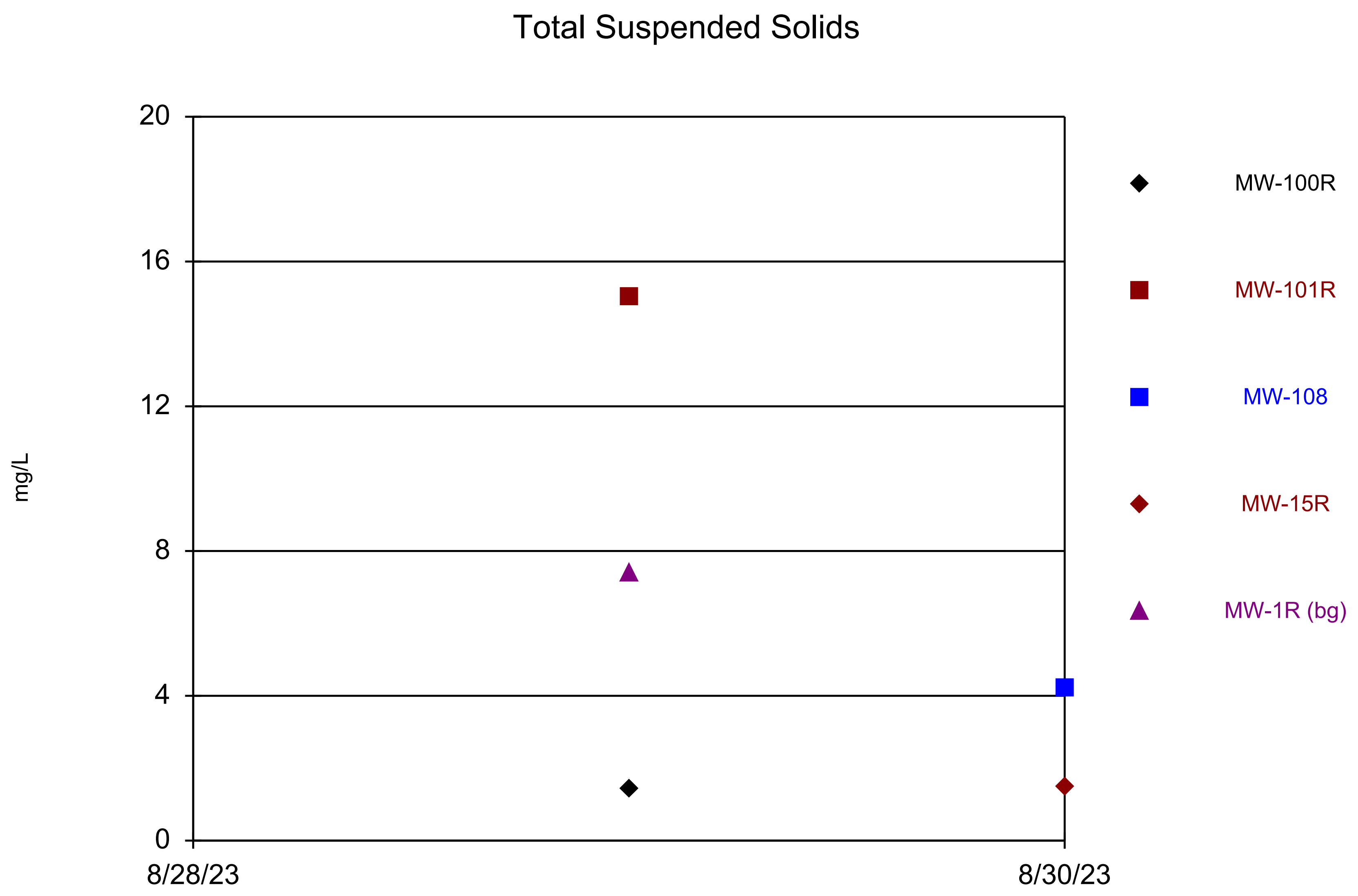
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Time Series

Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/6/2023 11:29 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	601	1510	432	2050	1440	808
8/24/2017	633	1290	420	2050	1560	887
8/16/2018	644	1160	448	2030	2160	
4/6/2019						640
8/7/2019	630	1100	430	2300	600	530
8/24/2020	590	1100	290		650	420
8/25/2020				2100		
8/10/2021					530	420
8/11/2021	500	900	270			
8/12/2021				1900		
8/23/2022						440
8/24/2022	590	1000	300	1400		
8/29/2023	600	1000				530
8/30/2023			290	1300		



Time Series Analysis Run 10/6/2023 11:21 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Total Suspended Solids (mg/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-1R (bg)
8/29/2023	1.4 (J)	15			7.4
8/30/2023			4.2	1.5 (J)	

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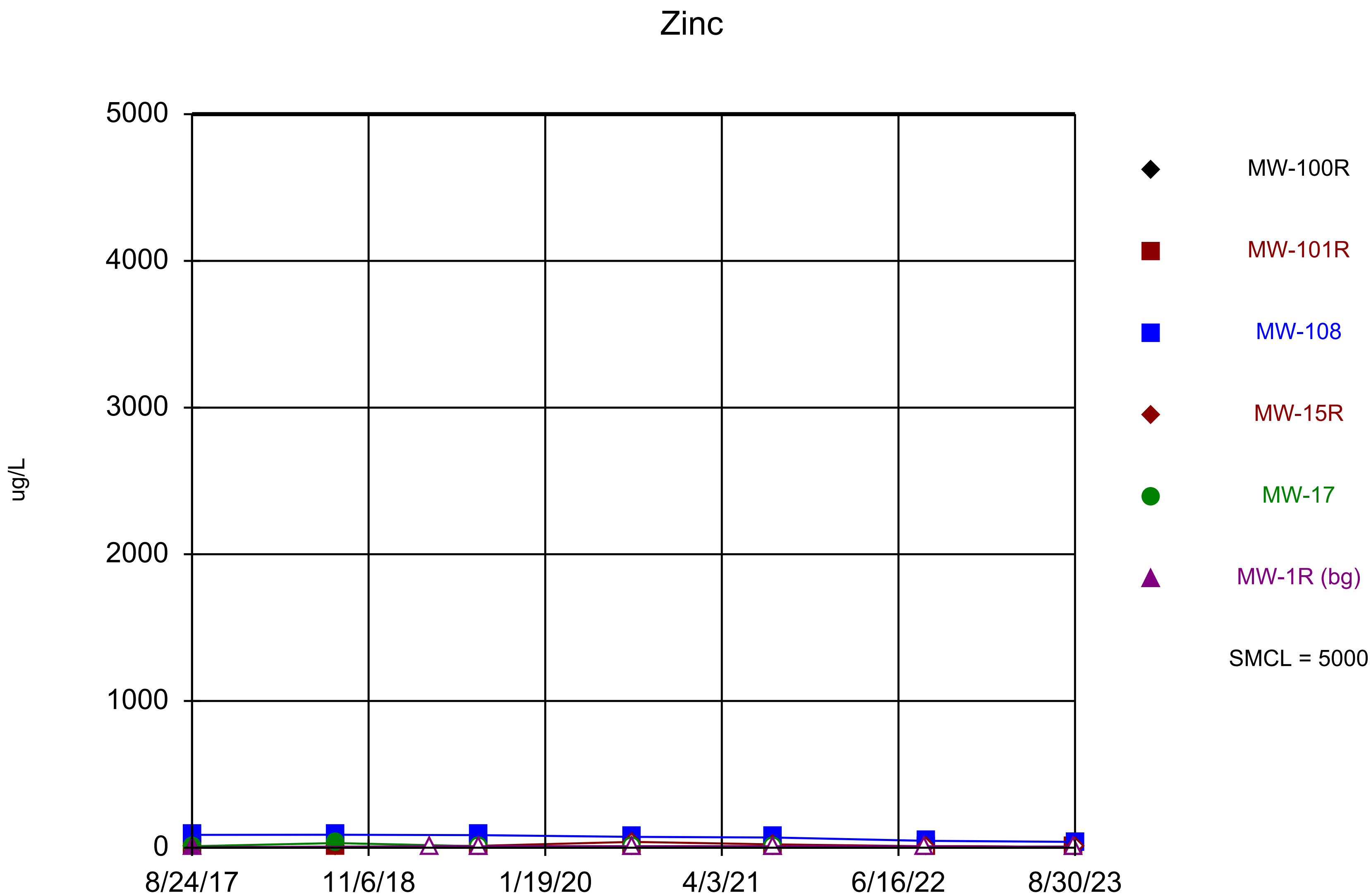
Hollow symbols indicate censored values.



Time Series Analysis Run 10/6/2023 11:21 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Zinc (ug/L)   Analysis Run 10/6/2023 11:29 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.88 (J)	1.8 (J)	87.8	1.5 (J)	10.4	2.4 (J)
8/16/2018	<3.7	6.7 (J)	88.1	6 (J)	31.4	
4/6/2019						<10
8/7/2019	<10	<10	86	13 (J)	<10	<10
8/24/2020	<10	<10	74		<10	<10
8/25/2020				<40		
8/10/2021					<10	<10
8/11/2021	<10	<10	70			
8/12/2021				23		
8/23/2022						<10 (U)
8/24/2022	<10 (U)	<10 (U)	47	<10 (U)		
8/29/2023	<6.4 (U)	<6.4 (U)				<6.4 (U)
8/30/2023			40	<6.4 (U)		

ND substitution: RL or RL/2 if <15% NDs.

Attachment D2

Times Series Graphs - Pennsylvanian

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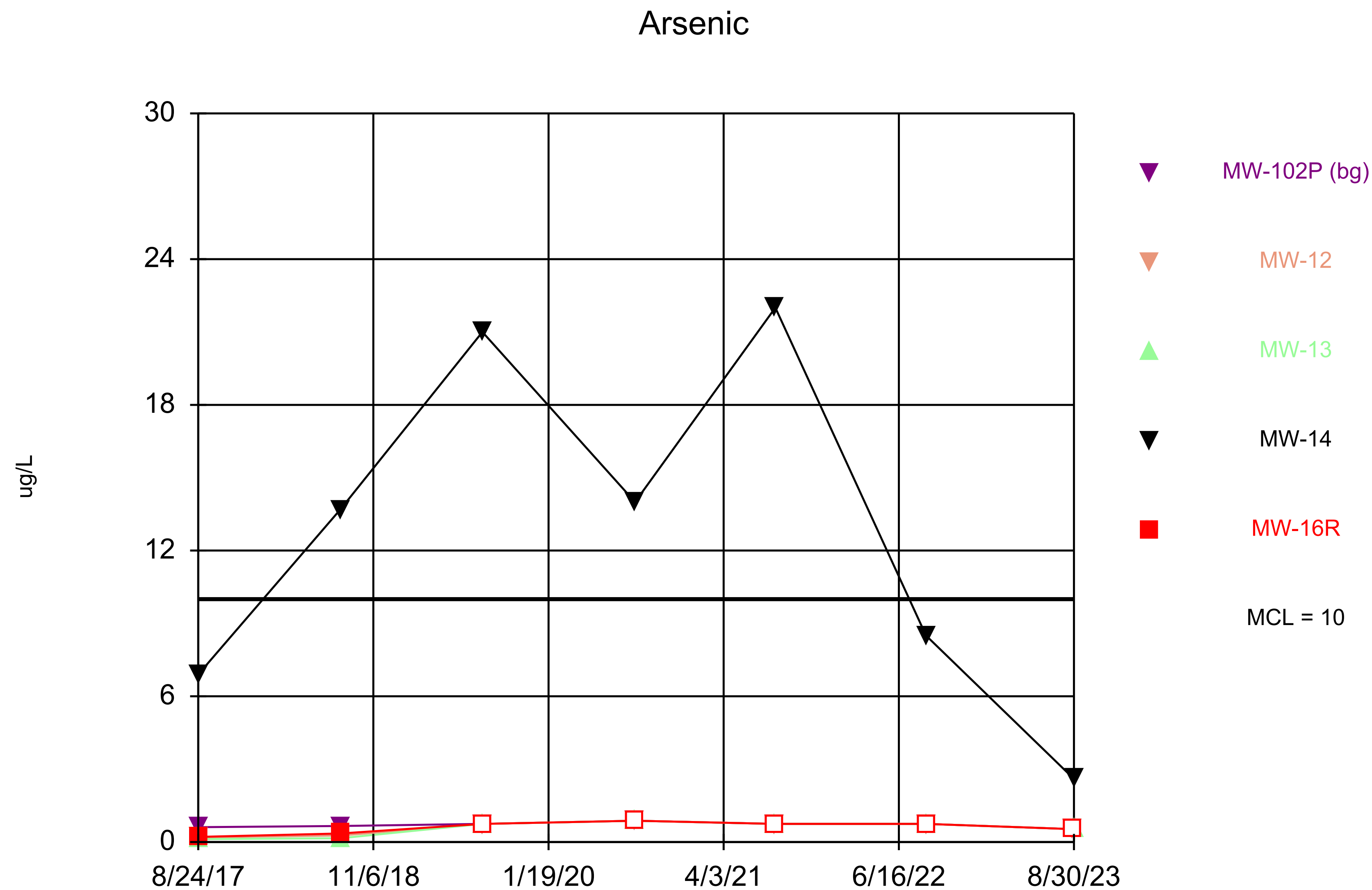
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

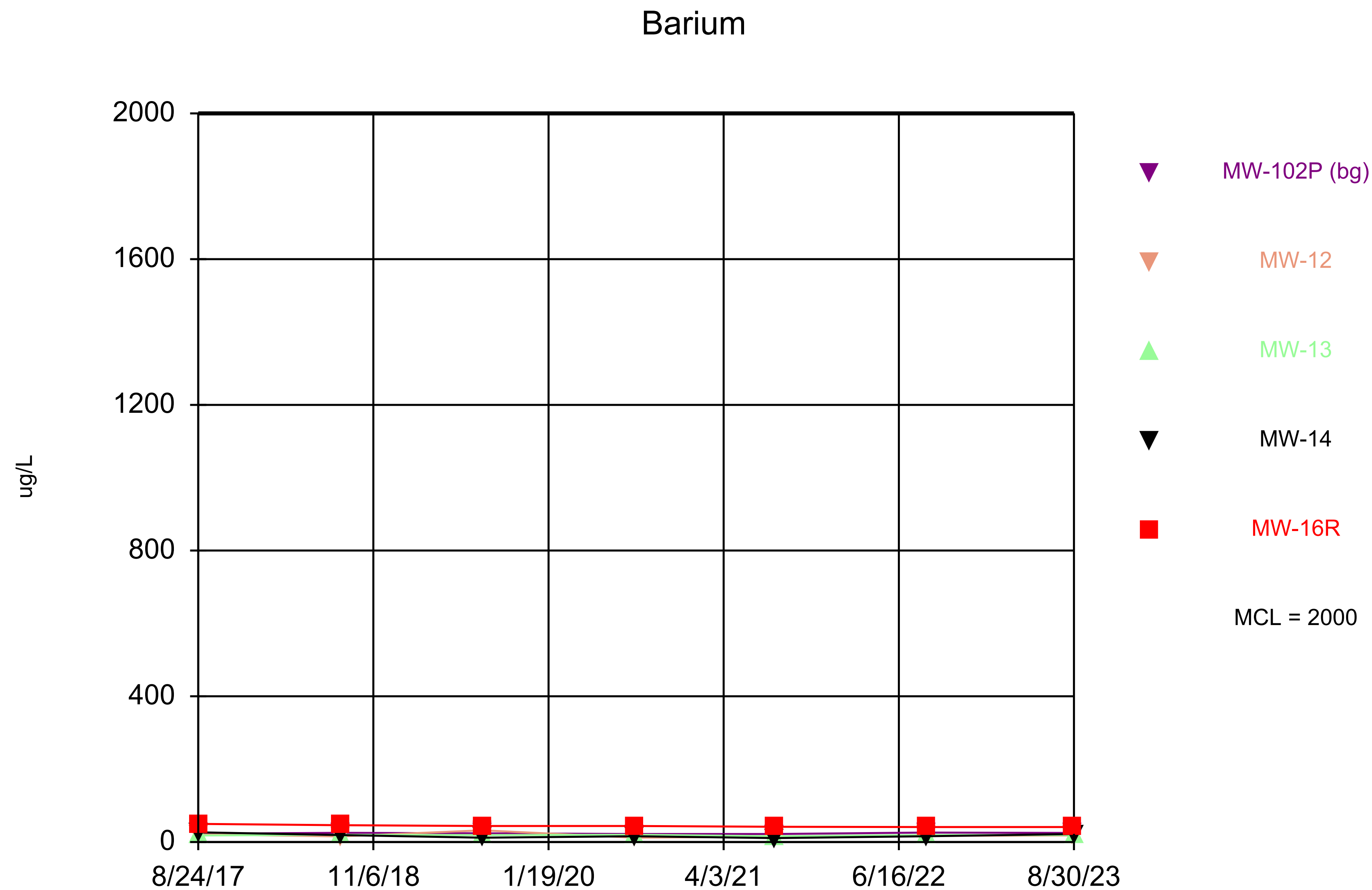
Time Series

Constituent: Arsenic (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	0.61 (J)	0.19 (J)	0.12 (J)	6.9	0.21 (J)
8/16/2018	0.66 (J)	0.27 (J)	0.16 (J)	13.7	0.35 (J)
8/7/2019	<0.75	<0.75	<0.75	21	<0.75
8/24/2020	<0.88	<0.88	<0.88	14	
8/25/2020					<0.88
8/10/2021		<0.75			
8/11/2021	<0.75		<0.75	22	<0.75
8/24/2022	<0.75 (U)	<0.75 (U)	<0.75 (U)	8.5	<0.75 (U)
8/29/2023	<0.53 (U)	<0.53 (U)			<0.53 (U)
8/30/2023			<0.53 (U)	2.6	

ND substitution: RL or RL/2 if <15% NDs.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Barium (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	22.7	21	18.2	26.8	49.7
8/16/2018	25.2	15.5	19.9	19.3	46.4
8/7/2019	24	32	19	12	44
8/24/2020	22	12	20	16	
8/25/2020					44
8/10/2021		15 (B)			
8/11/2021	22 (B)		16 (B)	11 (B)	42 (B)
8/24/2022	26	17	19	16	41
8/29/2023	25	18			41
8/30/2023			19	22	

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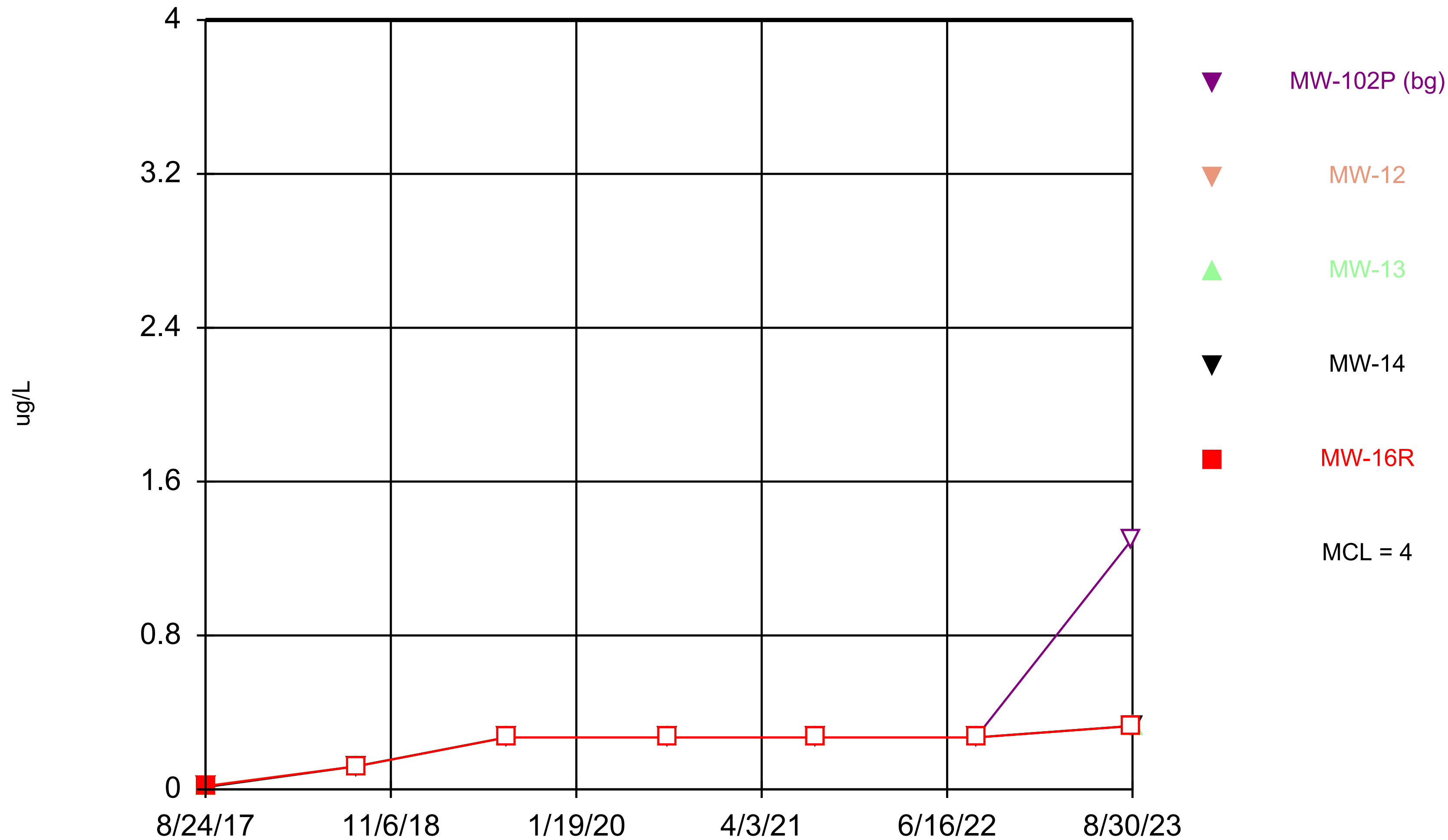
Hollow symbols indicate censored values.

Beryllium



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Beryllium (ug/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	0.013 (J)	0.019 (J)	<0.012	<0.012	0.016 (J)
8/16/2018	<0.12	<0.12	<0.12	<0.12	<0.12
8/7/2019	<0.27	<0.27	<0.27	<0.27	<0.27
8/24/2020	<0.27	<0.27	<0.27	<0.27	
8/25/2020					<0.27
8/10/2021		<0.27			
8/11/2021	<0.27		<0.27	<0.27	<0.27
8/24/2022	<0.27 (U)	<0.27 (U)	<0.27 (U)	<0.27 (U)	<0.27 (U)
8/29/2023	<1.3 (U)	<0.33 (U)			<0.33 (U)
8/30/2023			<0.33 (U)	<0.33 (U)	

ND substitution: RL or RL/2 if <15% NDs.

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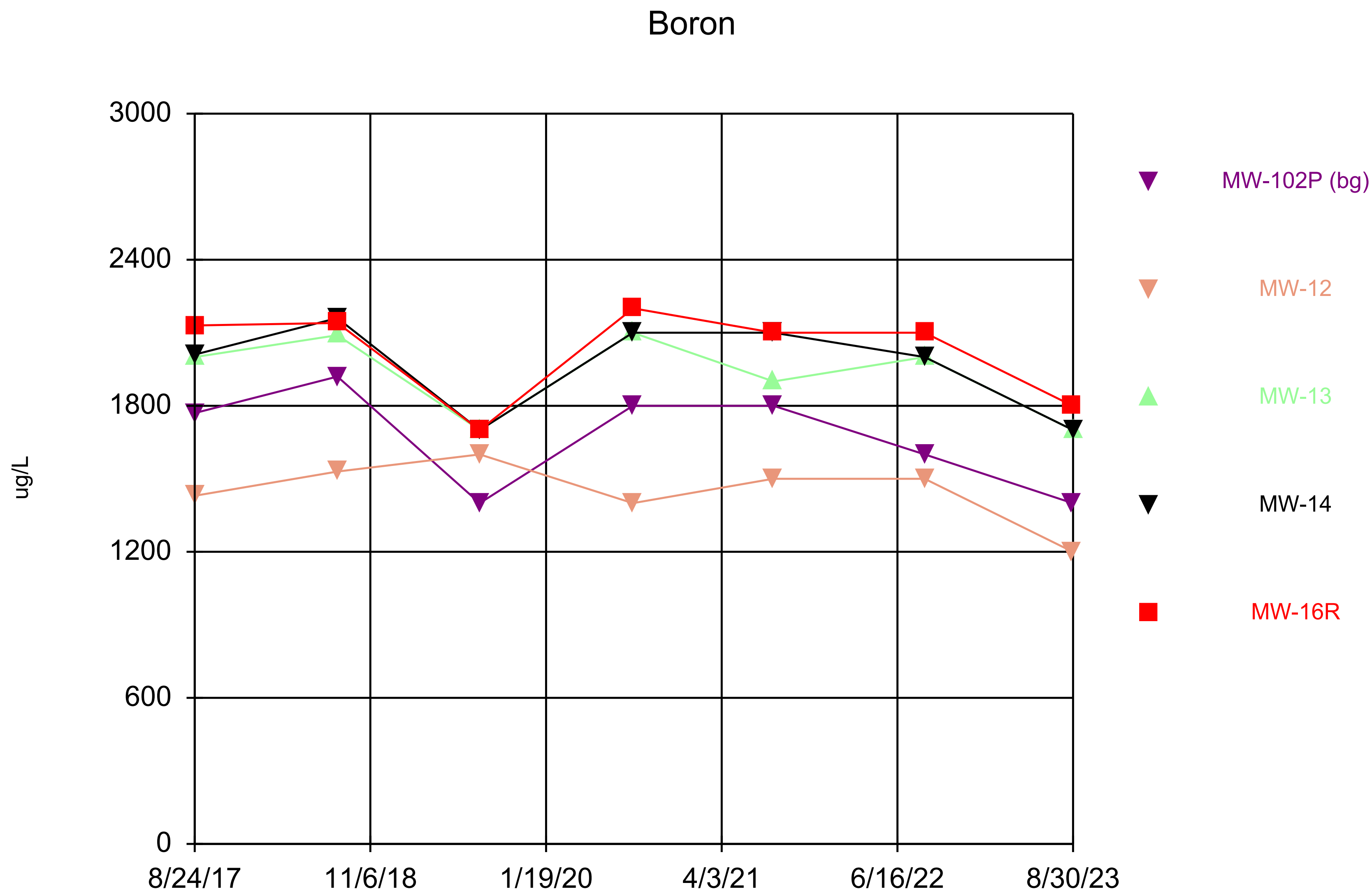

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Boron (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	1770	1430	2000	2010	2130
8/16/2018	1920	1530	2090	2160	2140
8/7/2019	1400 (B)	1600 (B)	1700 (B)	1700 (B)	1700 (B)
8/24/2020	1800	1400	2100	2100	
8/25/2020					2200
8/10/2021		1500			
8/11/2021	1800		1900	2100	2100
8/24/2022	1600	1500	2000	2000	2100
8/29/2023	1400	1200			1800
8/30/2023			1700	1700	

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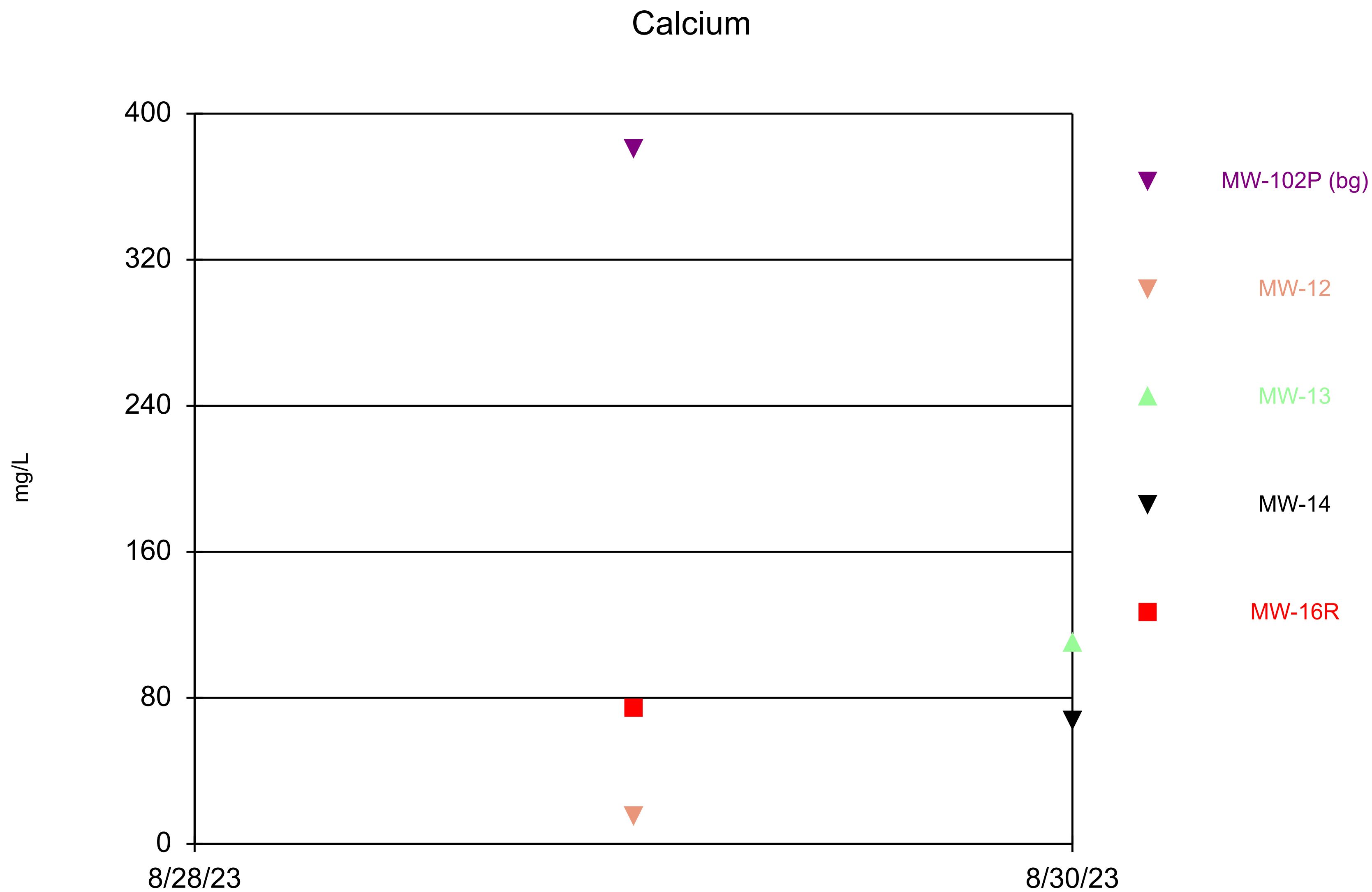

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Calcium (mg/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/29/2023	380	15			74
8/30/2023			110	67	

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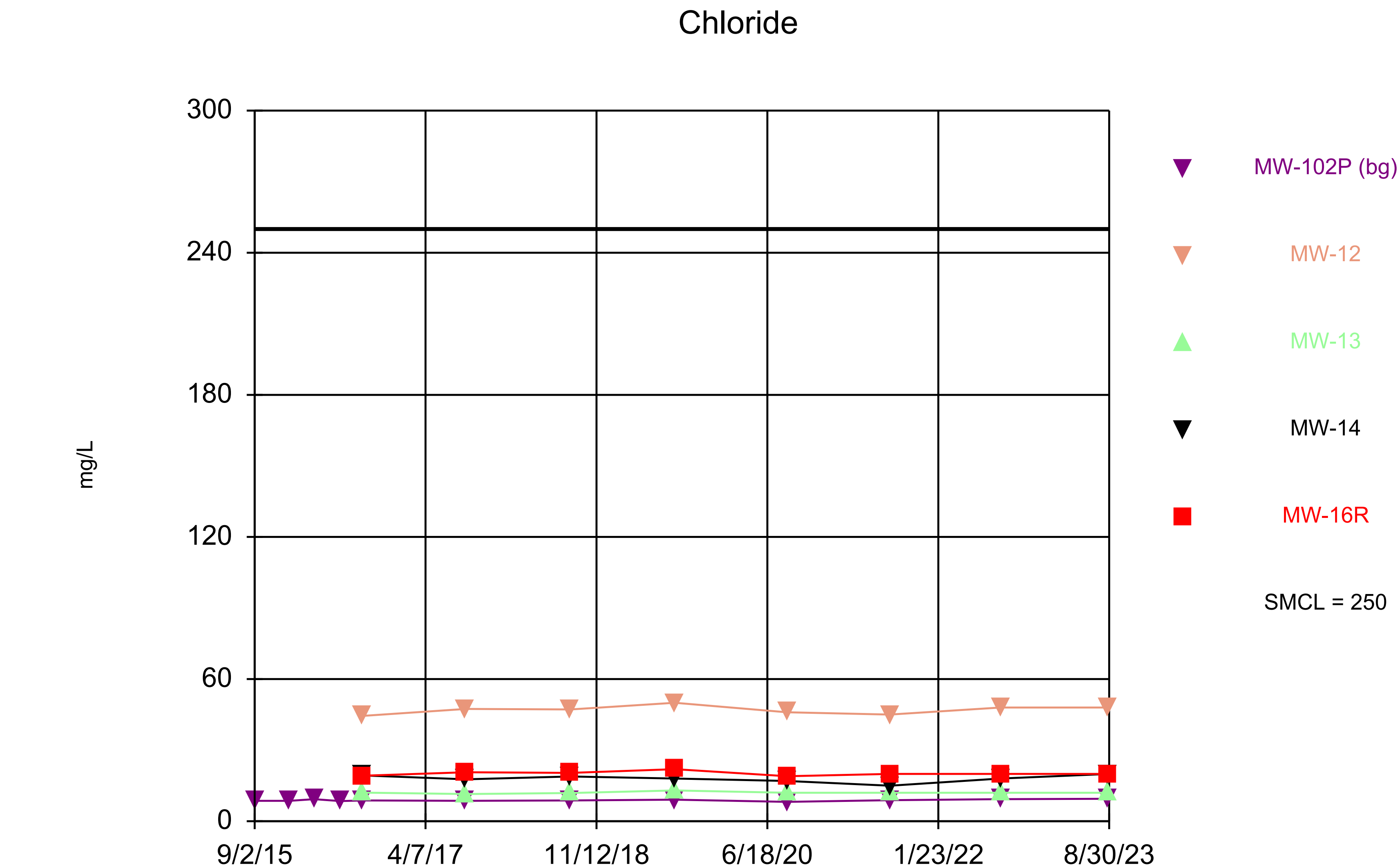

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Chloride (mg/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/2/2015	8.6				
12/30/2015	8.6				
3/23/2016	9.3				
6/21/2016	8.5				
9/7/2016	8.8	44.5	12.1	19.3	19.2
8/24/2017	8.6	47.4	11.5	17.7	20.7
8/16/2018	8.8	47.2	11.9	18.9	20.4
8/7/2019	9.1	50	13	18	22
8/24/2020	8.2	46	12	17	
8/25/2020					19
8/10/2021		45			
8/11/2021	8.9		12	15	20
8/24/2022	9.3	48	12	18	20
8/29/2023	9.5	48			20
8/30/2023			12	20	

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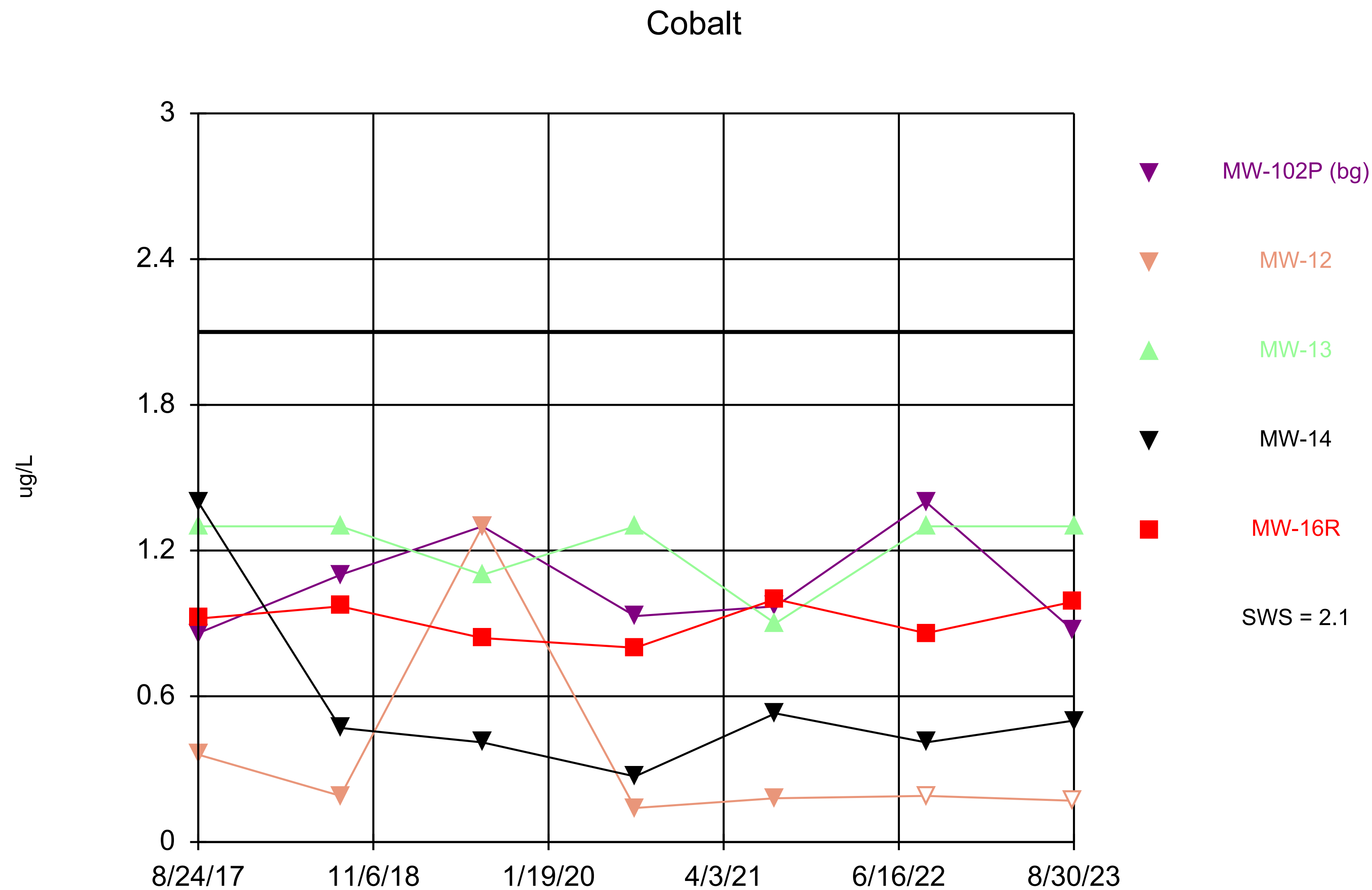
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Cobalt (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	0.86 (J)	0.36 (J)	1.3	1.4	0.92 (J)
8/16/2018	1.1	0.19 (J)	1.3	0.47 (J)	0.97 (J)
8/7/2019	1.3 (J)	1.3	1.1	0.41 (J)	0.84
8/24/2020	0.93	0.14 (J)	1.3	0.27 (J)	
8/25/2020					0.8
8/10/2021		0.18 (J)			
8/11/2021	0.97		0.9	0.53	1
8/24/2022	1.4	<0.19 (U)	1.3	0.41 (J)	0.86
8/29/2023	0.87	<0.17 (U)			0.99
8/30/2023			1.3	0.5	

ND substitution: RL or RL/2 if <15% NDs.

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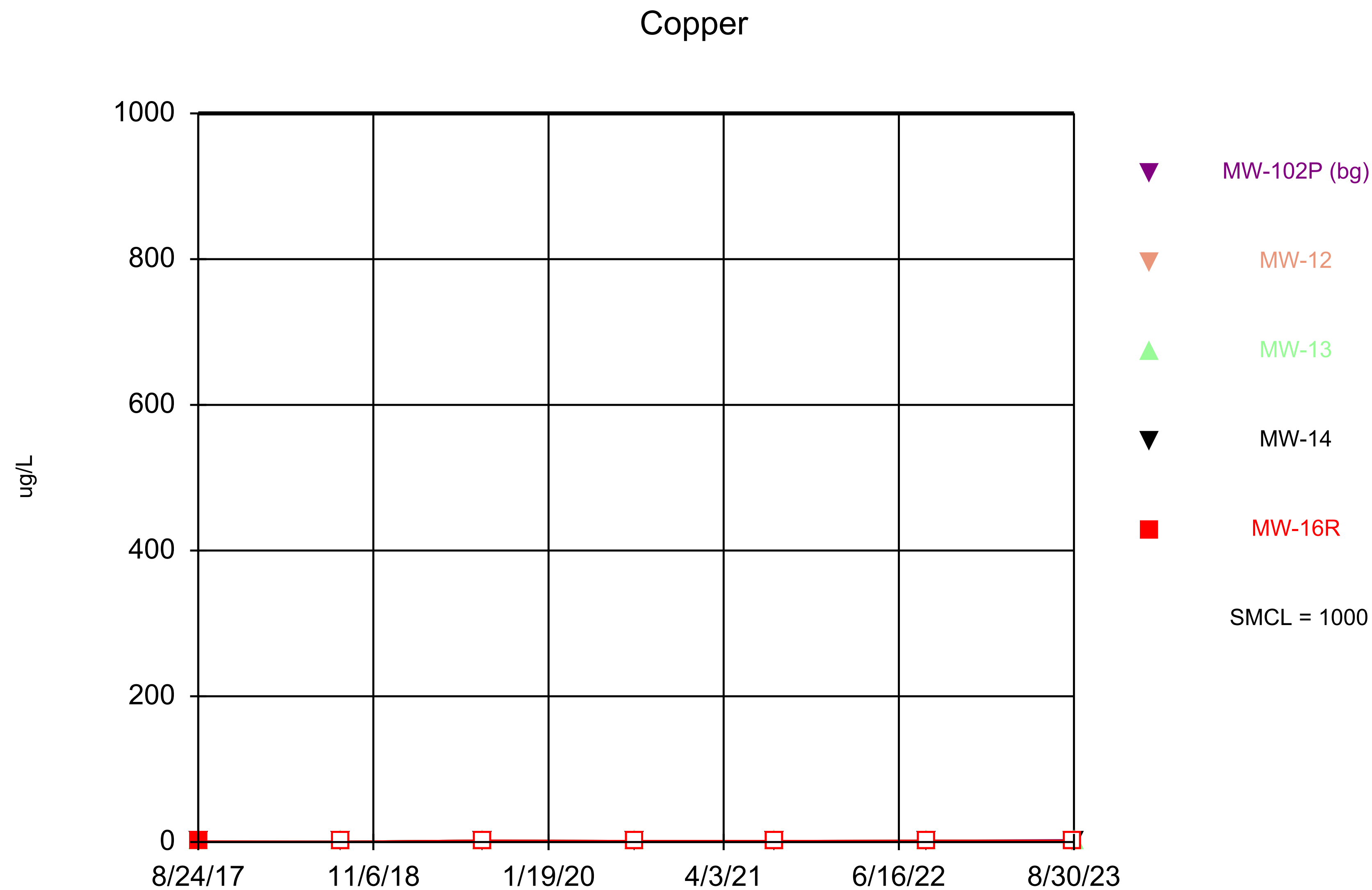
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Copper (ug/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	0.23 (J)	0.94 (J)	0.62 (J)	0.54 (J)	0.97 (J)
8/16/2018	<0.48	<0.48	<0.48	0.6 (J)	<0.48
8/7/2019	<2	<2	<2	<2	<2
8/24/2020	<1.5	<1.5	<1.5	<1.5	
8/25/2020					<1.5
8/10/2021		<1.4			
8/11/2021	<1.4		<1.4	<1.4	<1.4
8/24/2022	<1.8 (U)	<1.8 (U)	<1.8 (U)	<1.8 (U)	<1.8 (U)
8/29/2023	2.7 (J)	<1.8 (U)			<1.8 (U)
8/30/2023			<1.8 (U)	<1.8 (U)	

ND substitution: RL or RL/2 if <15% NDs.

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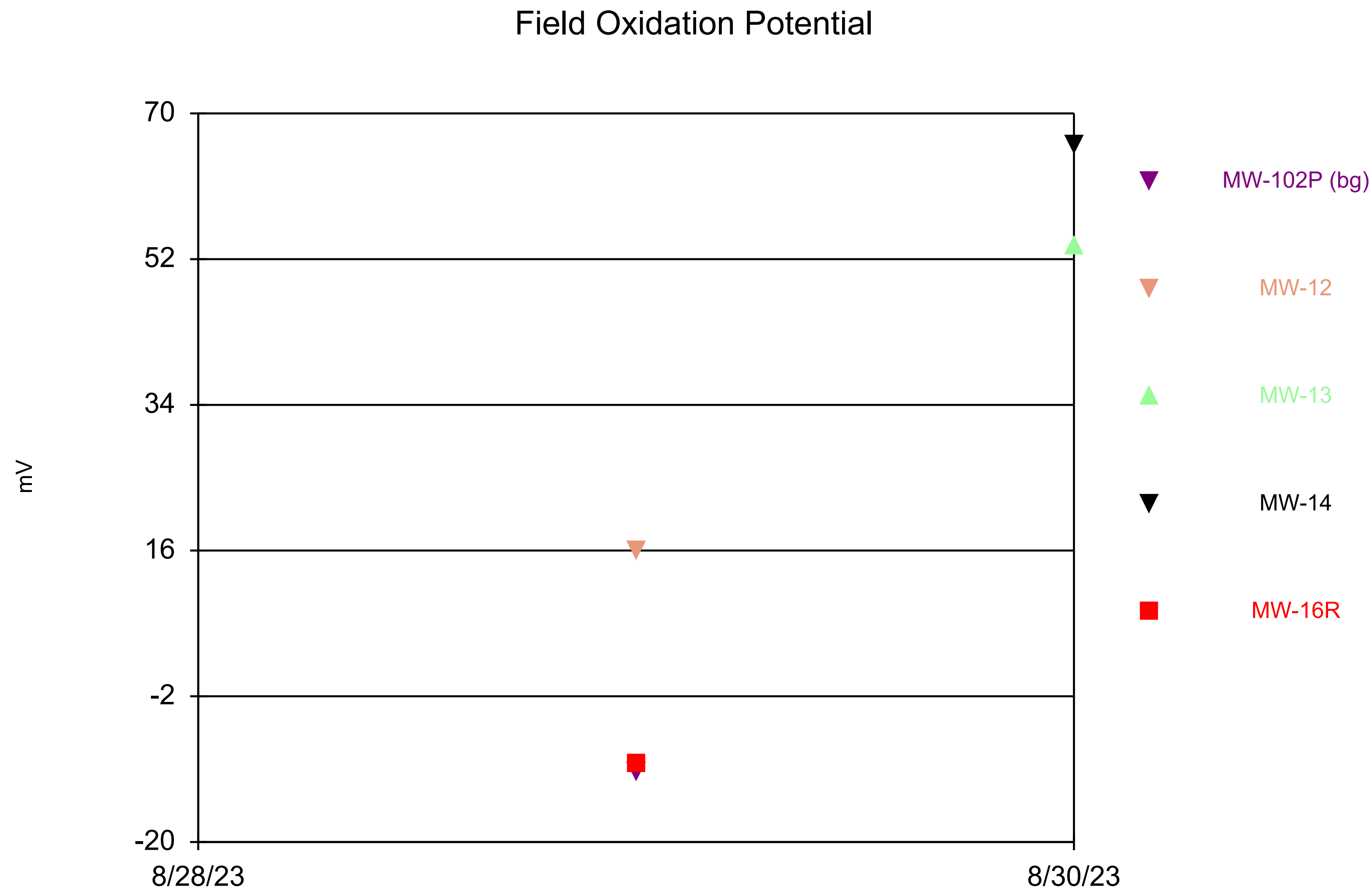


Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

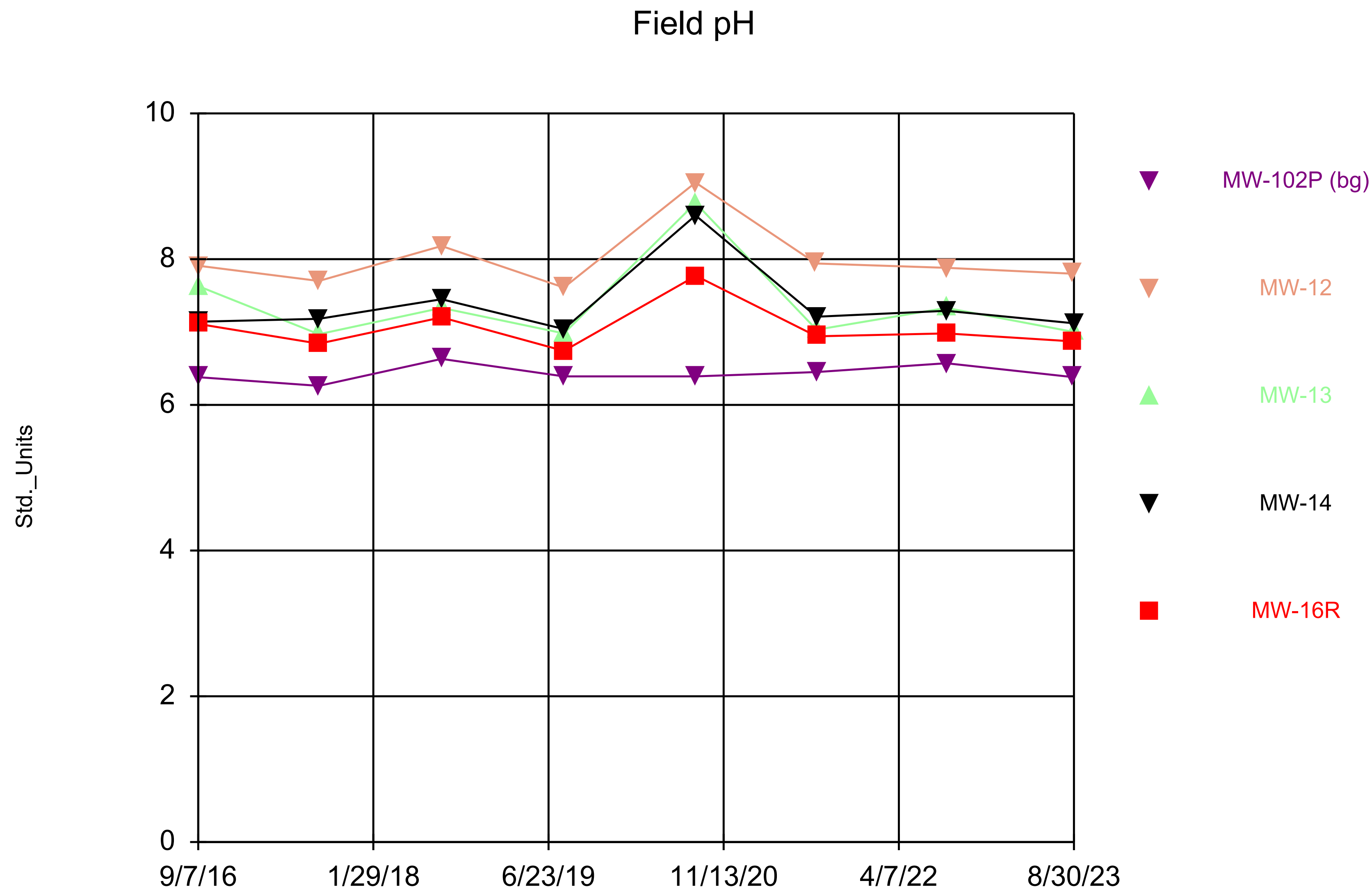
Time Series

Constituent: Field Oxidation Potential (mV) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/29/2023	-11.4	16.1			-10.4
8/30/2023			53.7	66.1	

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Field pH (Std._Units) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/7/2016	6.38	7.91	7.63	7.14	7.11
8/24/2017	6.26	7.7	6.97	7.18	6.84
8/16/2018	6.63	8.18	7.33	7.45	7.2
8/7/2019	6.39	7.61	6.98	7.04	6.74
8/24/2020	6.39	9.05	8.77	8.6	
8/25/2020					7.77
8/10/2021		7.94			
8/11/2021	6.45		7.03	7.21	6.94
8/24/2022	6.57	7.88	7.33	7.29	6.98
8/29/2023	6.38	7.8			6.87
8/30/2023			7	7.12	

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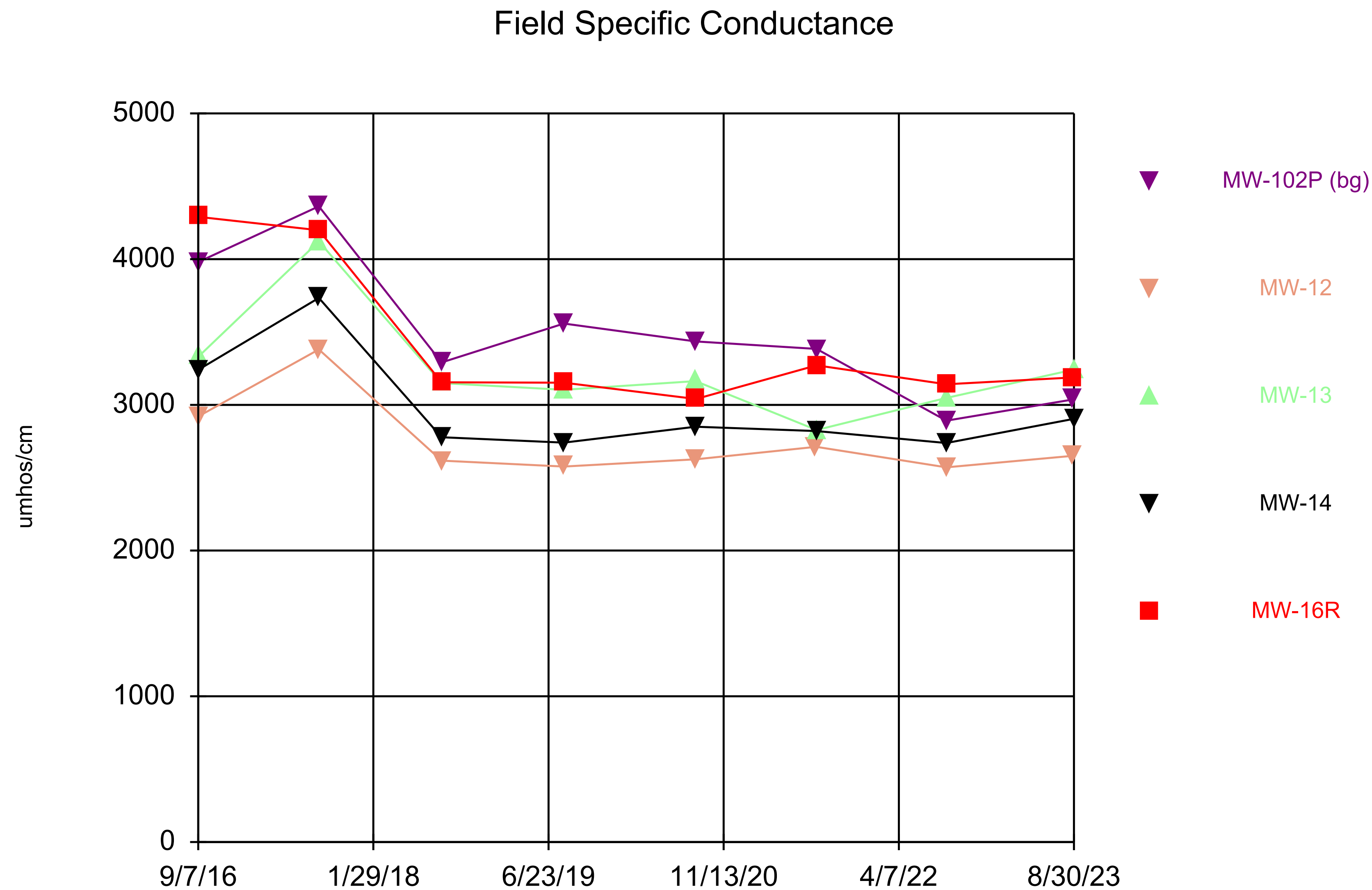

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Field Specific Conductance (umhos/cm)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/7/2016	3980	2920	3330	3240	4290
8/24/2017	4362	3380	4121	3734	4198
8/16/2018	3291	2617	3149	2778	3155
8/7/2019	3558	2577	3103	2741	3152
8/24/2020	3435	2626	3163	2850	
8/25/2020					3040
8/10/2021		2712			
8/11/2021	3384		2827	2820	3271
8/24/2022	2891	2571	3047	2738	3141
8/29/2023	3037	2651			3188
8/30/2023			3242	2904	

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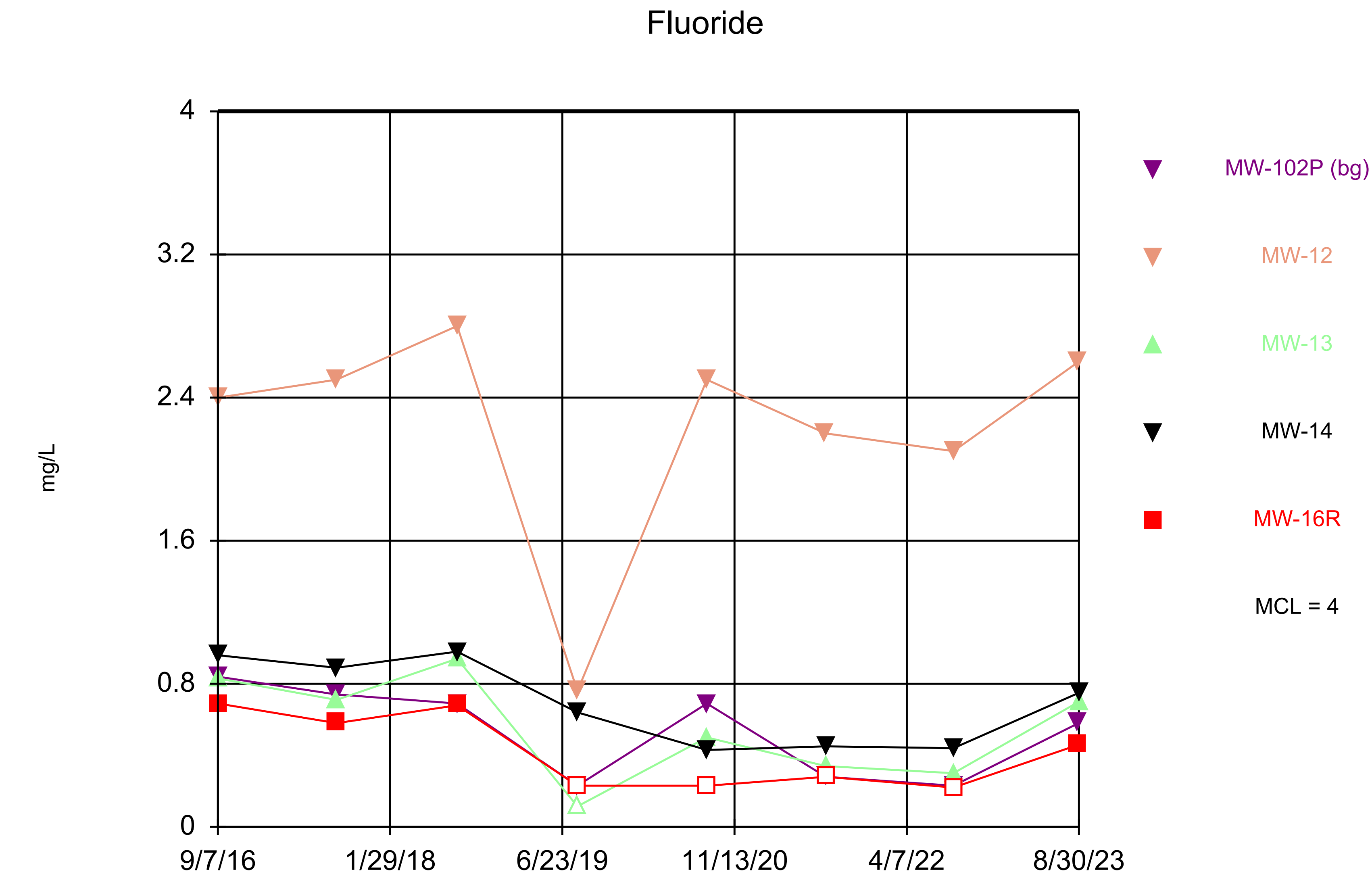
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Fluoride (mg/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/7/2016	0.84	2.4	0.83	0.96	0.69
8/24/2017	0.74	2.5	0.71	0.89	0.58
8/16/2018	0.69	2.8	0.94	0.98	0.68
8/7/2019	<0.23	0.76	<0.23	0.64	<0.23
8/24/2020	0.69	2.5	0.5	0.43 (J)	
8/25/2020					<0.23
8/10/2021		2.2			
8/11/2021	<0.28		0.34 (J)	0.45 (J)	<0.28
8/24/2022	0.23 (J)	2.1	0.3 (J)	0.44 (J)	<0.22 (U)
8/29/2023	0.58 (J)	2.6			0.46 (J)
8/30/2023			0.7 (J)	0.75 (J)	

ND substitution: RL or RL/2 if <15% NDs.

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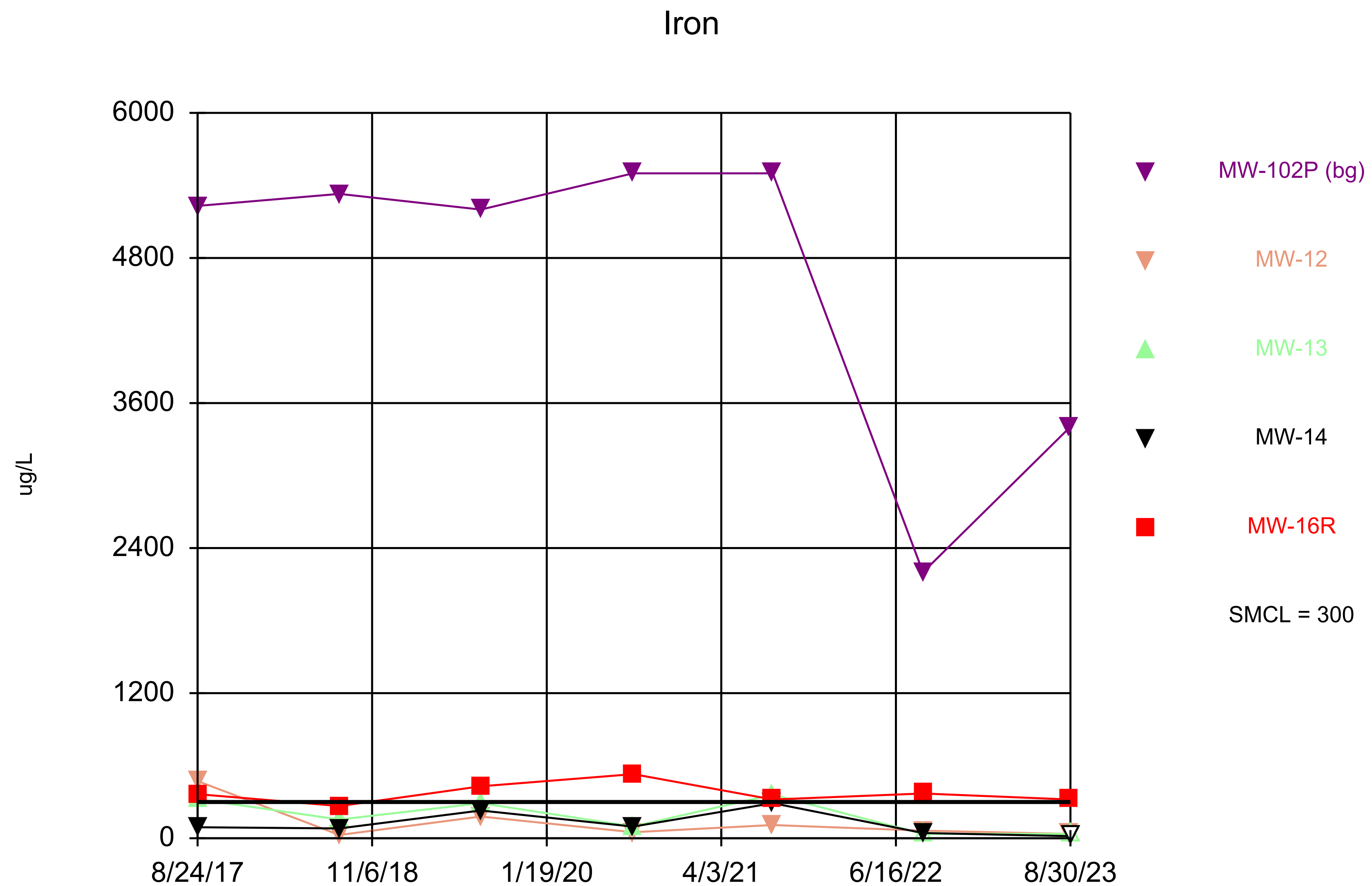
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

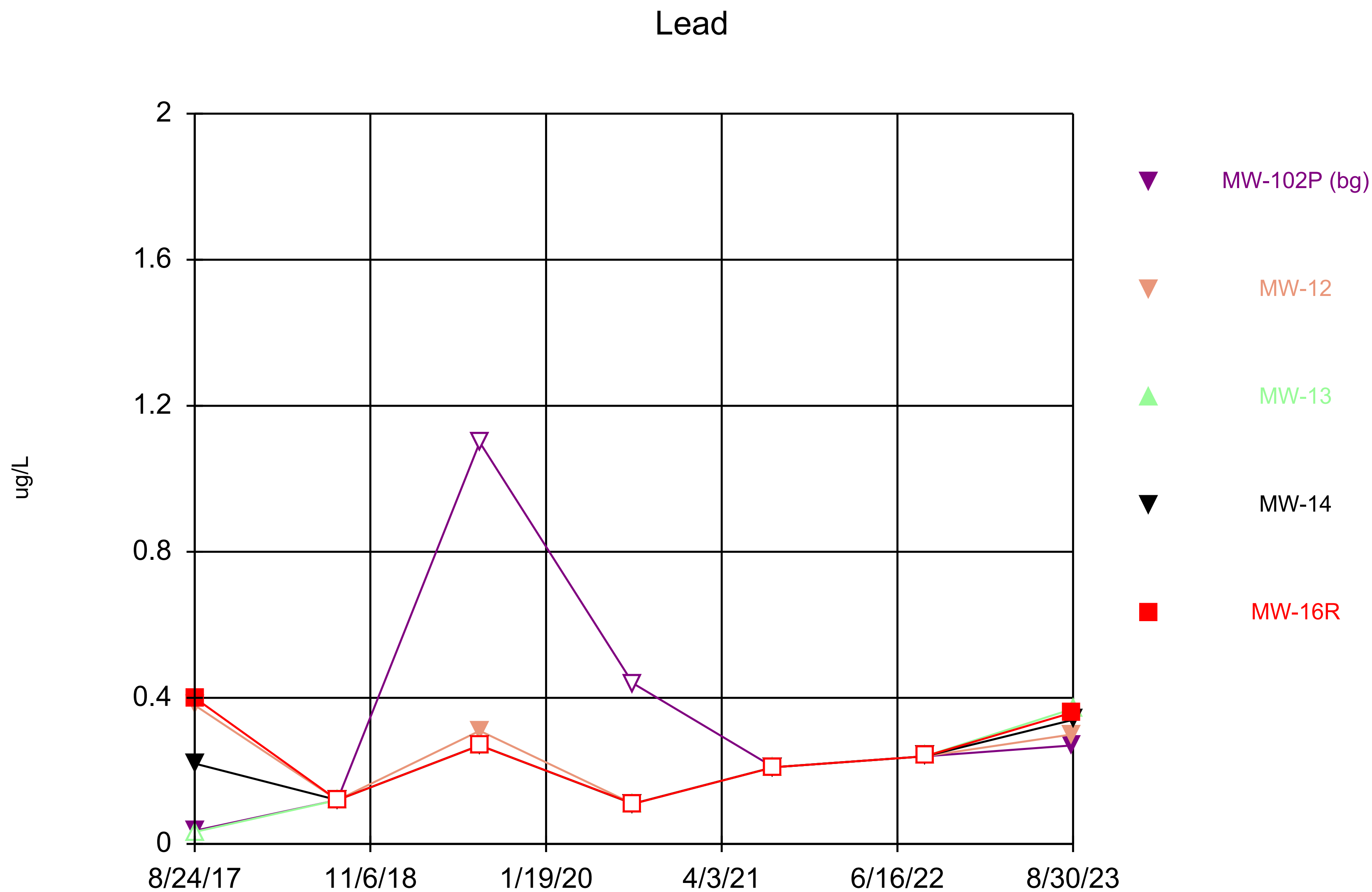
Constituent: Iron (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	5230	473	324	91.5	365
8/16/2018	5330	27.1 (J)	155	81.8	266
8/7/2019	5200	180	290	230	430
8/24/2020	5500	<50	98 (J)	97 (J)	
8/25/2020					530
8/10/2021		110			
8/11/2021	5500		360	290	320
8/24/2022	2200	63 (J)	<36 (U)	43 (J)	370
8/29/2023	3400	<36 (U)			320
8/30/2023			<36 (U)	<36 (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 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Lead (ug/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	0.036 (J)	0.38 (J)	<0.033	0.22 (J)	0.4 (J)
8/16/2018	<0.12	<0.12	<0.12	0.12 (J)	<0.12
8/7/2019	<1.1	0.31 (J)	<0.27	<0.27	<0.27
8/24/2020	<0.44	<0.11	<0.11	<0.11	
8/25/2020					<0.11
8/10/2021		0.21 (J)			
8/11/2021	<0.21		<0.21	<0.21	<0.21
8/24/2022	<0.24 (U)	<0.24 (U)	<0.24 (U)	<0.24 (U)	<0.24 (U)
8/29/2023	0.27 (JB)	0.3 (JB)			0.36 (JB)
8/30/2023			0.37 (JB)	0.34 (JB)	

ND substitution: RL or RL/2 if <15% NDs.

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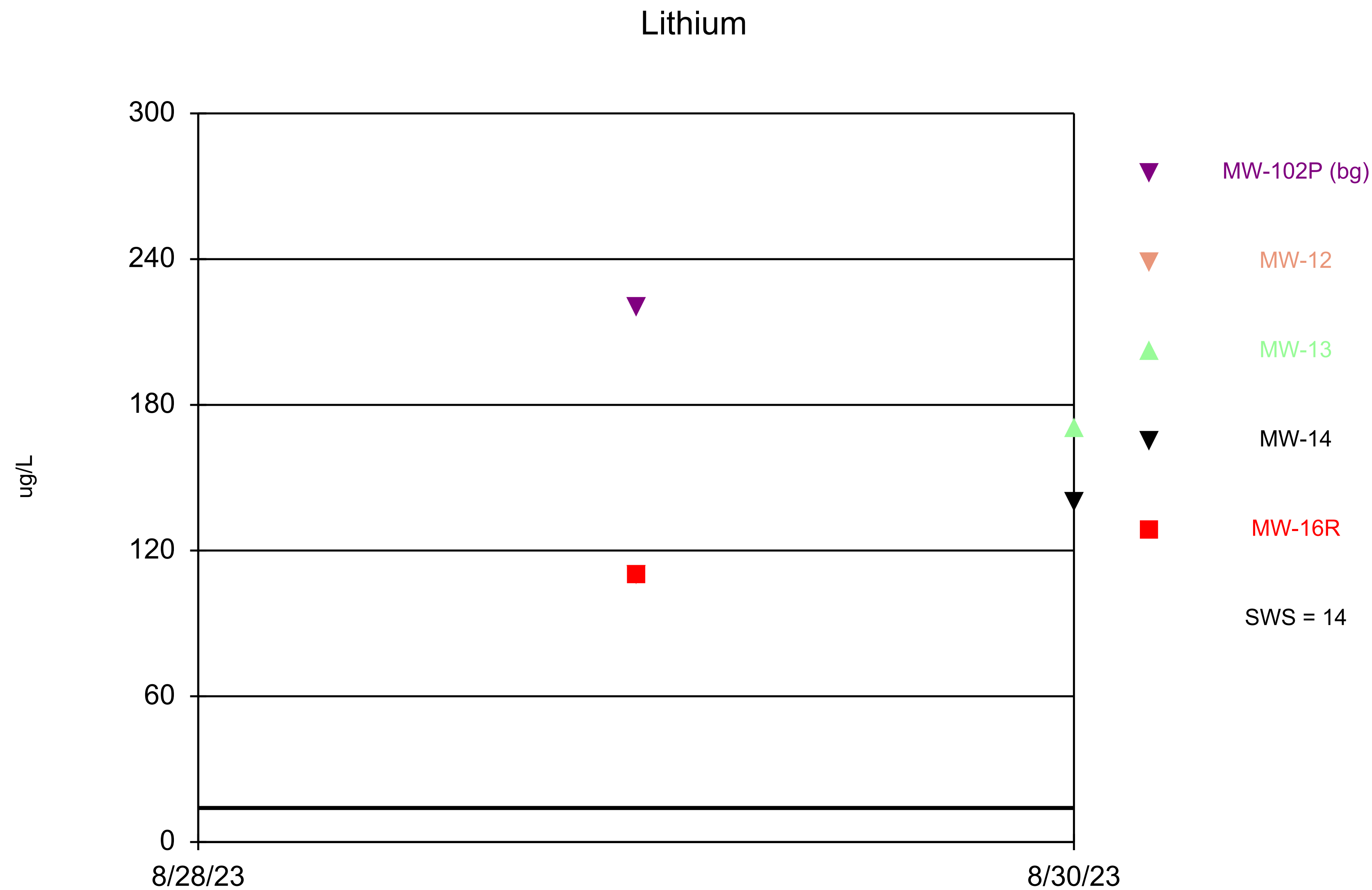

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Lithium (ug/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/29/2023	220	110			110
8/30/2023			170	140	

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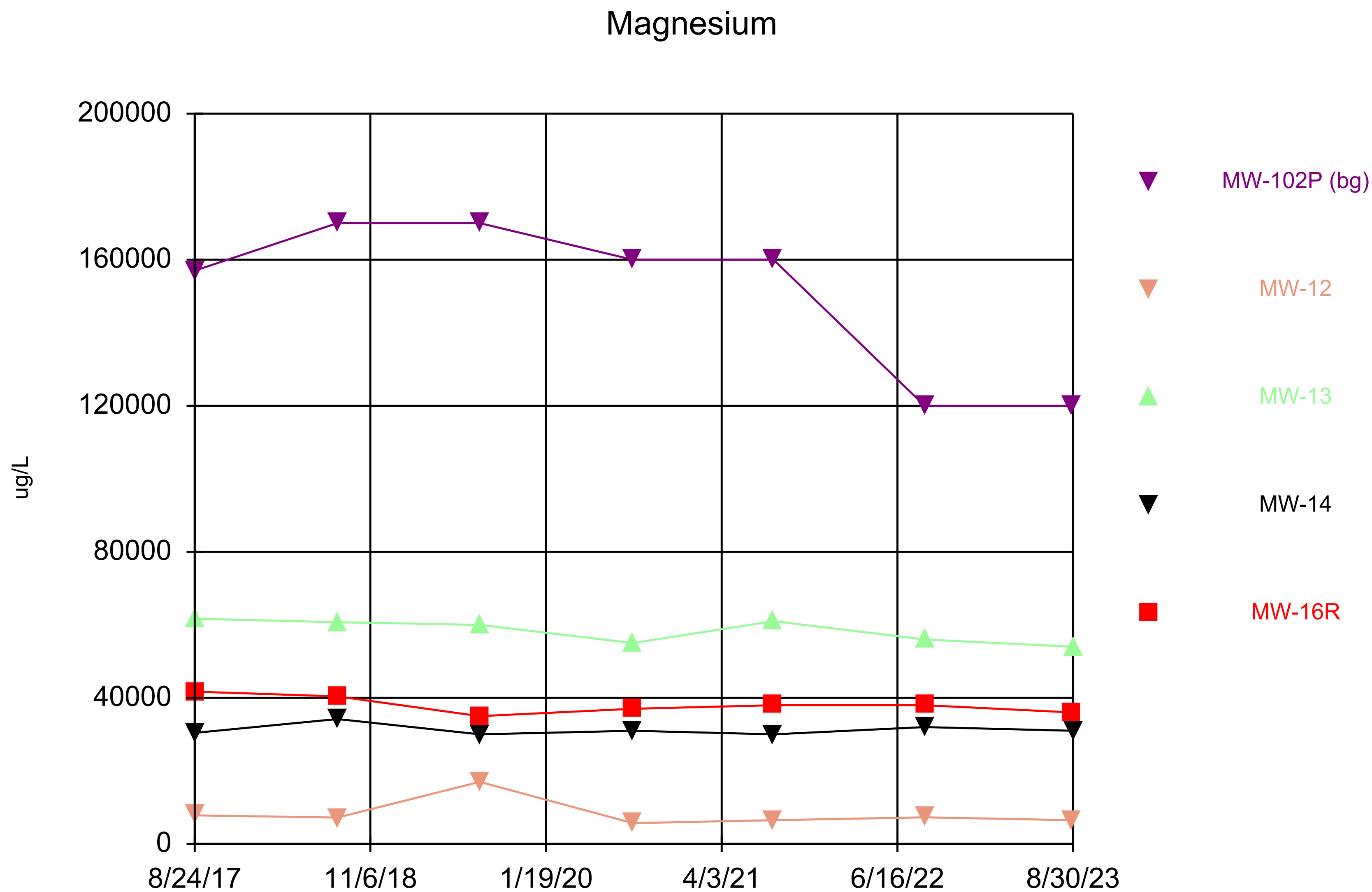

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Magnesium (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	157000	7830	61700	30400	41700
8/16/2018	170000	7230	60700	34200	40400
8/7/2019	170000	17000	60000	30000	35000
8/24/2020	160000	5700	55000	31000	
8/25/2020					37000
8/10/2021		6500			
8/11/2021	160000		61000	30000	38000
8/24/2022	120000	7300	56000	32000	38000
8/29/2023	120000	6500			36000
8/30/2023			54000	31000	

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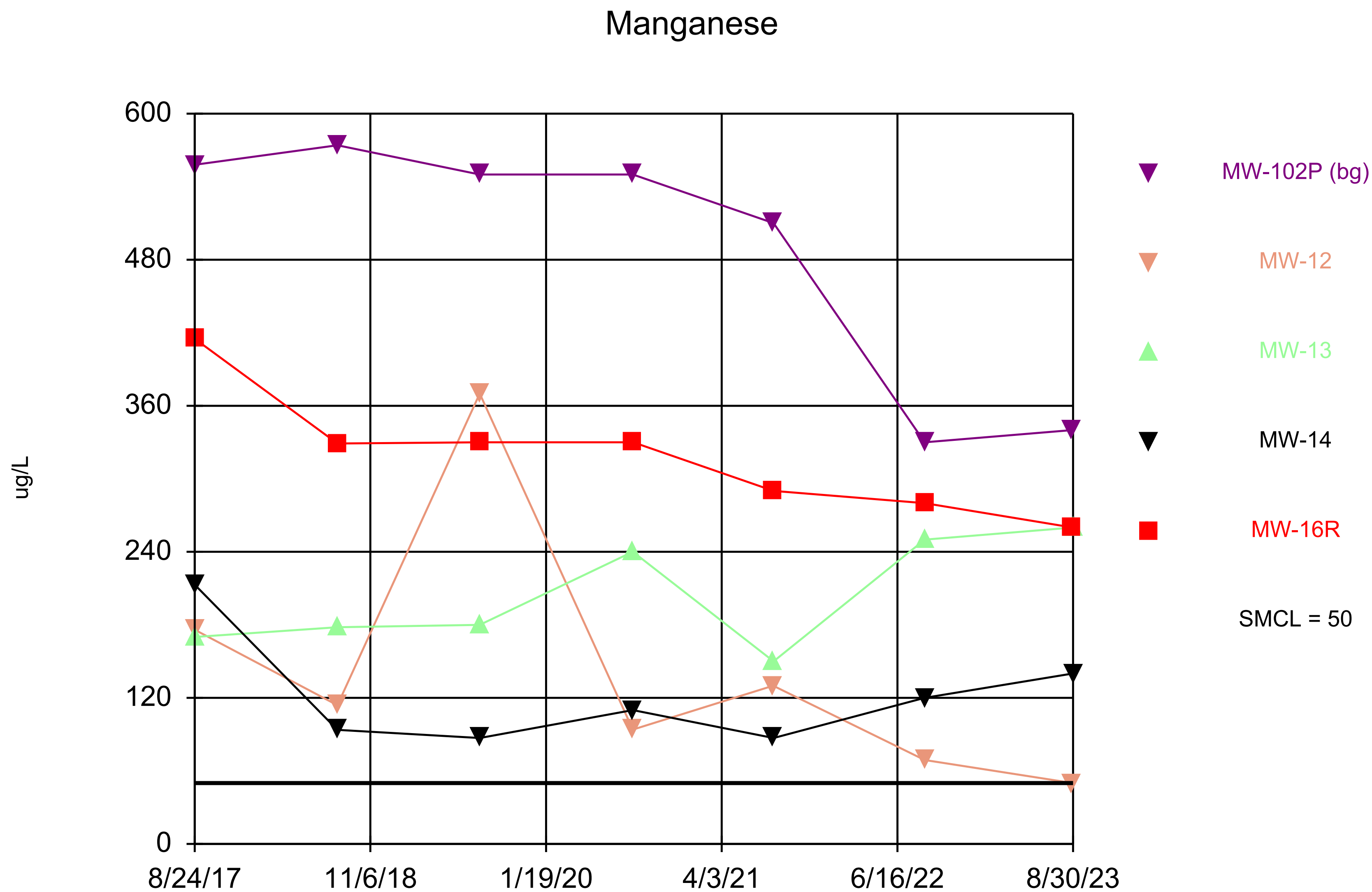

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Manganese (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	558	176	170	213	415
8/16/2018	574	114	178	93.7	329
8/7/2019	550	370	180	87	330
8/24/2020	550	94	240	110	
8/25/2020					330
8/10/2021		130			
8/11/2021	510		150	87	290
8/24/2022	330	69	250	120	280
8/29/2023	340	50			260
8/30/2023			260	140	

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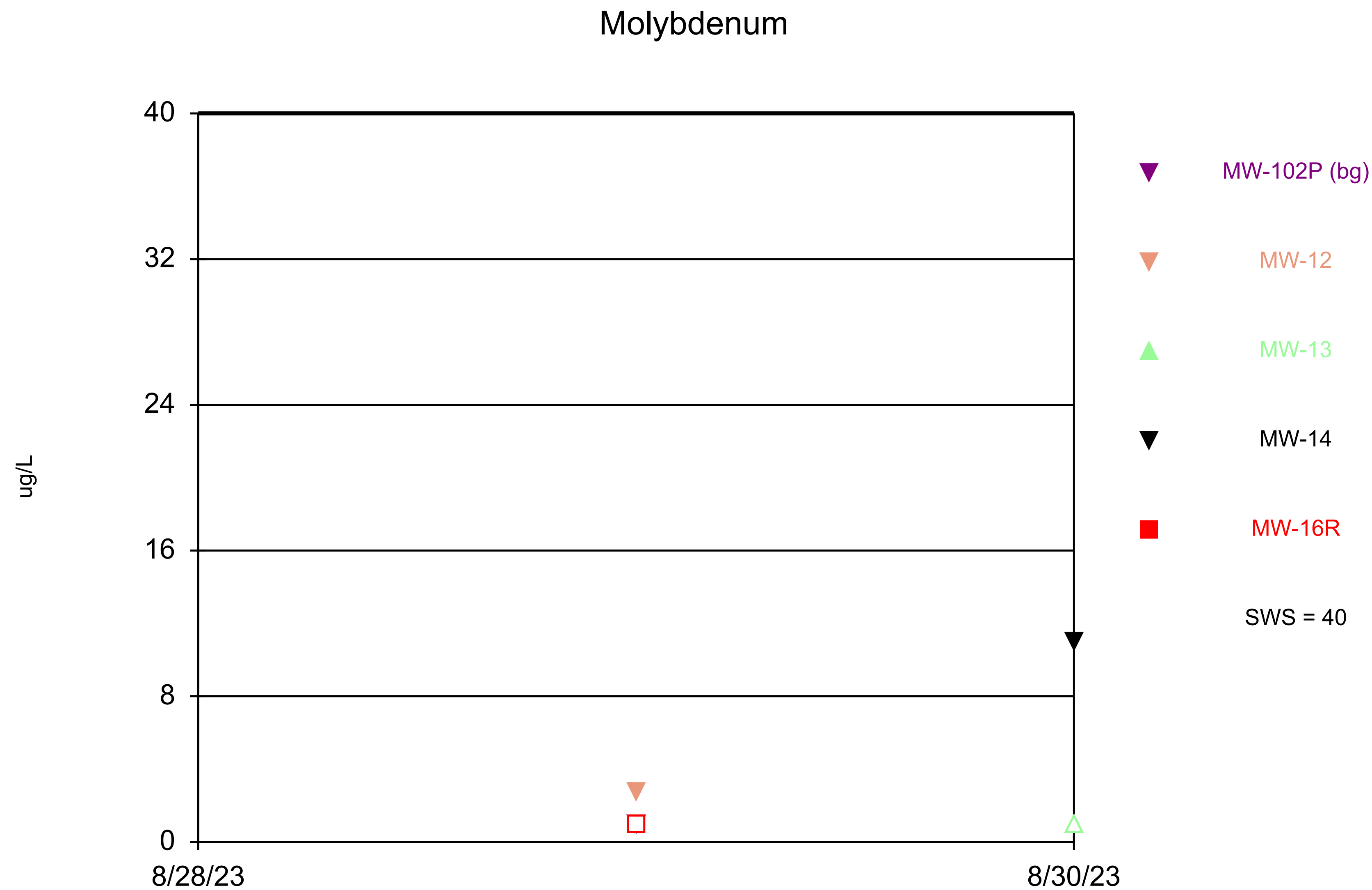
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Molybdenum (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/29/2023	<0.91 (U)	2.7			<0.91 (U)
8/30/2023			<0.91 (U)	11	

ND substitution: RL or RL/2 if <15% NDs.

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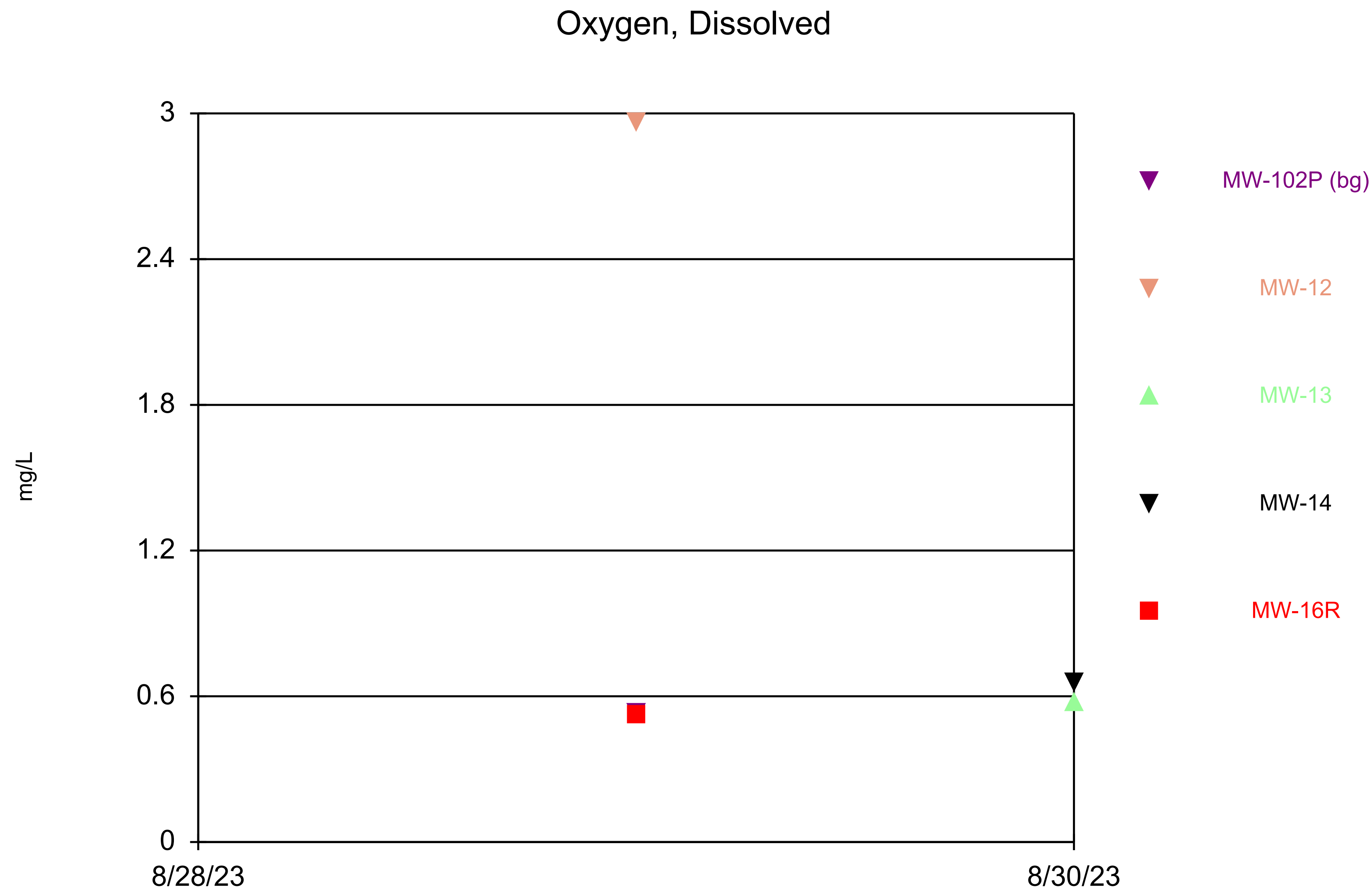


Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

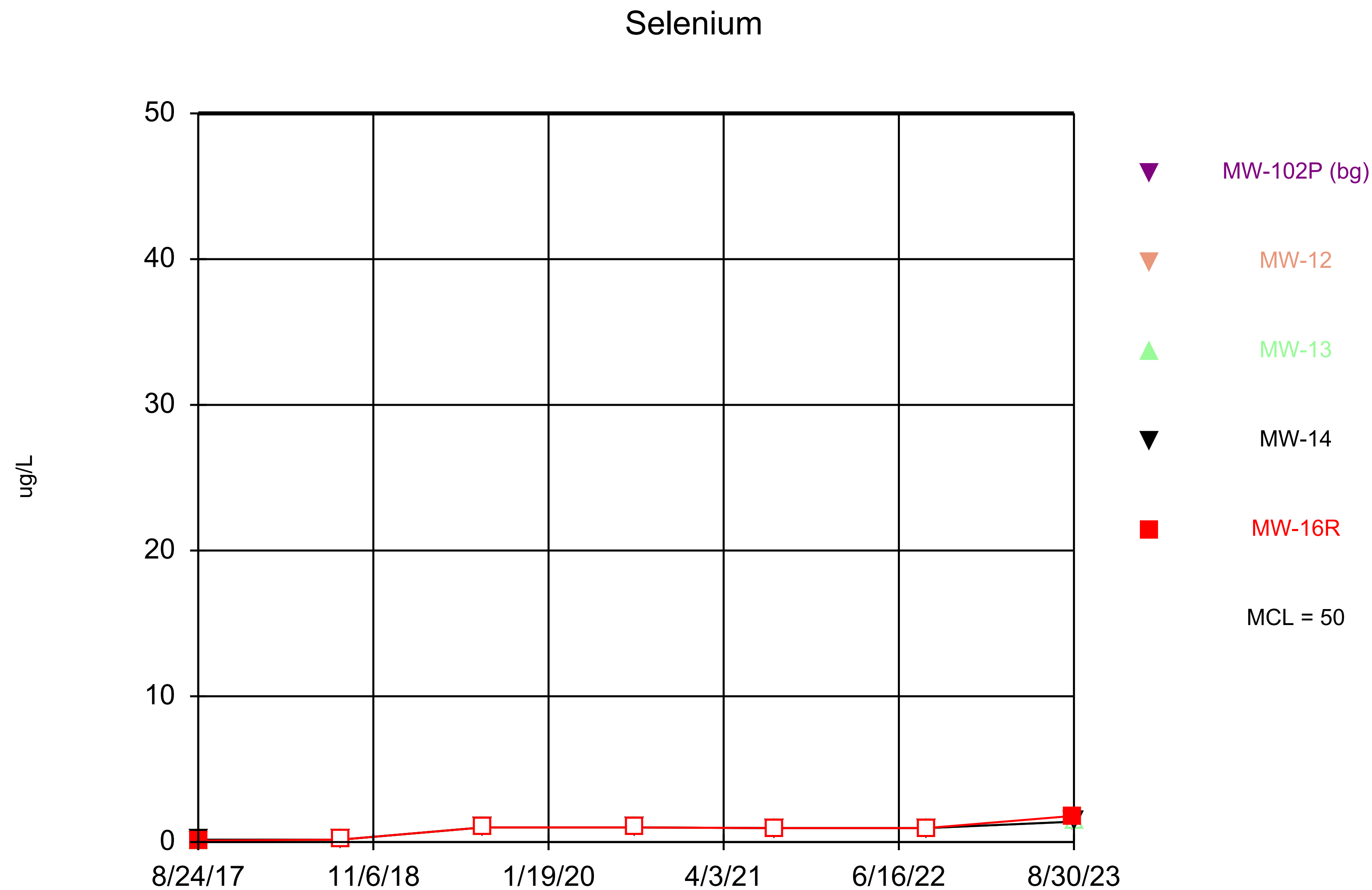
Time Series

Constituent: Oxygen, Dissolved (mg/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/29/2023	0.53	2.96			0.52
8/30/2023			0.57	0.66	

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Selenium (ug/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	<0.086	<0.086	<0.086	0.16 (J)	0.099 (J)
8/16/2018	<0.16	<0.16	<0.16	<0.16	<0.16
8/7/2019	<1	<1	<1	<1	<1
8/24/2020	<1	<1	<1	<1	
8/25/2020					<1
8/10/2021		<0.96			
8/11/2021	<0.96		<0.96	<0.96	<0.96
8/24/2022	<0.96 (U)	<0.96 (U)	<0.96 (U)	<0.96 (U)	<0.96 (U)
8/29/2023	<1.4 (U)	1.4 (J)			1.8 (J)
8/30/2023			<1.4 (U)	<1.4 (U)	

ND substitution: RL or RL/2 if <15% NDs.

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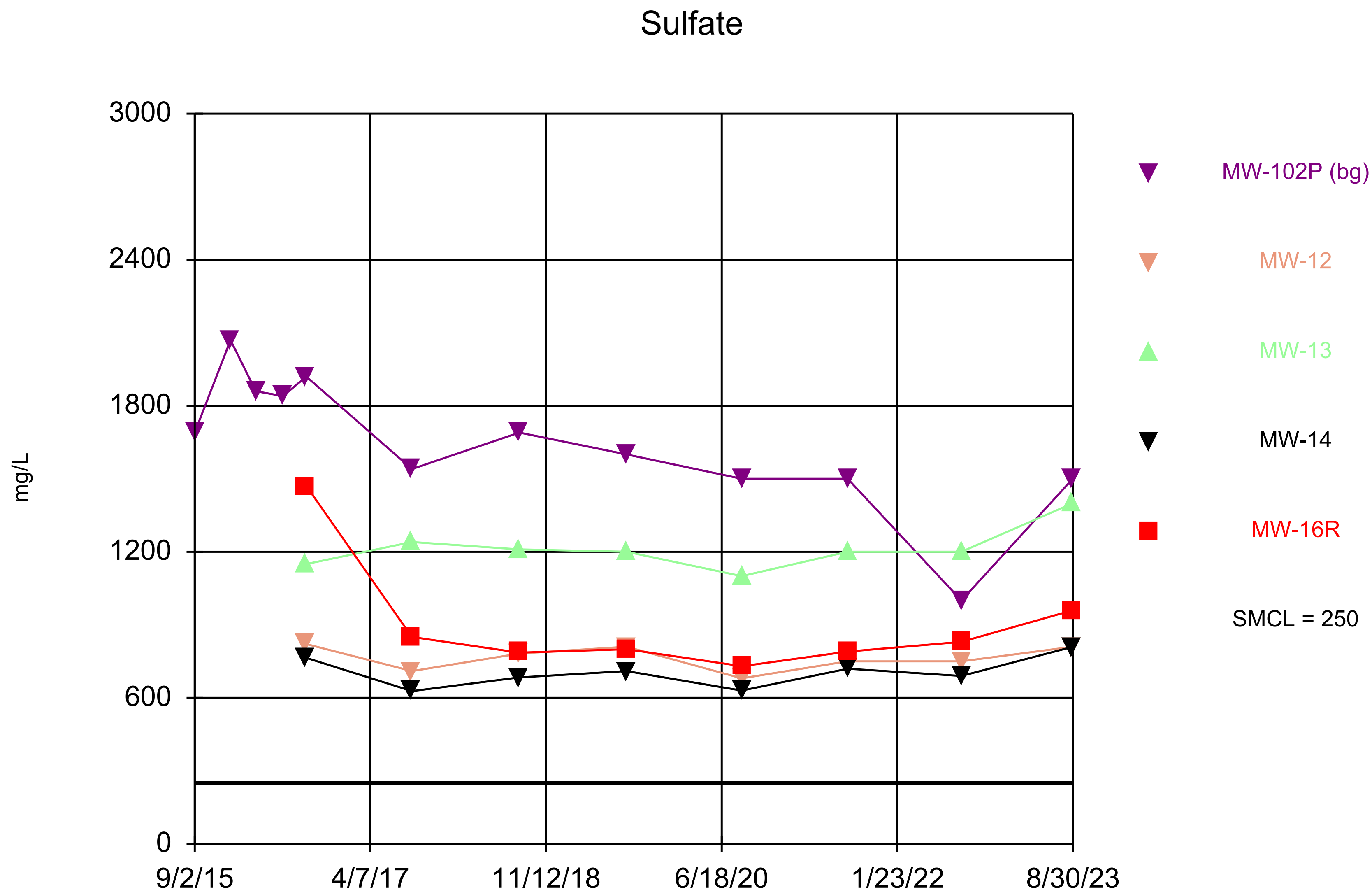

Time Series Analysis Run 10/9/2023 3:37 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Sulfate (mg/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/2/2015	1690				
12/30/2015	2070				
3/23/2016	1860				
6/21/2016	1840				
9/7/2016	1920	821	1150	764	1470
8/24/2017	1540	710	1240	628	850
8/16/2018	1690	782	1210	684	786
8/7/2019	1600	810	1200	710	800
8/24/2020	1500	680	1100	630	
8/25/2020					730
8/10/2021		750			
8/11/2021	1500		1200	720	790
8/24/2022	1000	750	1200	690	830
8/29/2023	1500	810			960
8/30/2023			1400	810	

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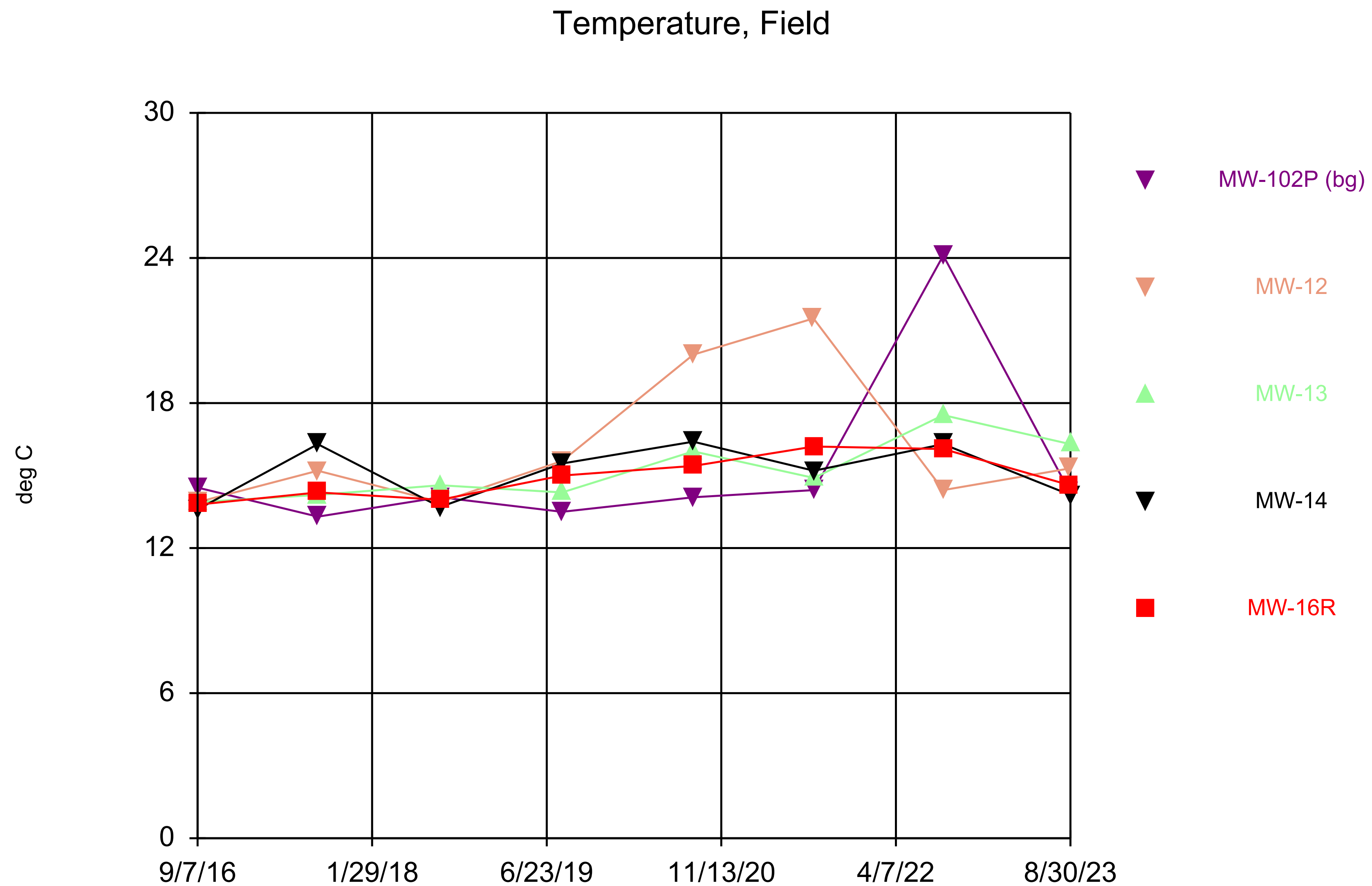

Time Series Analysis Run 10/9/2023 3:38 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Temperature, Field (deg C) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/7/2016	14.5	13.9	13.9	13.6	13.8
8/24/2017	13.3	15.2	14.2	16.3	14.3
8/16/2018	14.1	13.9	14.6	13.7	14
8/7/2019	13.5	15.6	14.3	15.5	15
8/24/2020	14.1	20	16	16.4	
8/25/2020					15.4
8/10/2021		21.5			
8/11/2021	14.4		14.9	15.2	16.2
8/24/2022	24.1	14.4	17.5	16.3	16.1
8/29/2023	14.3	15.3			14.6
8/30/2023			16.3	14.2	

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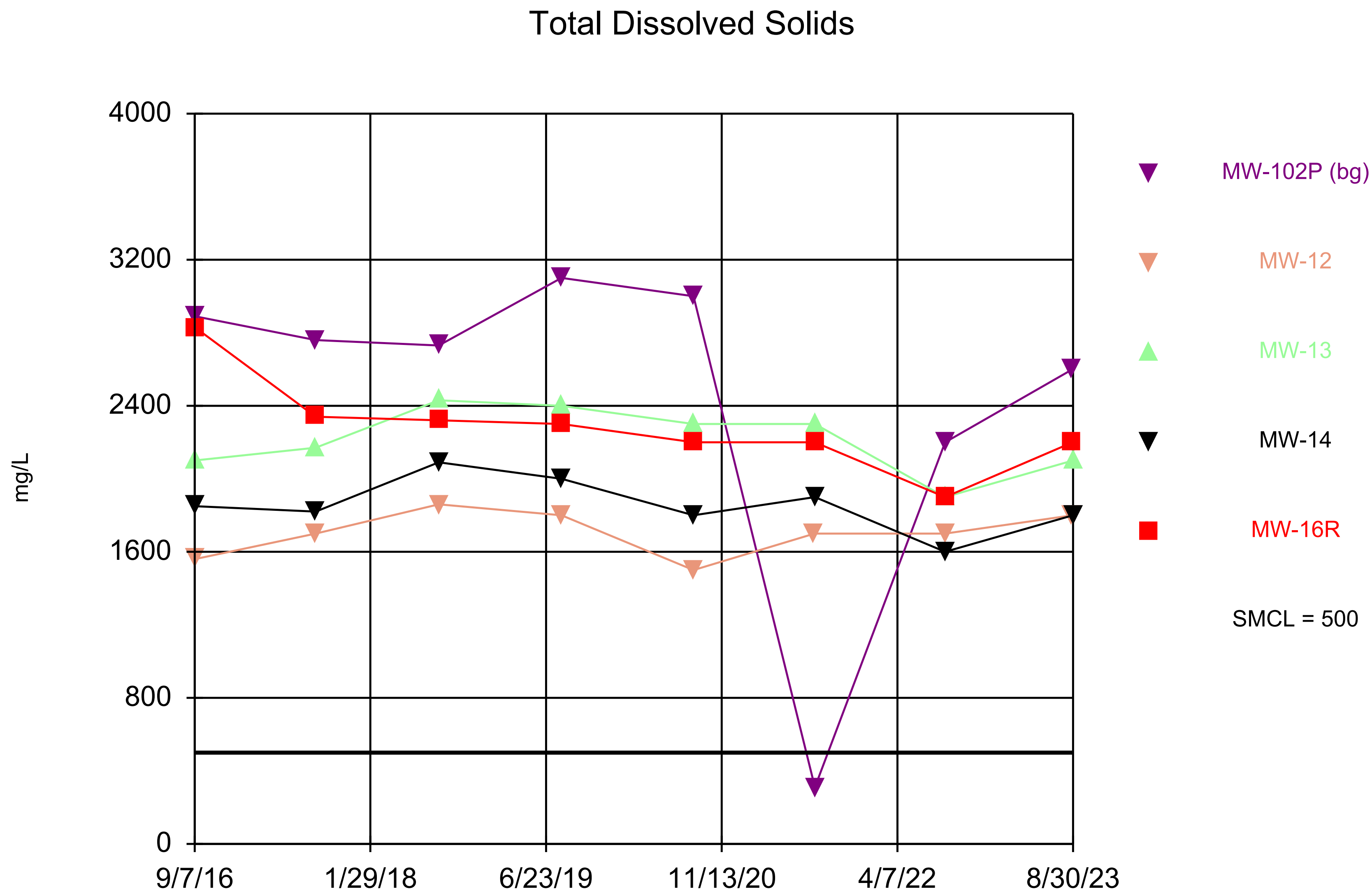

Time Series Analysis Run 10/9/2023 3:38 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
9/7/2016	2890	1560	2100	1850	2830
8/24/2017	2760	1700	2170	1820	2340
8/16/2018	2730	1860	2430	2090	2320
8/7/2019	3100	1800	2400	2000	2300
8/24/2020	3000	1500	2300	1800	
8/25/2020					2200
8/10/2021		1700			
8/11/2021	310 (X)		2300	1900	2200
8/24/2022	2200	1700	1900	1600	1900
8/29/2023	2600	1800			2200
8/30/2023			2100	1800	

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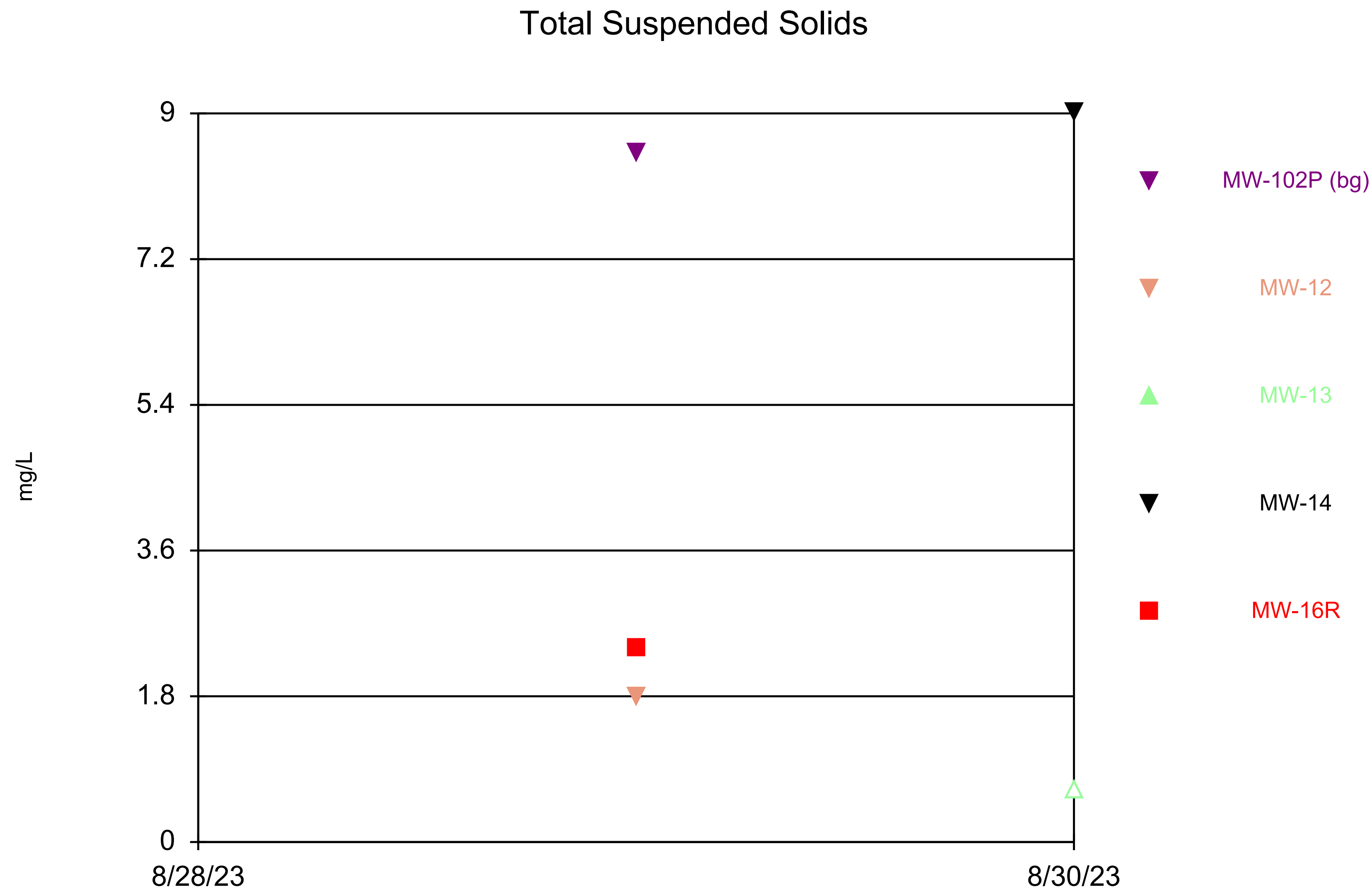
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:38 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Total Suspended Solids (mg/L)   Analysis Run 10/9/2023 4:04 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/29/2023	8.5	1.8 (J)			2.4
8/30/2023			<0.64 (U)	9	

ND substitution: RL or RL/2 if <15% NDs.

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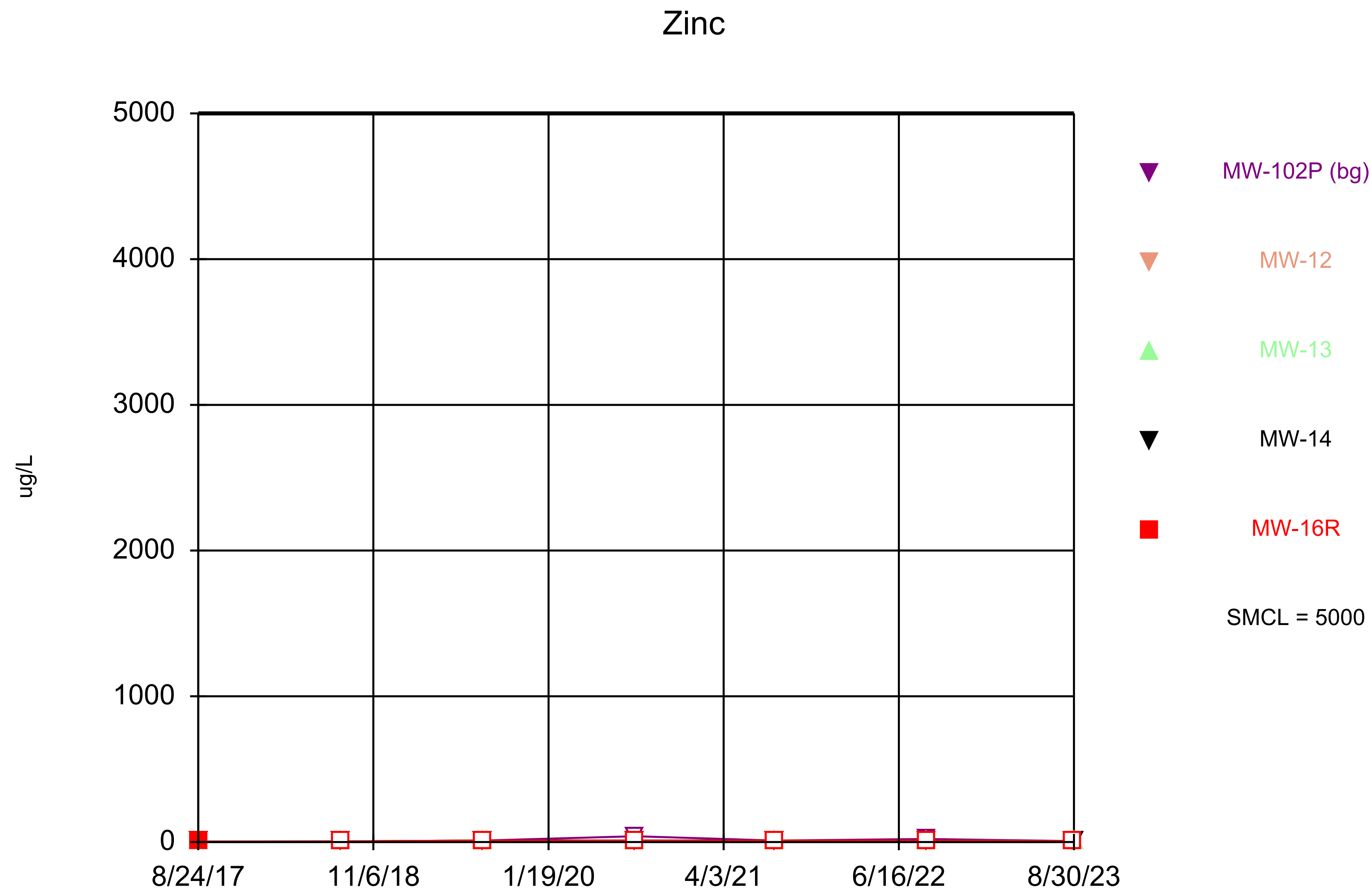
Hollow symbols indicate censored values.



Time Series Analysis Run 10/9/2023 3:38 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Time Series

Constituent: Zinc (ug/L) Analysis Run 10/9/2023 4:04 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-12	MW-13	MW-14	MW-16R
8/24/2017	3.6 (J)	3.7 (J)	2 (J)	1.7 (J)	1 (J)
8/16/2018	4.3 (J)	<3.7	<3.7	<3.7	<3.7
8/7/2019	<10	<10	<10	<10	<10
8/24/2020	<40	<10	<10	<10	
8/25/2020					<10
8/10/2021		<10			
8/11/2021	<10		<10	<10	<10
8/24/2022	21	<10 (U)	<10 (U)	<10 (U)	<10 (U)
8/29/2023	6.9 (J)	<6.4 (U)			<6.4 (U)
8/30/2023			<6.4 (U)	<6.4 (U)	

ND substitution: RL or RL/2 if <15% NDs.

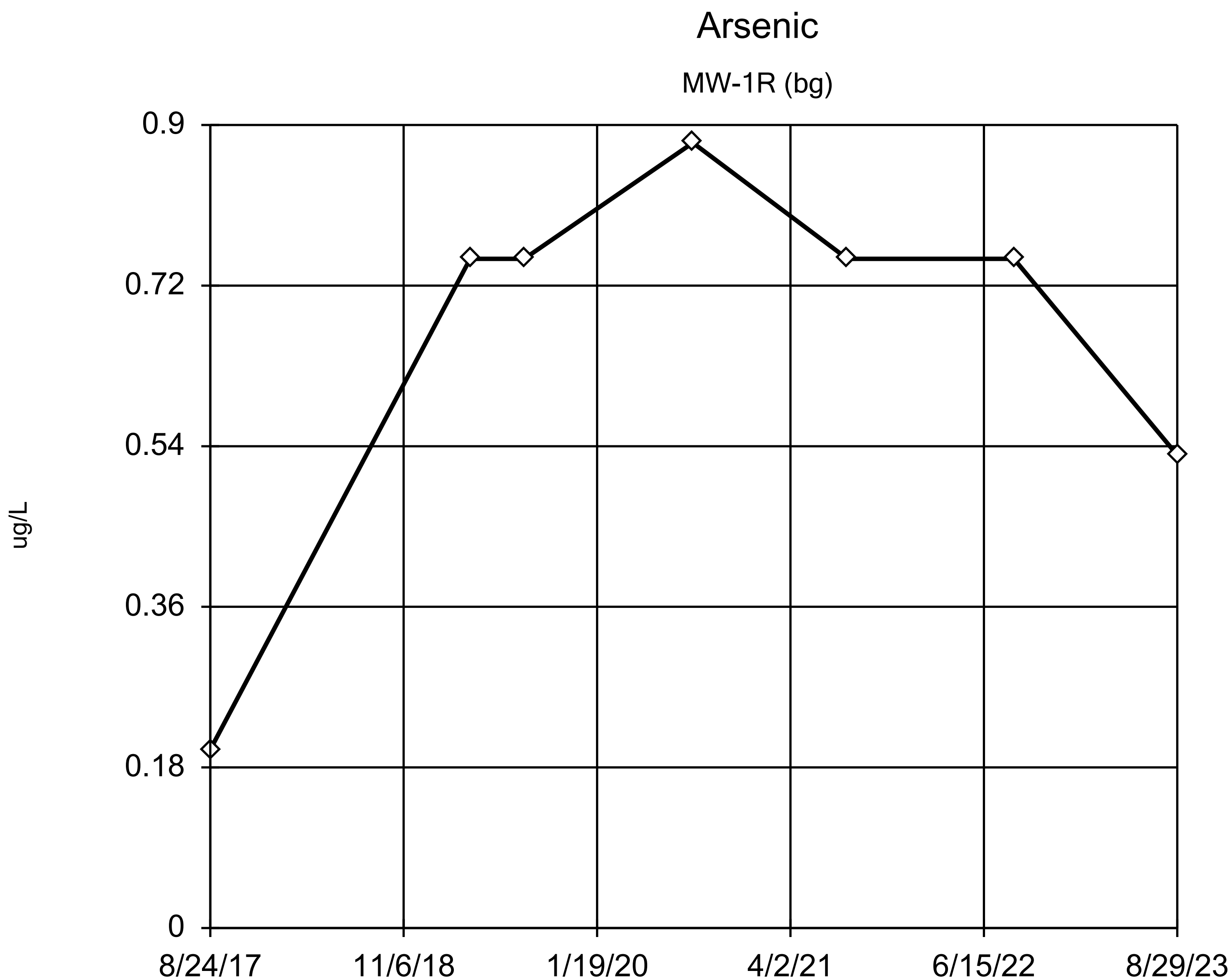
Attachment D3

Outlier Analysis Results - Shallow

Outlier Analysis

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML   Printed 10/6/2023, 11:33 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Arsenic (ug/L)	MW-1R (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	0.6586	0.227	unknown	ShapiroWilk
Barium (ug/L)	MW-1R (bg)	No	n/a	n/a	Dixon`s	0.05	7	73.86	6.44	normal	ShapiroWilk
Beryllium (ug/L)	MW-1R (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	0.2517	0.1163	unknown	ShapiroWilk
Boron (ug/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	7	82.14	20.45	normal	ShapiroWilk
Chloride (mg/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	35	92.33	96.59	ln(x)	ShapiroWilk
Cobalt (ug/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.1687	0.108	normal	ShapiroWilk
Copper (ug/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	7	1.67	0.3803	normal	ShapiroWilk
Field pH (Std._Units)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	8	7.331	0.257	normal	ShapiroWilk
Field Specific Conductance (umh...	MW-1R (bg)	No	n/a	n/a	NP (nrm)	NaN	7	980.4	350.3	unknown	ShapiroWilk
Fluoride (mg/L)	MW-1R (bg)	No	n/a	n/a	Dixon`s	0.05	8	0.4475	0.2133	normal	ShapiroWilk
Iron (ug/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	7	97.5	127	ln(x)	ShapiroWilk
Lead (ug/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.4	0.2844	ln(x)	ShapiroWilk
Magnesium (ug/L)	**MW-1R (bg)**	**Yes**	**48100**	**8/24/2017**	**NP (nrm)**	**NaN**	**7**	**32871**	**6756**	**unknown**	**ShapiroWilk**
Manganese (ug/L)	**MW-1R (bg)**	**Yes**	**20**	**4/6/2019**	**Dixon`s**	**0.05**	**7**	**5.871**	**6.297**	**normal**	**ShapiroWilk**
Selenium (ug/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	7	1.48	0.6283	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-1R (bg)	No	n/a	n/a	NP (nrm)	NaN	25	226.5	117.9	unknown	ShapiroWilk
Temperature, Field (deg C)	MW-1R (bg)	No	n/a	n/a	Dixon`s	0.05	8	16.22	3.925	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-1R (bg)	No	n/a	n/a	EPA 1989	0.05	8	584.4	179.5	normal	ShapiroWilk
Zinc (ug/L)	MW-1R (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	8.4	2.966	unknown	ShapiroWilk



n = 7

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).

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Tukey's Outlier Screening   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Arsenic (ug/L) Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	0.2 (J)
4/6/2019	<0.75
8/7/2019	<0.75
8/24/2020	<0.88
8/10/2021	<0.75
8/23/2022	<0.75 (U)
8/29/2023	<0.53 (U)

ND substitution: RL or RL/2 if <15% NDs.

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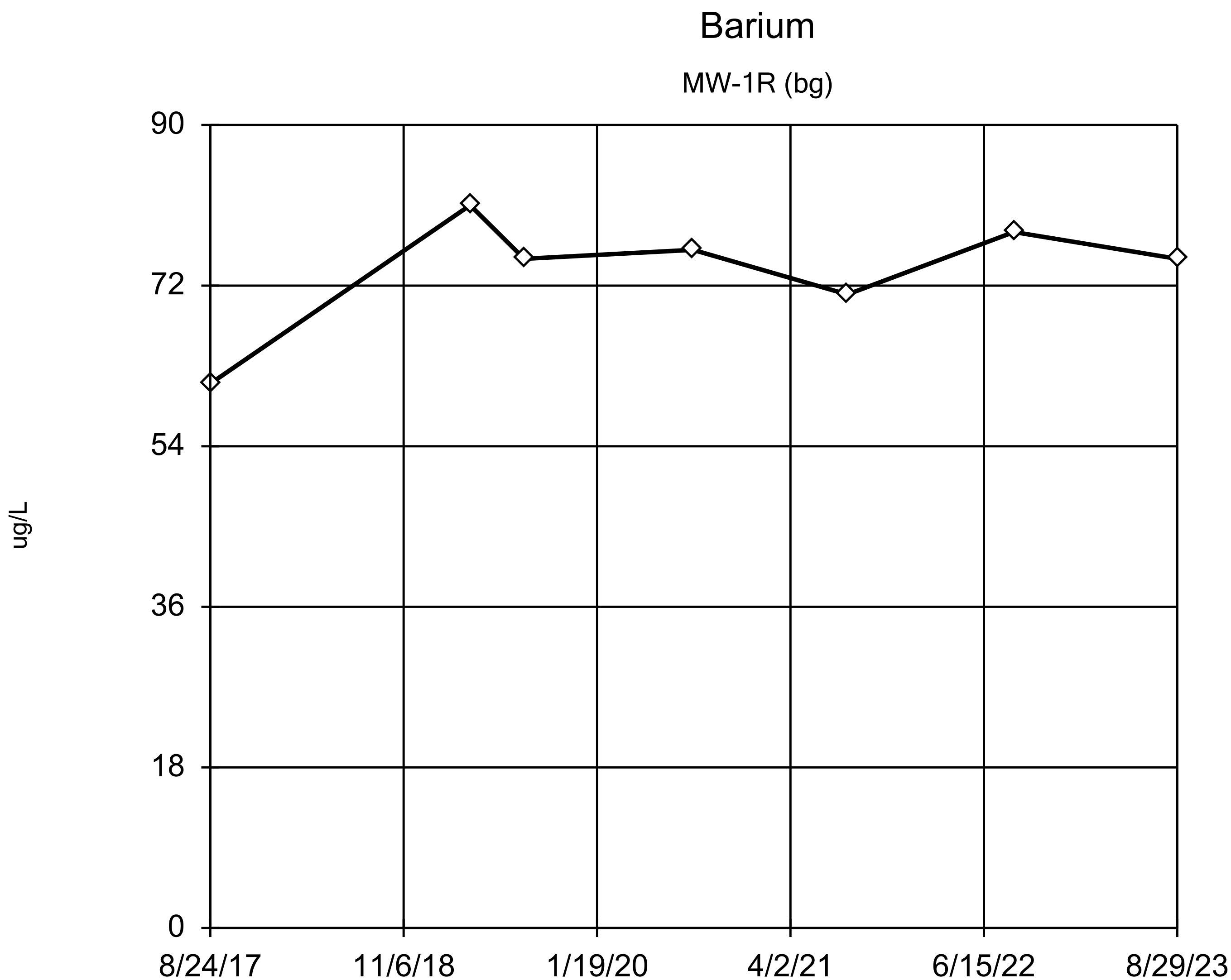


n = 7

No statistical outliers.
Testing for 1 low outlier.
Mean = 73.86.
Std. Dev. = 6.44.
61: c = 0.5
tabl = 0.507.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9674
Critical = 0.826
The distribution was found to be normally distributed.

Dixon's Outlier Test   Analysis Run 10/6/2023 11:32 AM   View: Shallow

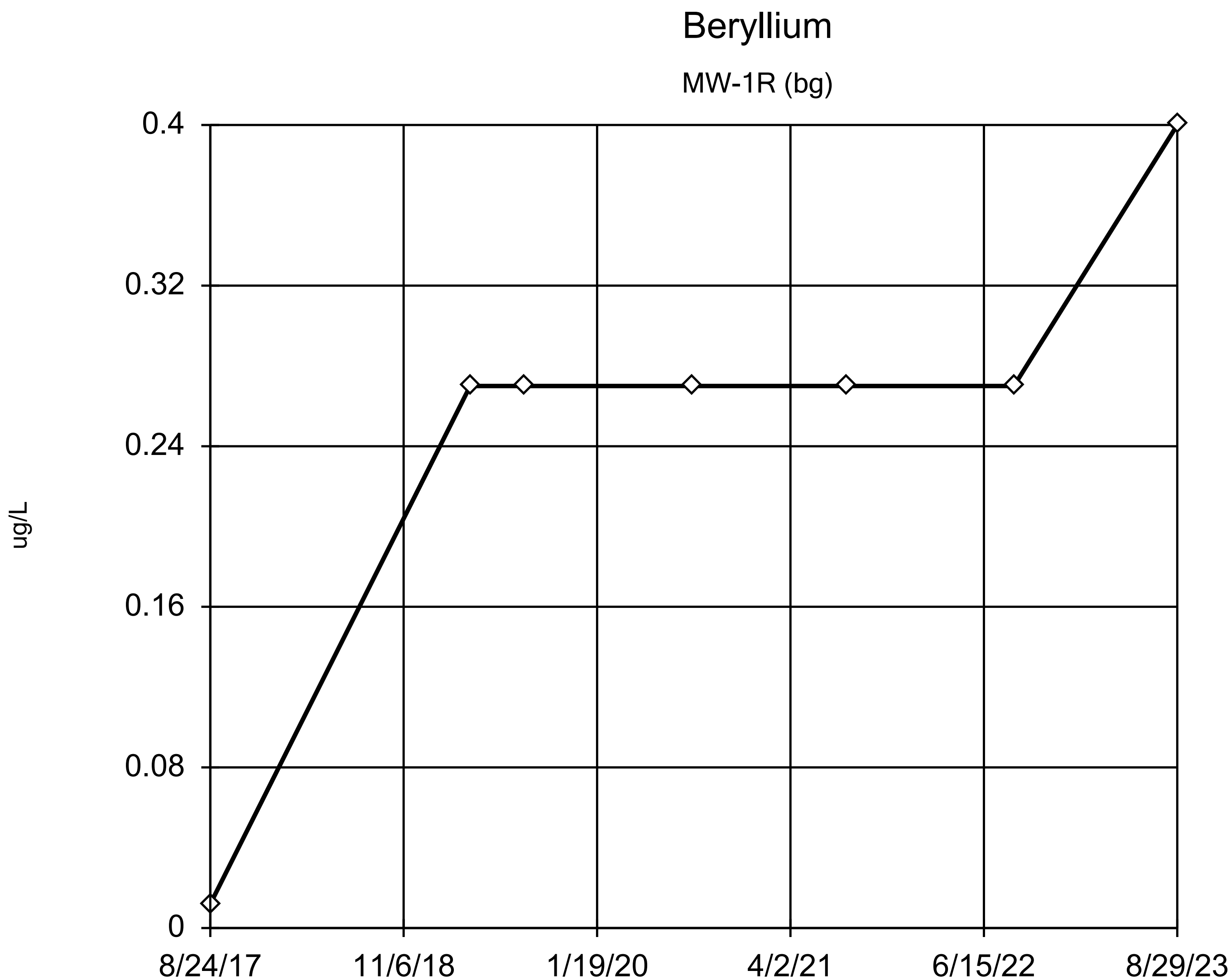
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Barium (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	61
4/6/2019	81
8/7/2019	75
8/24/2020	76
8/10/2021	71 (B)
8/23/2022	78
8/29/2023	75



n = 7

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).

The results were invalidated, because the lower and upper quartiles are equal.

Tukey's Outlier Screening   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Beryllium (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	<0.012
4/6/2019	<0.27
8/7/2019	<0.27
8/24/2020	<0.27
8/10/2021	<0.27
8/23/2022	<0.27 (U)
8/29/2023	0.4 (J)

ND substitution: RL or RL/2 if <15% NDs.

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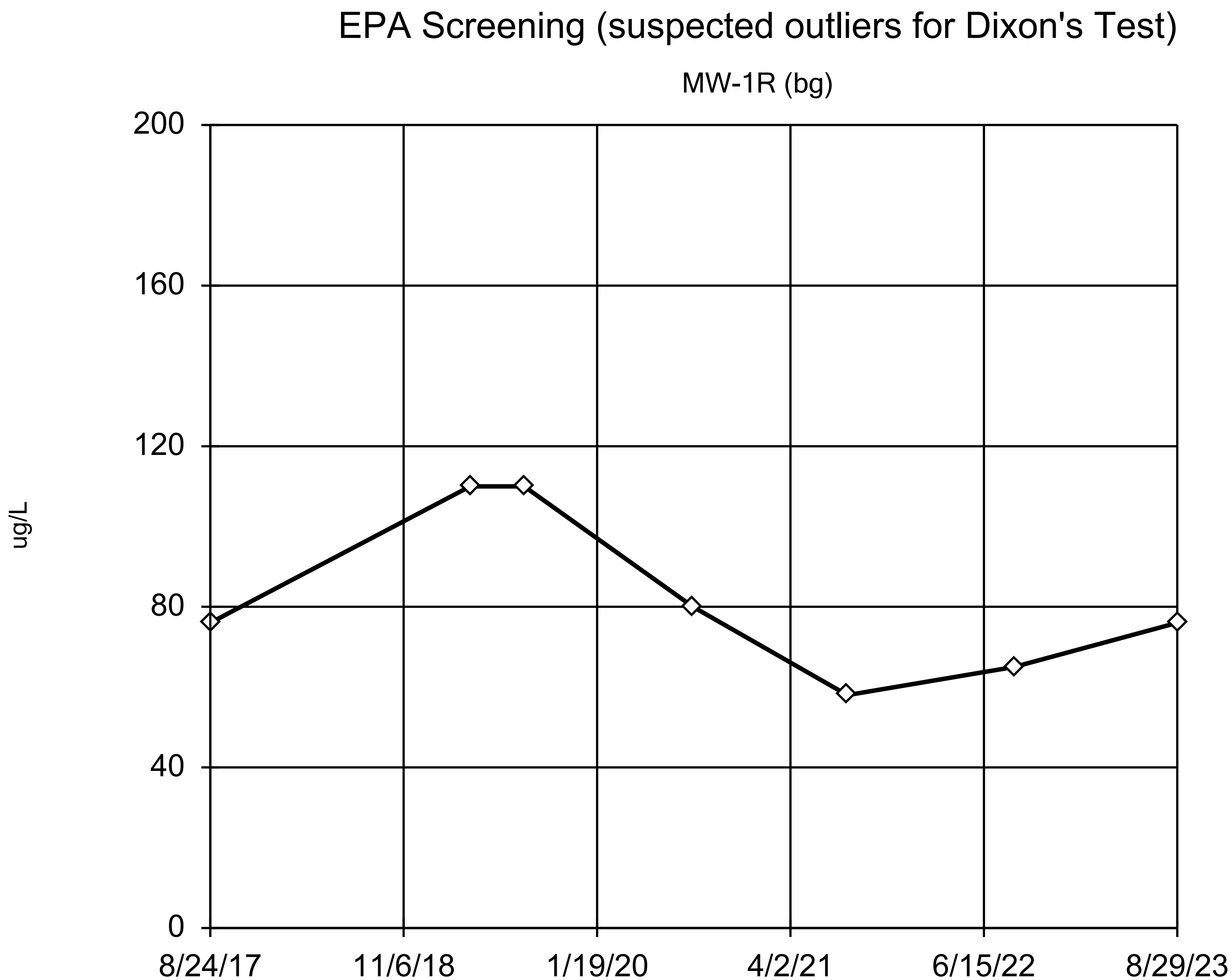

n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 82.14, std. dev. 20.45, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.866
Critical = 0.838
The distribution was found to be normally distributed.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Boron (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	76 (J)
4/6/2019	110 (J)
8/7/2019	110 (J,B)
8/24/2020	<80
8/10/2021	<58
8/23/2022	65 (J)
8/29/2023	<76 (U)

ND substitution: RL or RL/2 if <15% NDs.

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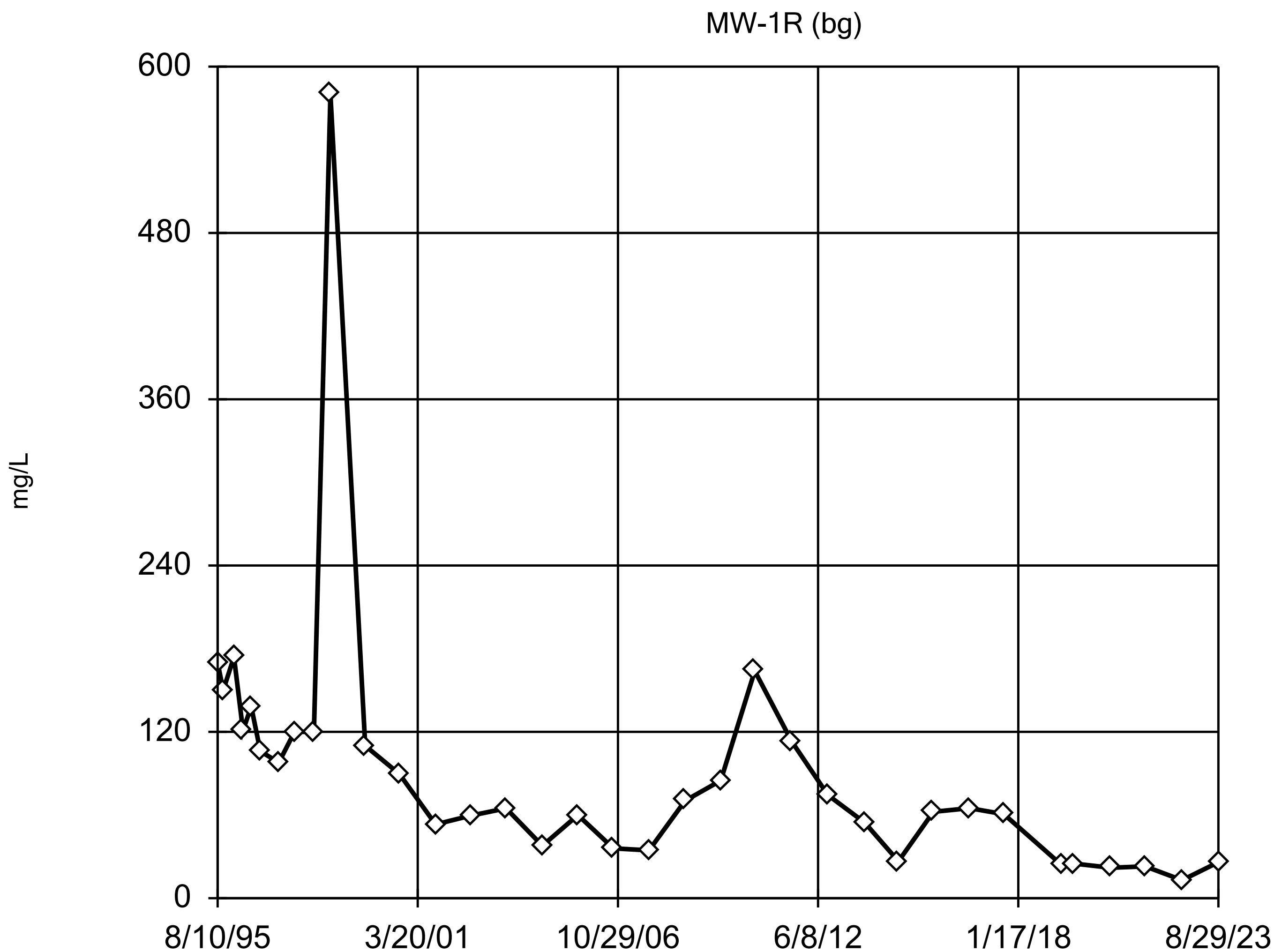
EPA Screening (suspected outliers for Rosner's Test)



n = 35

Rosner's will not be run. No suspect values identified or unable to establish suspect values. Mean 92.33, std. dev. 96.59, critical Tn 2.811

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9708
Critical = 0.944 (after natural log transformation)
The distribution was found to be log-normal.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

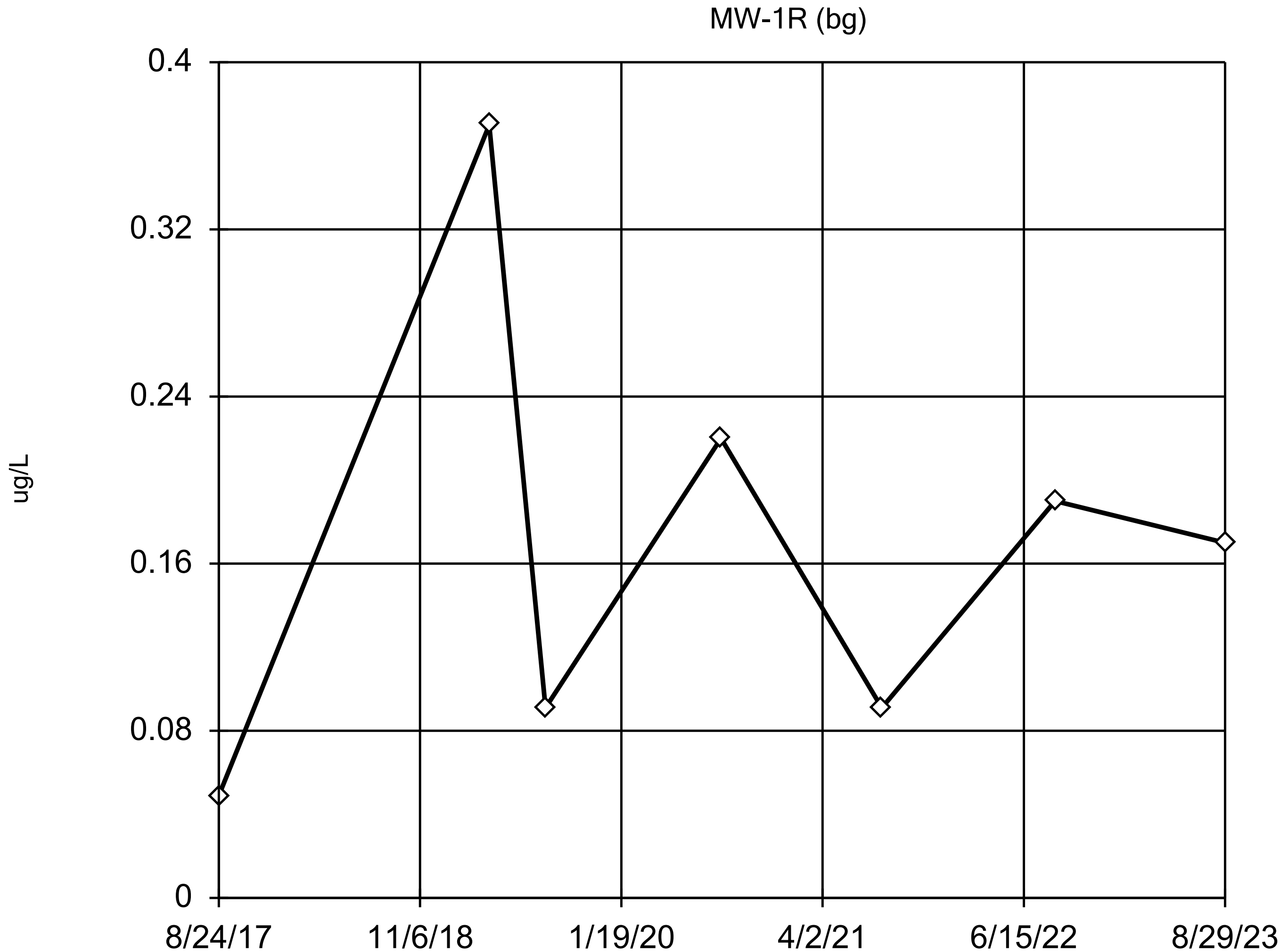
EPA 1989 Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
8/10/1995	170
10/6/1995	150
1/25/1996	174
4/26/1996	121
7/19/1996	138.3
10/21/1996	106
4/28/1997	98
10/6/1997	120
4/22/1998	120
10/7/1998	580 (X)
9/29/1999	110
9/13/2000	89.6
9/19/2001	53.3
9/11/2002	59.5
9/10/2003	64.8
9/15/2004	37.9
9/14/2005	60
9/13/2006	35.9
9/12/2007	34.5
9/17/2008	70.4
9/16/2009	84.9
8/31/2010	164
9/13/2011	113
9/18/2012	74.4
9/27/2013	54.7
9/10/2014	26.6
9/2/2015	62.4
9/7/2016	64.9
8/24/2017	60.6
4/6/2019	24
8/7/2019	25
8/24/2020	22
8/10/2021	23
8/23/2022	13
8/29/2023	26

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.1687, std. dev. 0.108, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9146
Critical = 0.838
The distribution was found to be normally distributed.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	0.049 (J)
4/6/2019	0.37 (J)
8/7/2019	<0.091
8/24/2020	0.22 (J)
8/10/2021	<0.091
8/23/2022	<0.19 (U)
8/29/2023	<0.17 (U)

ND substitution: RL or RL/2 if <15% NDs.

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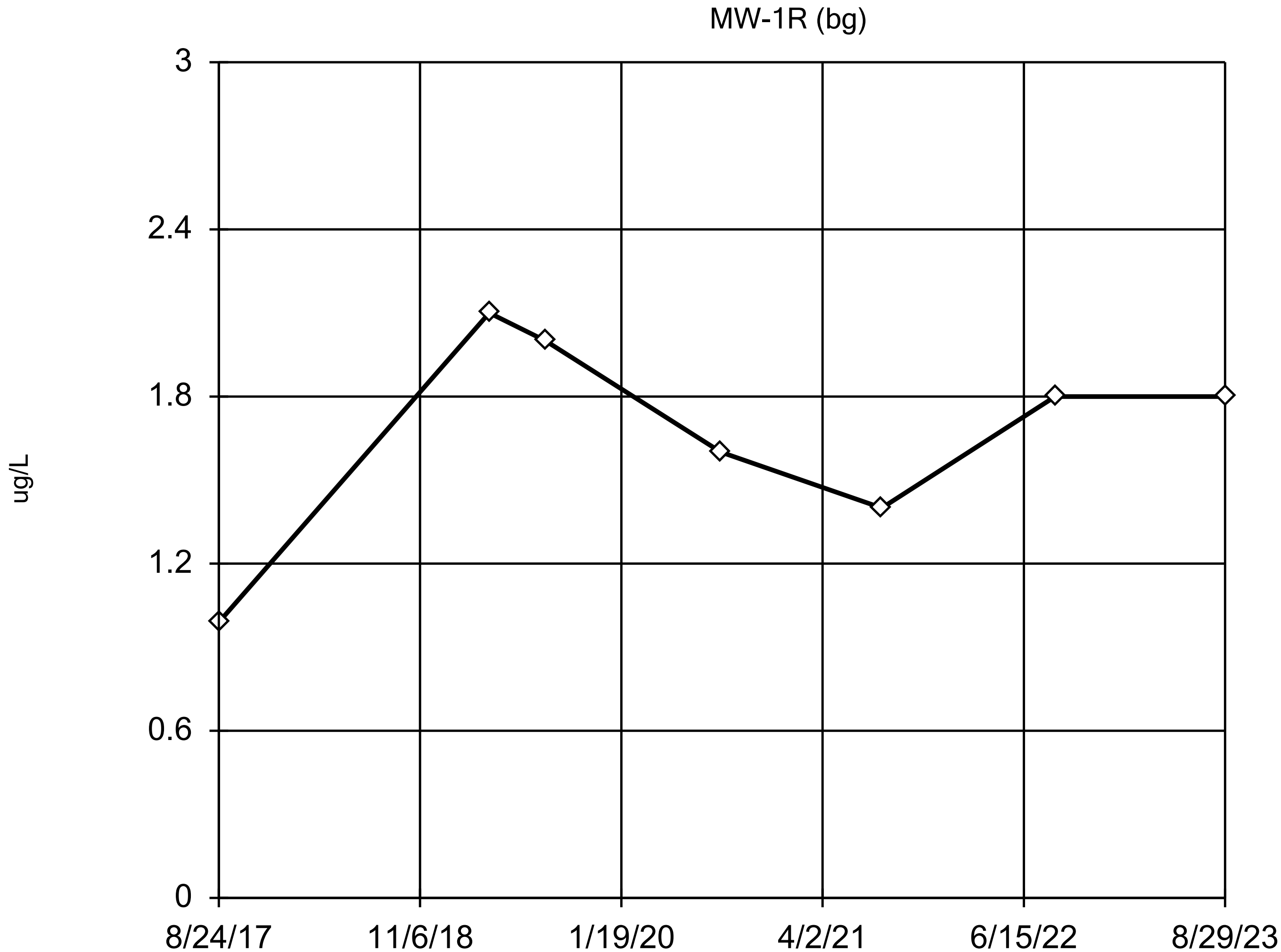
EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identi-
fied or unable to estab-
lish suspect values.
Mean 1.67, std. dev. 0.3803,
critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.937
Critical = 0.838
The distribution was found
to be normally distrib-
uted.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

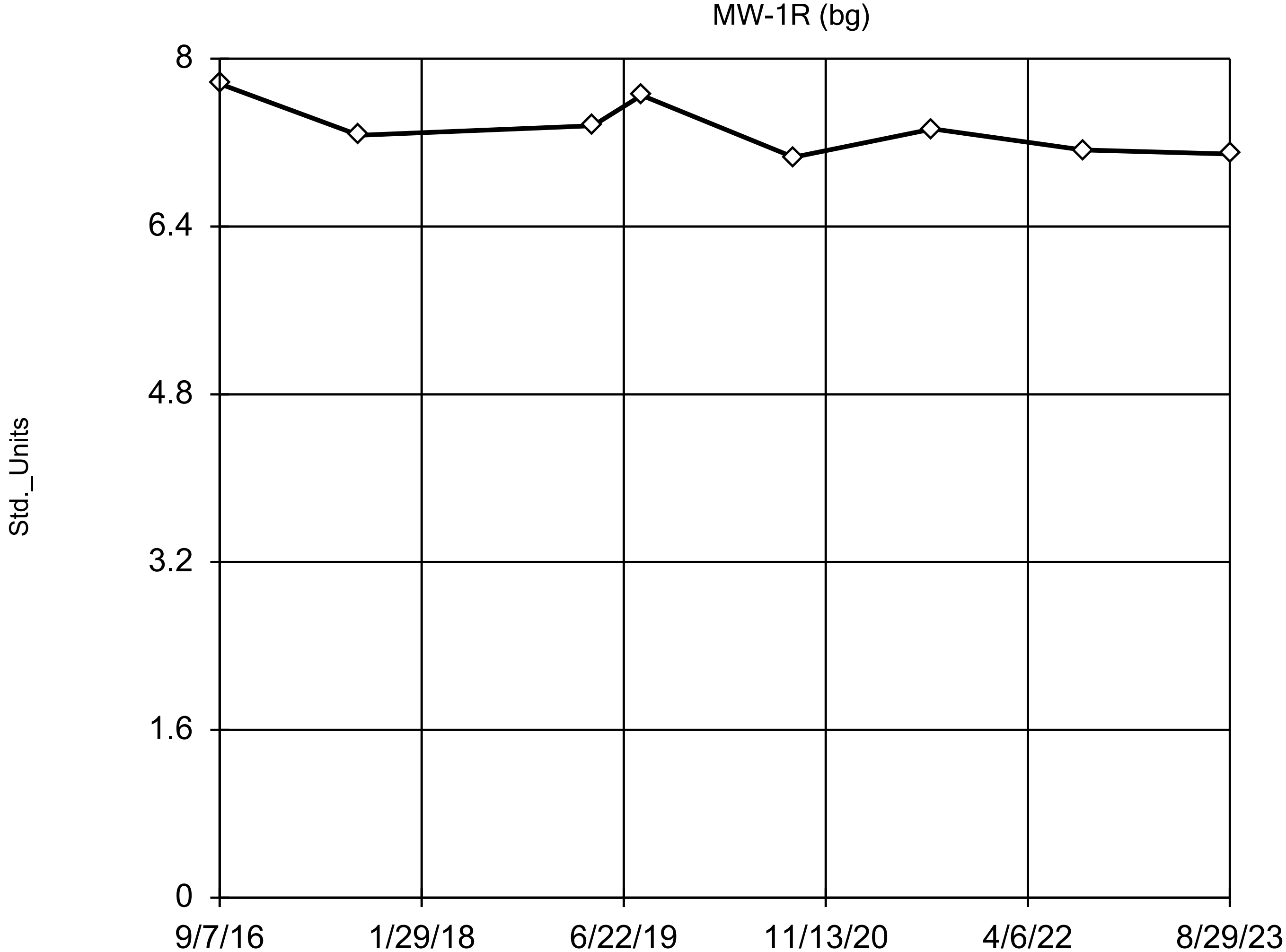
EPA 1989 Outlier Screening

Constituent: Copper (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	0.99 (J)
4/6/2019	2.1 (J)
8/7/2019	<2
8/24/2020	1.6 (J)
8/10/2021	<1.4
8/23/2022	<1.8 (U)
8/29/2023	<1.8 (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 7.331, std. dev. 0.257, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8979
Critical = 0.851
The distribution was found to be normally distributed.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

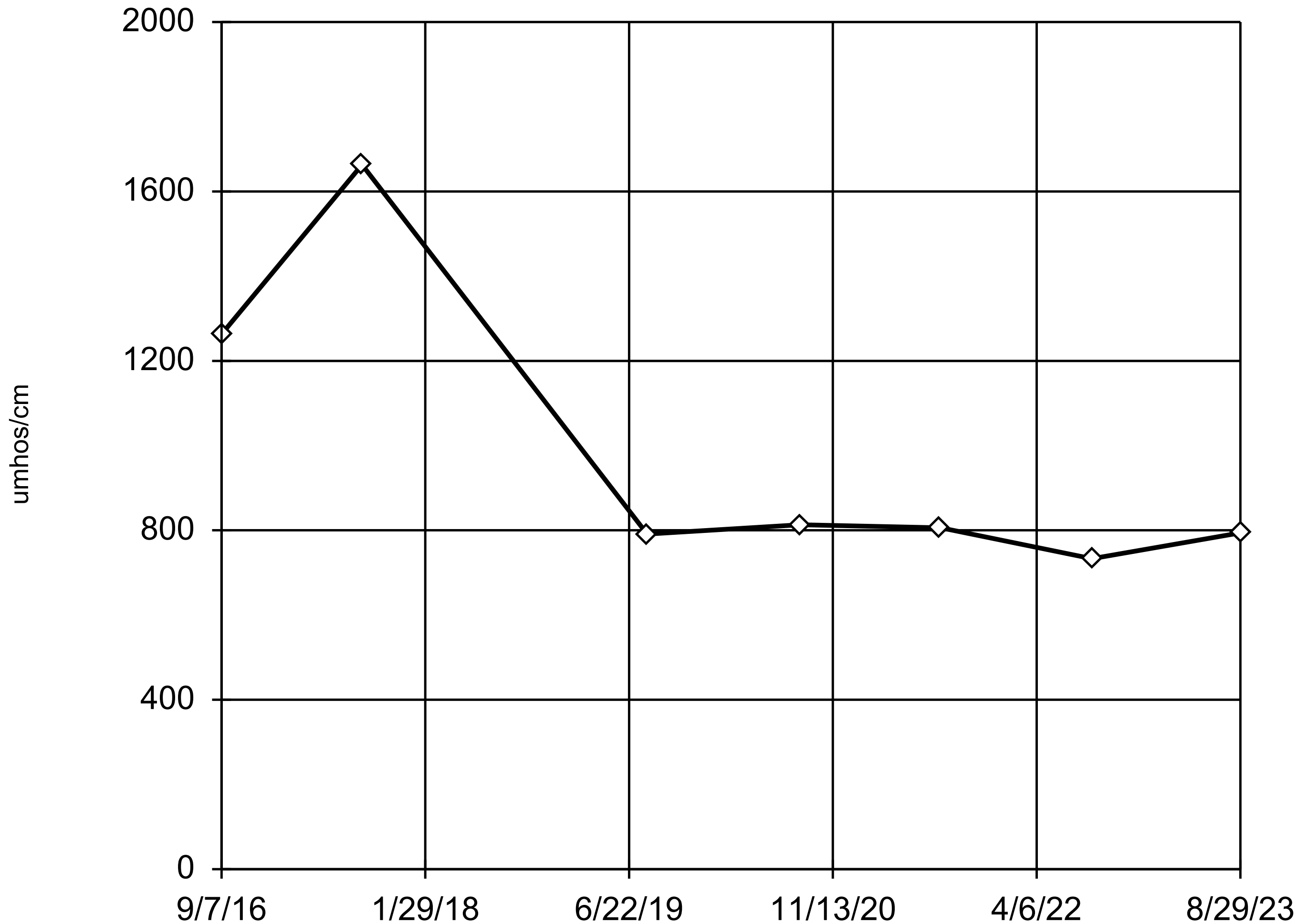
Constituent: Field pH (Std._Units)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
9/7/2016	7.76
8/24/2017	7.27
4/6/2019	7.36
8/7/2019	7.65
8/24/2020	7.06
8/10/2021	7.33
8/23/2022	7.13
8/29/2023	7.09

Field Specific Conductance

MW-1R (bg)



n = 7

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 = 5141, low cutoff = 194.3, based on IQR multiplier of 3.

Tukey's Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Field Specific Conductance (umhos/cm) Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
9/7/2016	1263
8/24/2017	1663
8/7/2019	791
8/24/2020	813
8/10/2021	806
8/23/2022	733
8/29/2023	794

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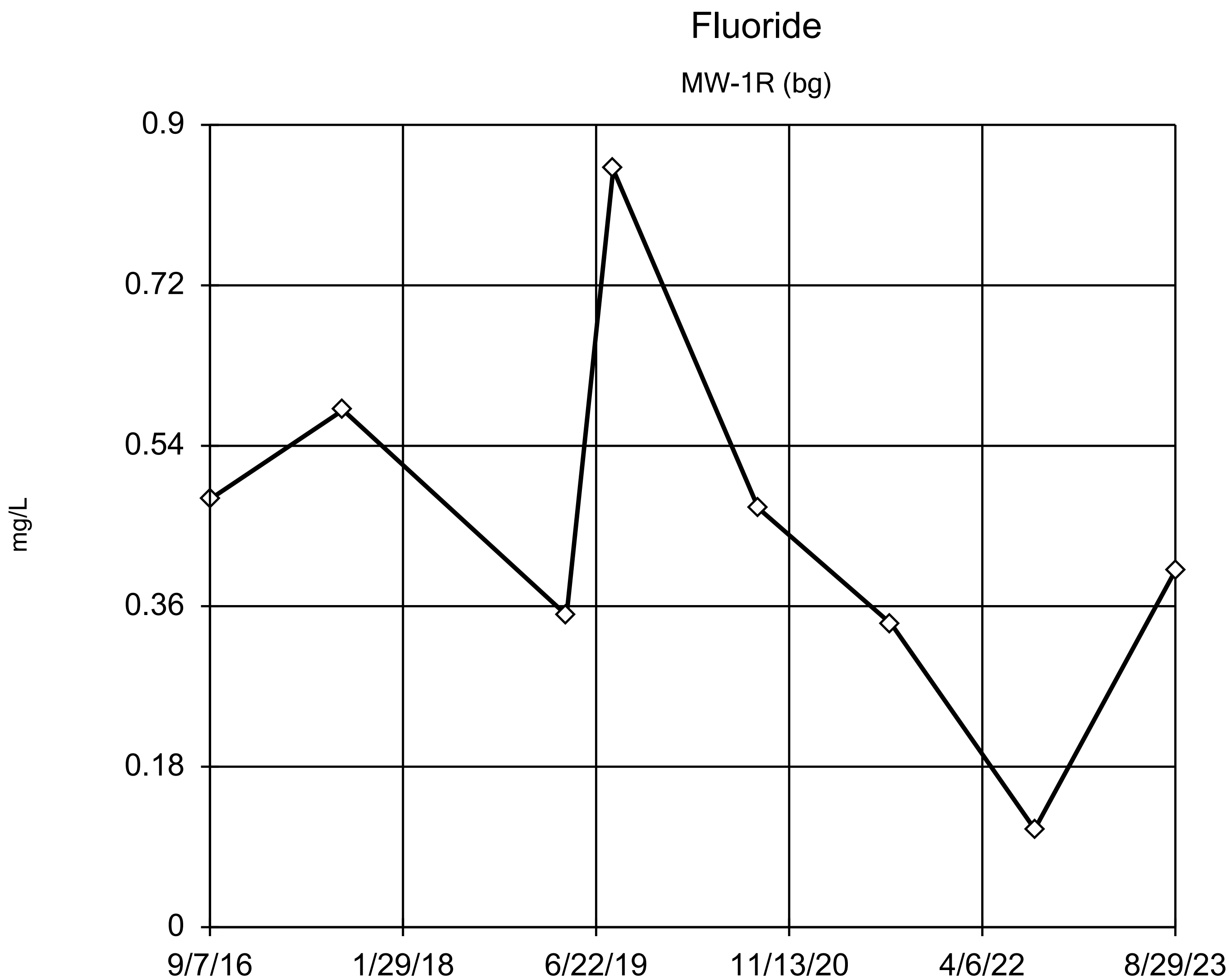


n = 8

No statistical outliers.
Testing for 1 low outlier.
Mean = 0.4475.
Std. Dev. = 0.2133.
<0.22 (U): c = 0.4894
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8452
Critical = 0.838
The distribution was found to be normally distributed.

Dixon's Outlier Test   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

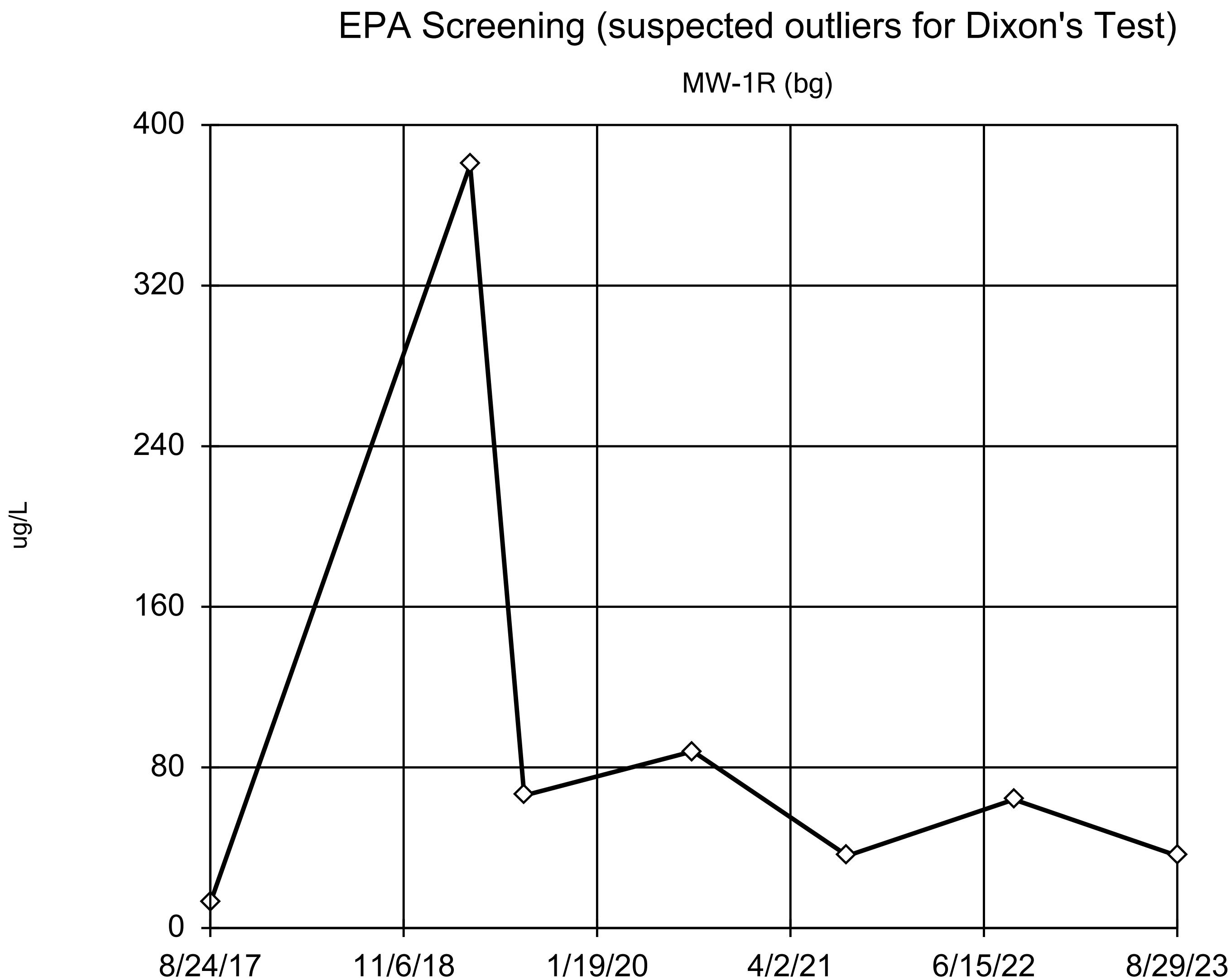
Dixon's Outlier Test

Constituent: Fluoride (mg/L) Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
9/7/2016	0.48
8/24/2017	0.58
4/6/2019	0.35 (J)
8/7/2019	0.85
8/24/2020	0.47 (J)
8/10/2021	0.34 (J)
8/23/2022	<0.22 (U)
8/29/2023	0.4 (J)

ND substitution: RL or RL/2 if <15% NDs.



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 97.5, std. dev. 127, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.943
Critical = 0.838 (after natural log transformation)
The distribution was found to be log-normal.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Iron (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	12.5 (J)
4/6/2019	380
8/7/2019	<66
8/24/2020	88 (J)
8/10/2021	<36
8/23/2022	64 (J)
8/29/2023	<36 (U)

ND substitution: RL or RL/2 if <15% NDs.

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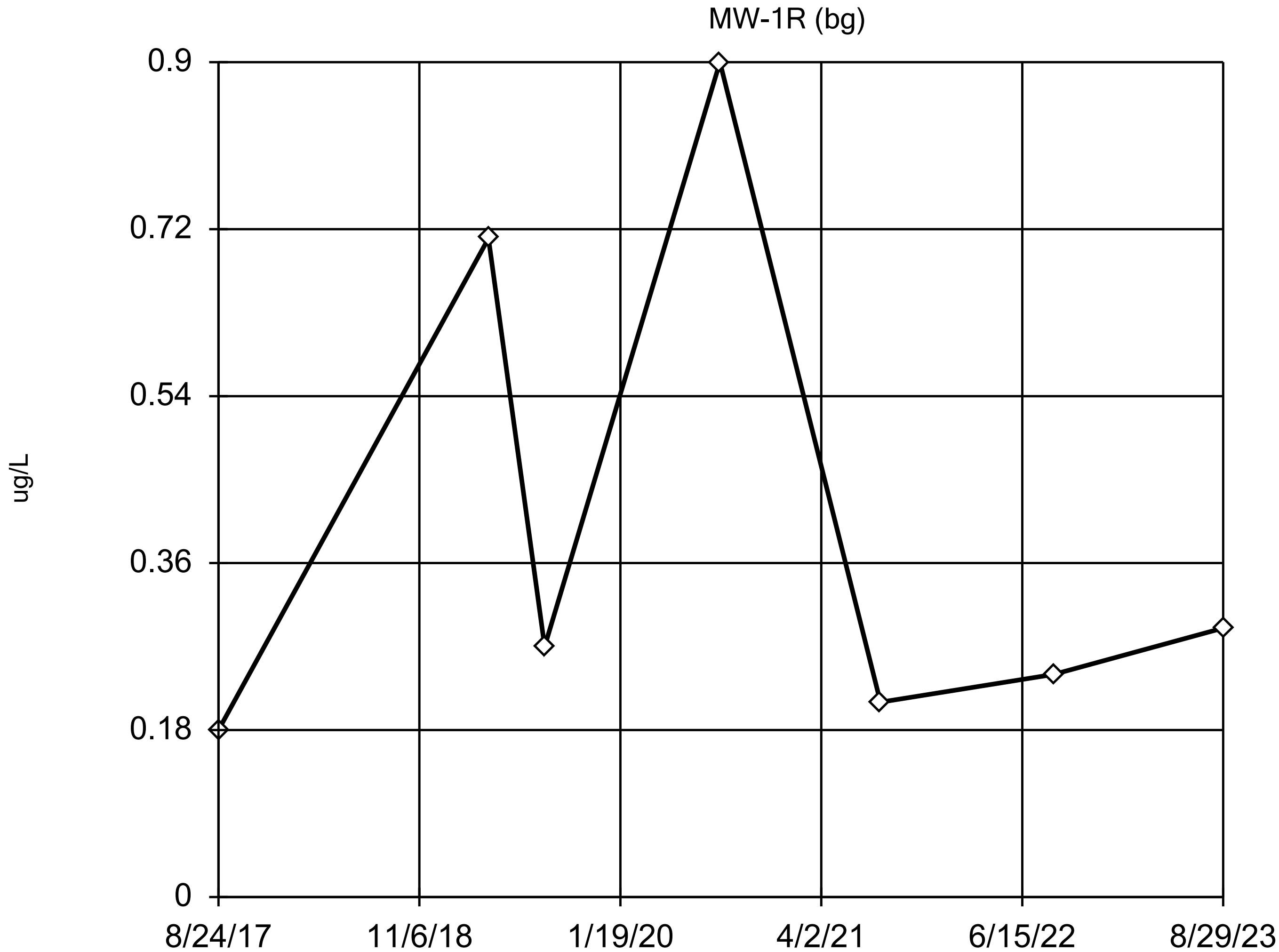
EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.4, std. dev. 0.2844, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8424
Critical = 0.838 (after natural log transformation)
The distribution was found to be log-normal.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	0.18 (J)
4/6/2019	0.71
8/7/2019	<0.27
8/24/2020	0.9
8/10/2021	<0.21
8/23/2022	<0.24 (U)
8/29/2023	0.29 (JB)

ND substitution: RL or RL/2 if <15% NDs.

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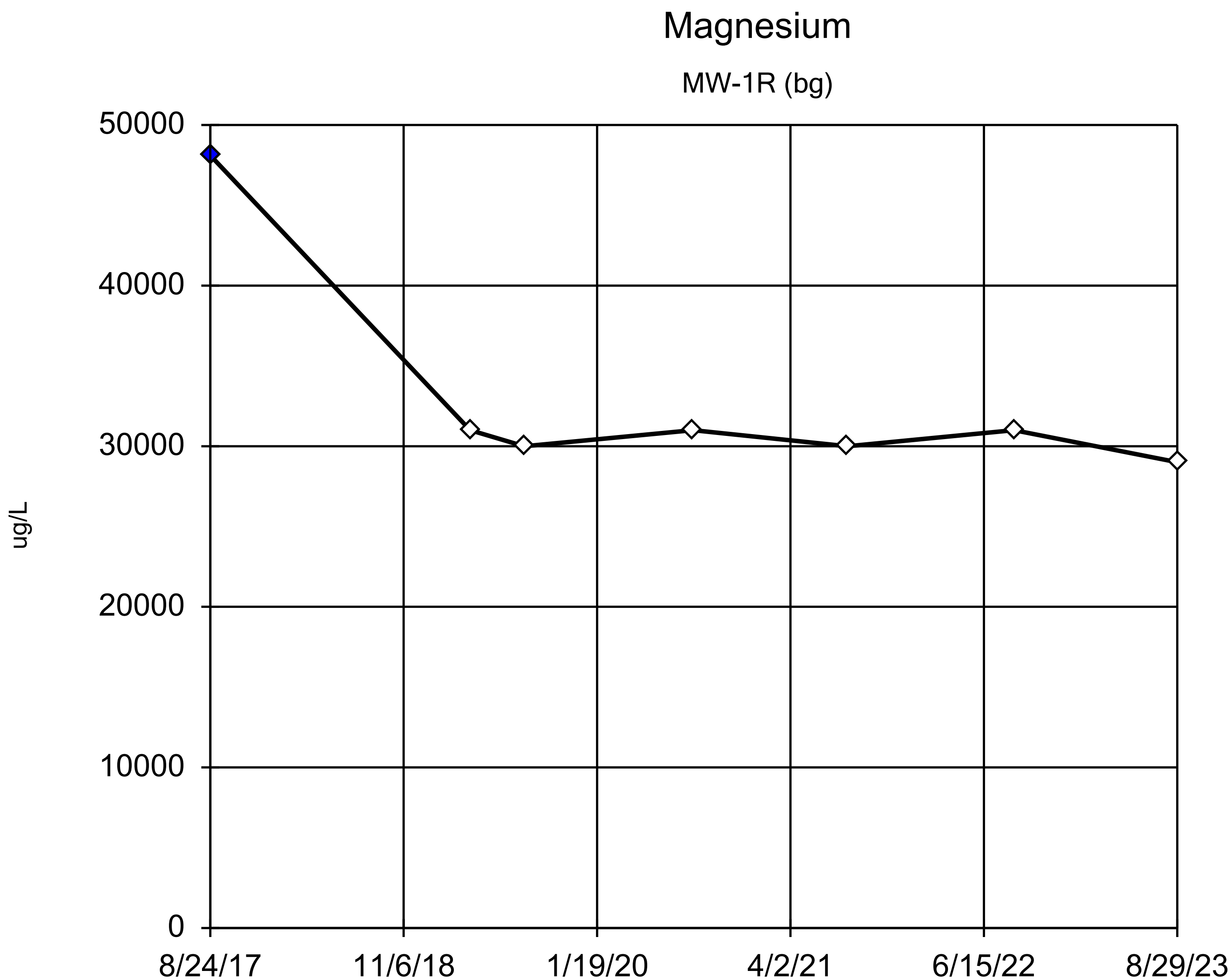

n = 7

Outlier is drawn as solid.
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 = 34204, low cutoff = 27189, based on IQR multiplier of 3.

Tukey's Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Magnesium (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	48100 (O)
4/6/2019	31000
8/7/2019	30000
8/24/2020	31000
8/10/2021	30000
8/23/2022	31000
8/29/2023	29000

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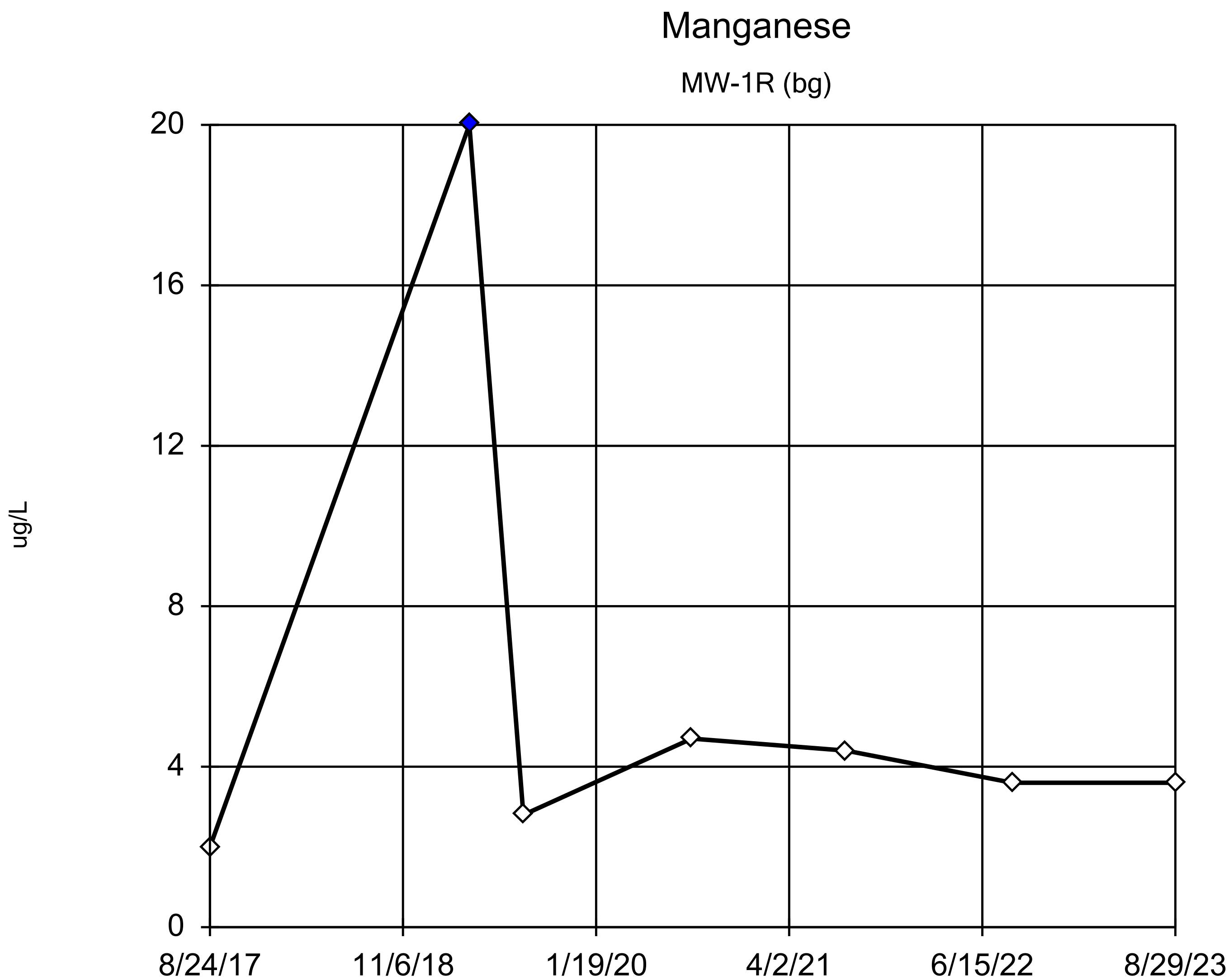

n = 7

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 5.871.
Std. Dev. = 6.297.
20: c = 0.85
tabl = 0.507.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9535
Critical = 0.826
The distribution, after removal of suspect value, was found to be normally distributed.

Dixon's Outlier Test   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Manganese (ug/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	2
4/6/2019	20 (O)
8/7/2019	2.8 (J)
8/24/2020	4.7 (J)
8/10/2021	<4.4
8/23/2022	<3.6 (U)
8/29/2023	<3.6 (U)

ND substitution: RL or RL/2 if <15% NDs.

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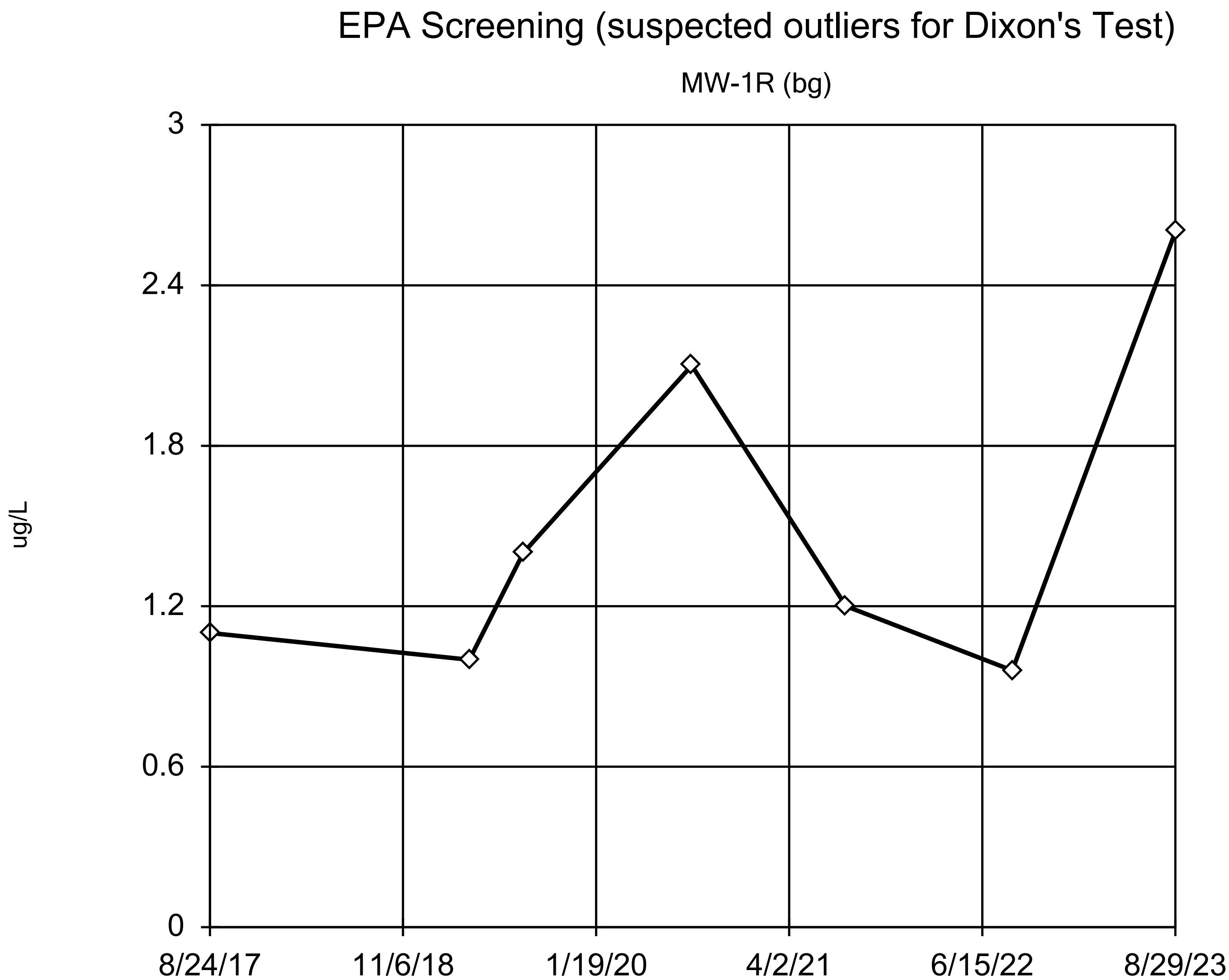

n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1.48, std. dev. 0.6283, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8753
Critical = 0.838 (after natural log transformation)
The distribution was found to be log-normal.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/6/2023 11:33 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	1.1
4/6/2019	<1
8/7/2019	1.4 (J)
8/24/2020	2.1 (J)
8/10/2021	1.2 (J)
8/23/2022	<0.96 (U)
8/29/2023	2.6 (J)

ND substitution: RL or RL/2 if <15% NDs.

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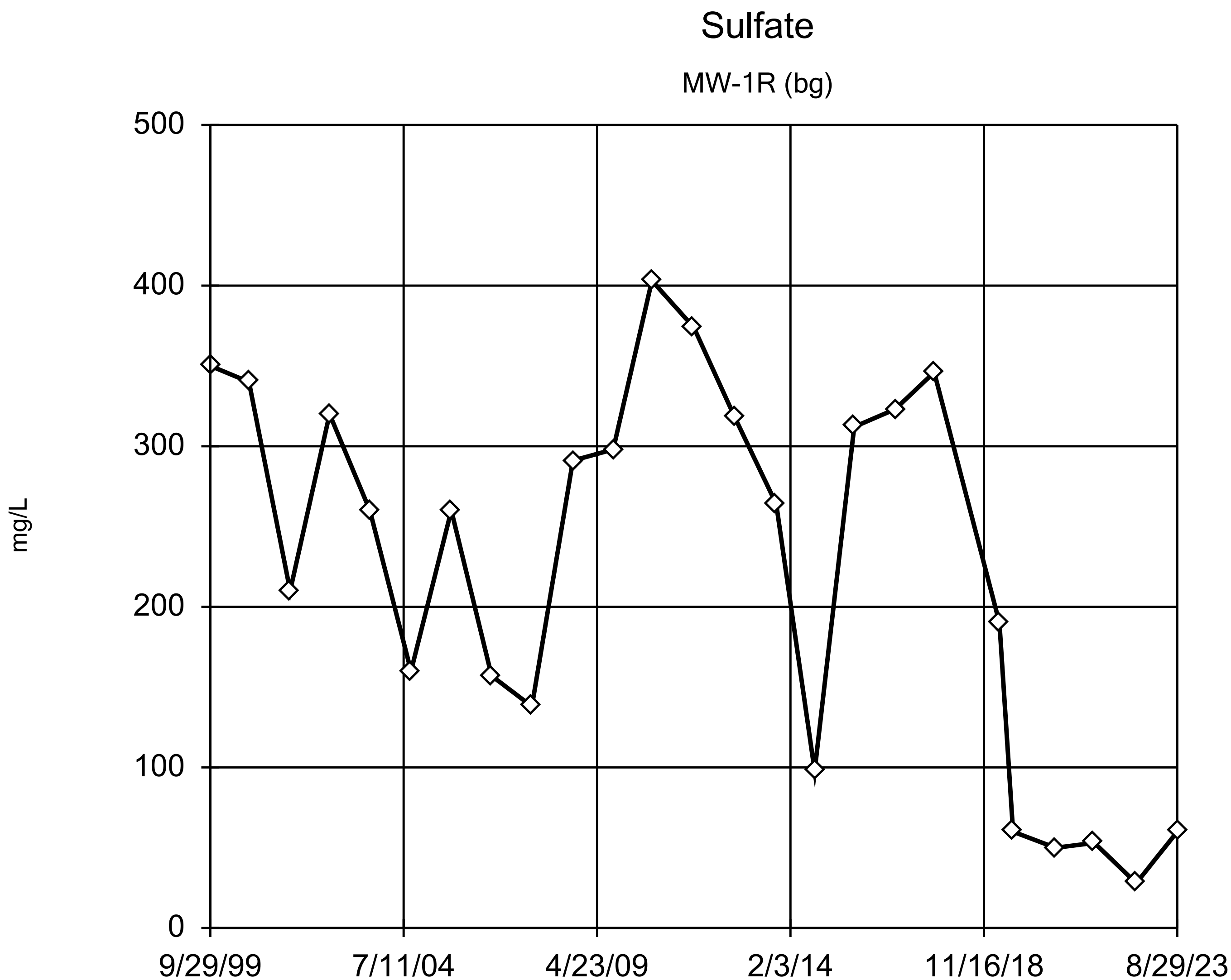

n = 25

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 = 608.7, low cutoff = -502.9, based on IQR multiplier of 3.

Tukey's Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Sulfate (mg/L) Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
9/29/1999	350
9/13/2000	340
9/19/2001	210
9/11/2002	320
9/10/2003	260
9/15/2004	160
9/14/2005	260
9/13/2006	157
9/12/2007	138
9/17/2008	291
9/16/2009	298
8/31/2010	403
9/13/2011	374
9/18/2012	318
9/27/2013	264
9/10/2014	97.8
9/2/2015	312
9/7/2016	323
8/24/2017	346
4/6/2019	190
8/7/2019	60
8/24/2020	50
8/10/2021	53
8/23/2022	28
8/29/2023	60

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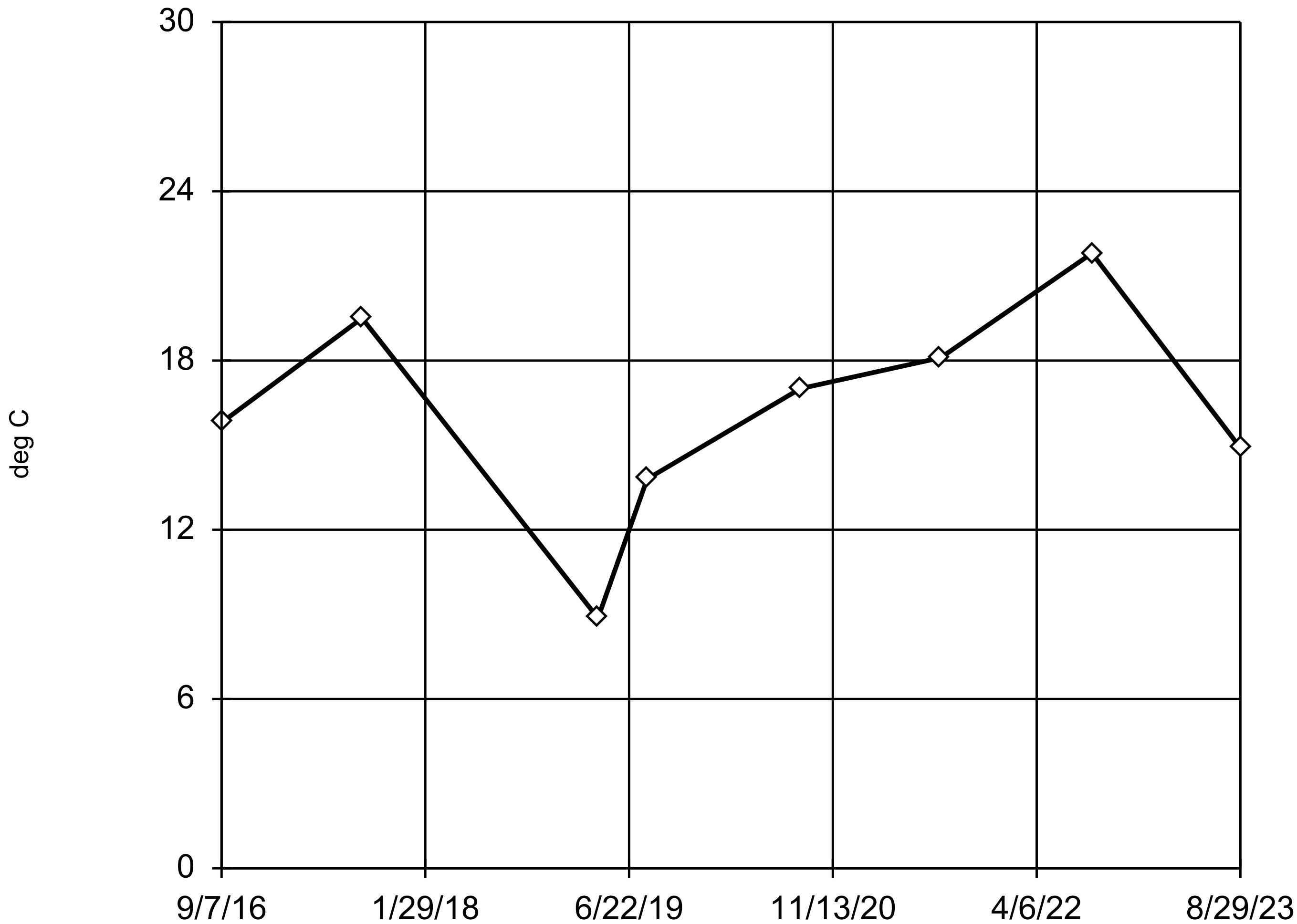
Temperature, Field

MW-1R (bg)



n = 8

No statistical outliers.
Testing for 1 low outlier.
Mean = 16.22.
Std. Dev. = 3.925.
8.87: c = 0.4638
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9751
Critical = 0.838
The distribution was found to be normally distributed.

Dixon's Outlier Test Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Temperature, Field (deg C)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
9/7/2016	15.8
8/24/2017	19.5
4/6/2019	8.87
8/7/2019	13.8
8/24/2020	17
8/10/2021	18.1
8/23/2022	21.8
8/29/2023	14.9

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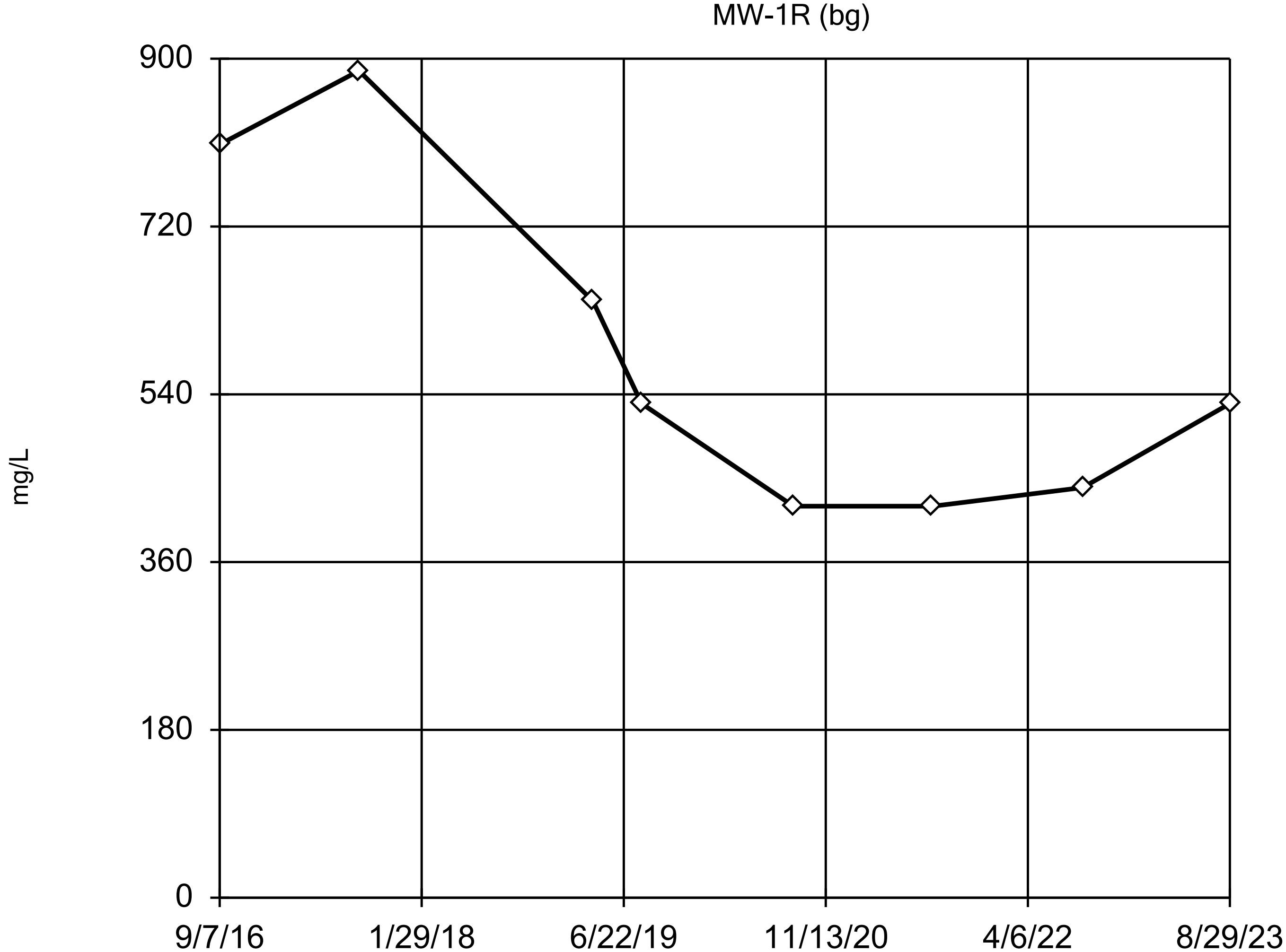
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 584.4, std. dev. 179.5, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8596
Critical = 0.851
The distribution was found to be normally distributed.

EPA 1989 Outlier Screening   Analysis Run 10/6/2023 11:33 AM   View: Shallow

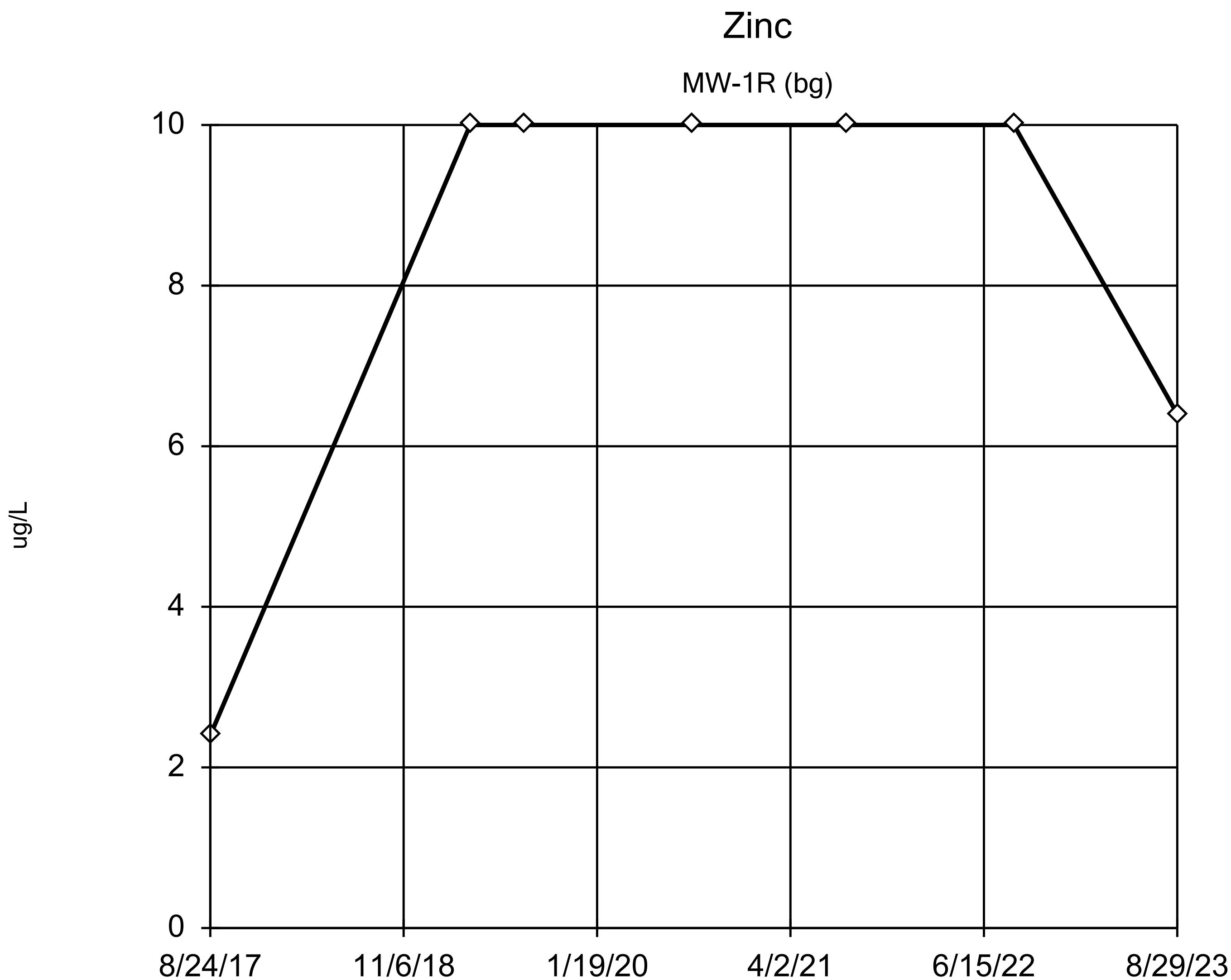
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 10/6/2023 11:33 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-1R (bg)
9/7/2016	808
8/24/2017	887
4/6/2019	640
8/7/2019	530
8/24/2020	420
8/10/2021	420
8/23/2022	440
8/29/2023	530



n = 7

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).

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Tukey's Outlier Screening Analysis Run 10/6/2023 11:33 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Zinc (ug/L) Analysis Run 10/6/2023 11:34 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-1R (bg)
8/24/2017	2.4 (J)
4/6/2019	<10
8/7/2019	<10
8/24/2020	<10
8/10/2021	<10
8/23/2022	<10 (U)
8/29/2023	<6.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

Attachment D4

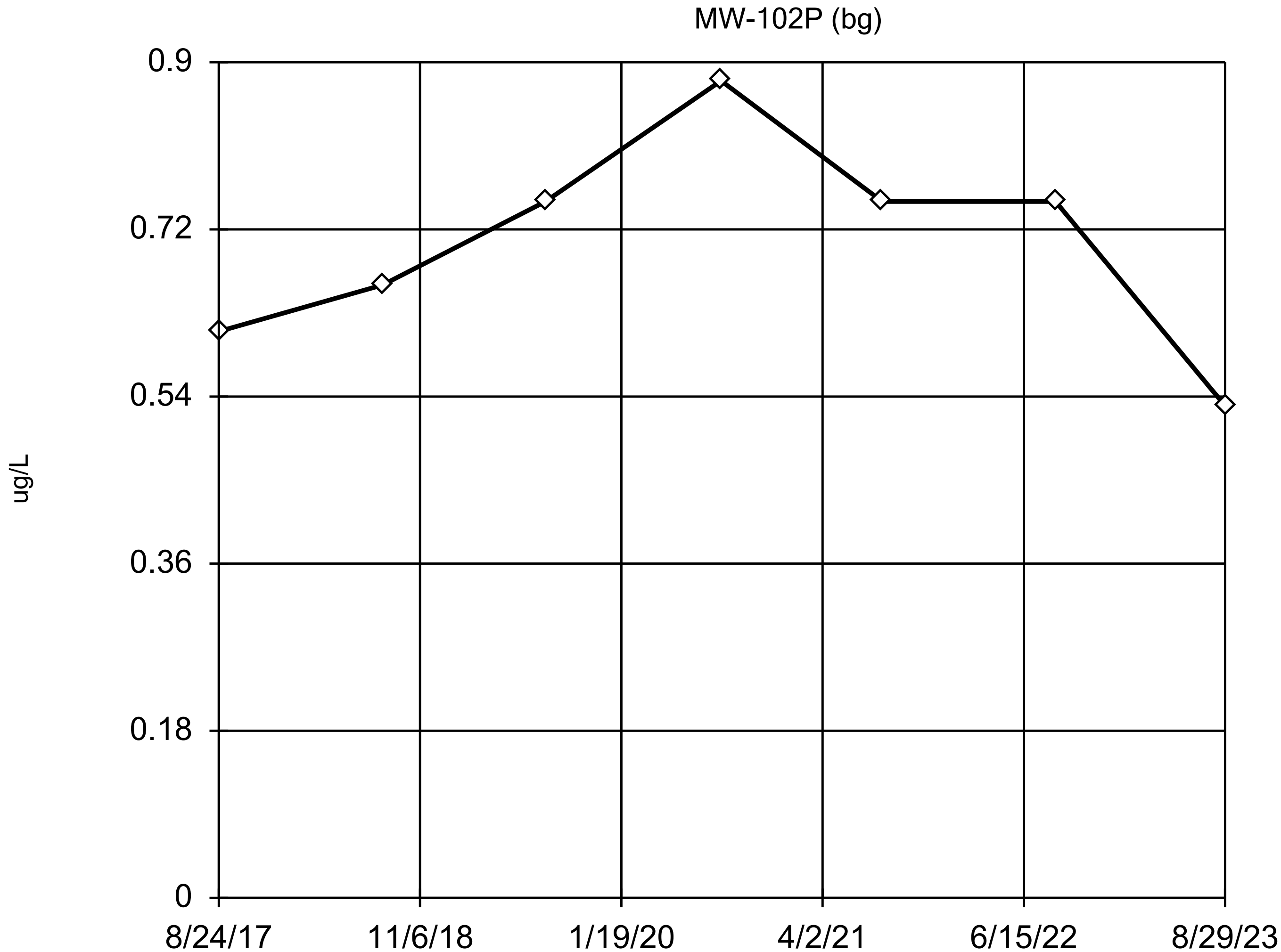
Outlier Analysis Results - Pennsylvanian

Outlier Analysis

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML   Printed 10/9/2023, 4:24 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Arsenic (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.7043	0.1143	normal	ShapiroWilk
Barium (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	23.84	1.631	normal	ShapiroWilk
Beryllium (ug/L)	MW-102P (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	0.359	0.427	unknown	ShapiroWilk
Boron (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	1670	207	normal	ShapiroWilk
Chloride (mg/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	12	8.85	0.3849	normal	ShapiroWilk
Cobalt (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	1.061	0.2144	normal	ShapiroWilk
Copper (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	1.444	0.8584	normal	ShapiroWilk
Field pH (Std._Units)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	8	6.431	0.1178	normal	ShapiroWilk
Field Specific Conductance (umh...	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	8	3492	481.5	normal	ShapiroWilk
Fluoride (mg/L)	MW-102P (bg)	No	n/a	n/a	NP (nrm)	NaN	8	0.535	0.2496	unknown	ShapiroWilk
Iron (ug/L)	**MW-102P (bg)**	**Yes**	**3400,2200**	**8/29/2023...**	**Dixon`s**	**0.05**	**7**	**4623**	**1298**	**normal**	**ShapiroWilk**
Lead (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	0.3451	0.3559	ln(x)	ShapiroWilk
Magnesium (ug/L)	MW-102P (bg)	No	n/a	n/a	NP (nrm)	NaN	7	151000	21764	unknown	ShapiroWilk
Manganese (ug/L)	MW-102P (bg)	No	n/a	n/a	NP (nrm)	NaN	7	487.4	105.9	unknown	ShapiroWilk
Selenium (ug/L)	MW-102P (bg)	n/a	n/a	n/a	NP (nrm)	NaN	7	0.7951	0.4848	unknown	ShapiroWilk
Sulfate (mg/L)	MW-102P (bg)	No	n/a	n/a	Dixon`s	0.05	12	1643	275.8	normal	ShapiroWilk
Temperature, Field (deg C)	**MW-102P (bg)**	**Yes**	**24.1**	**8/24/2022**	**Dixon`s**	**0.05**	**8**	**15.29**	**3.586**	**normal**	**ShapiroWilk**
Total Dissolved Solids (mg/L)	**MW-102P (bg)**	**Yes**	**310**	**8/11/2021**	**Dixon`s**	**0.05**	**8**	**2449**	**906.9**	**normal**	**ShapiroWilk**
Zinc (ug/L)	MW-102P (bg)	No	n/a	n/a	EPA 1989	0.05	7	13.69	12.97	ln(x)	ShapiroWilk

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.7043, std. dev. 0.1143, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9524
Critical = 0.838
The distribution was found to be normally distributed.

Constituent: Arsenic   Analysis Run 10/9/2023 4:23 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Arsenic (ug/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	0.61 (J)
8/16/2018	0.66 (J)
8/7/2019	<0.75
8/24/2020	<0.88
8/11/2021	<0.75
8/24/2022	<0.75 (U)
8/29/2023	<0.53 (U)

ND substitution: RL or RL/2 if <15% NDs.

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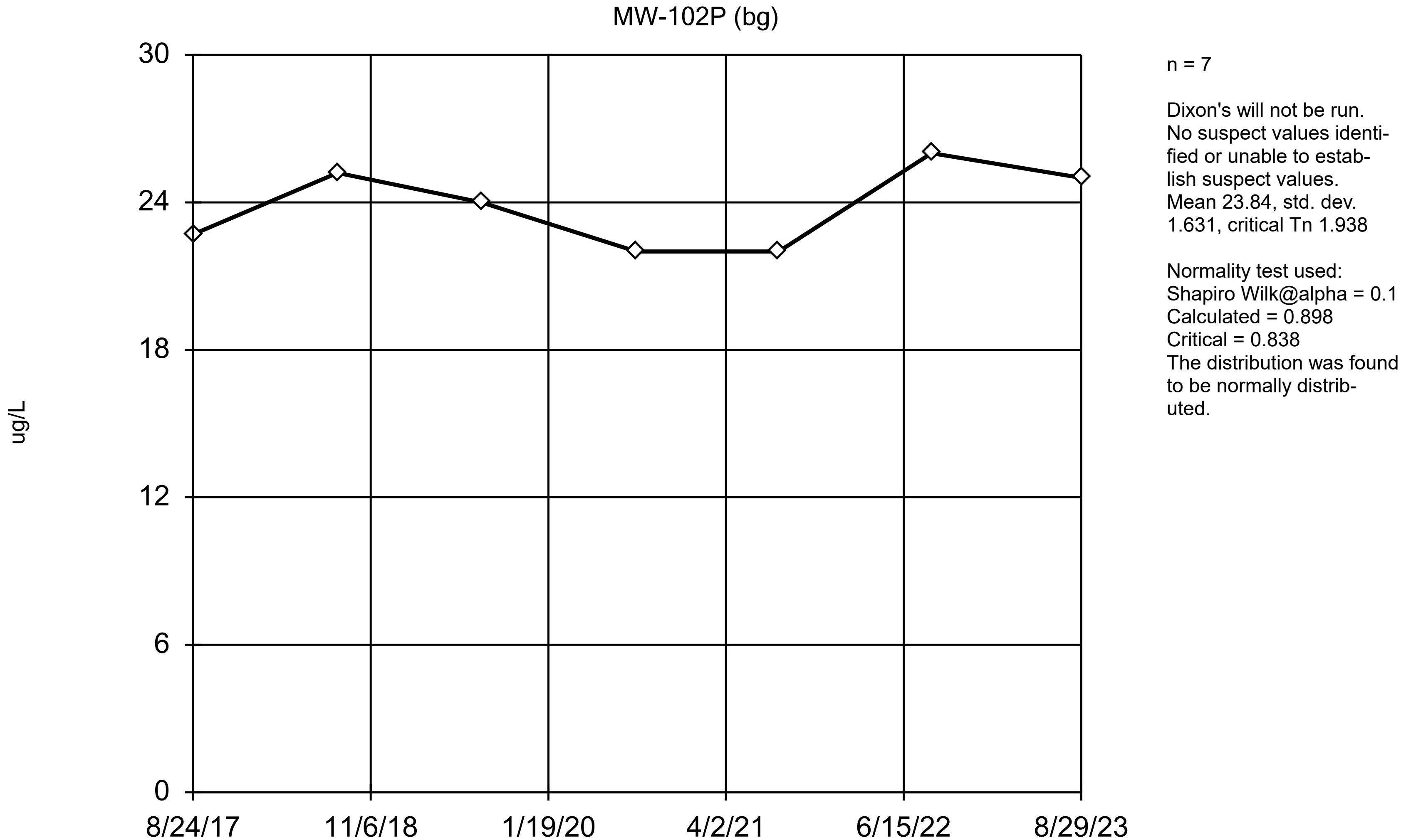
EPA Screening (suspected outliers for Dixon's Test)



Constituent: Barium Analysis Run 10/9/2023 4:23 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

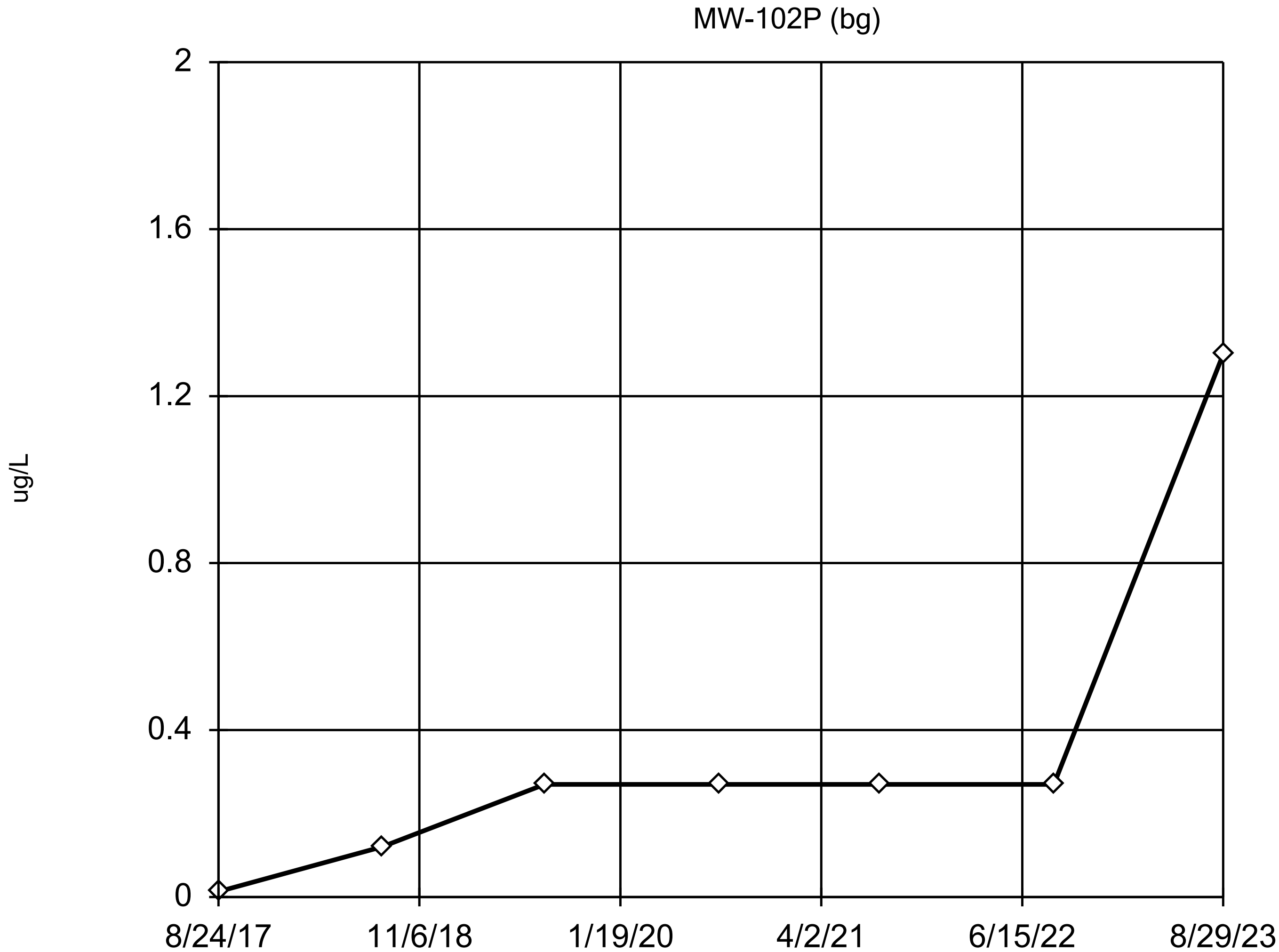
EPA 1989 Outlier Screening

Constituent: Barium (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	22.7
8/16/2018	25.2
8/7/2019	24
8/24/2020	22
8/11/2021	22 (B)
8/24/2022	26
8/29/2023	25

Tukey's Outlier Screening



n = 7

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 root transformed to achieve best W statistic (graph shown in original units).

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Beryllium   Analysis Run 10/9/2023 4:23 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Beryllium (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	0.013 (J)
8/16/2018	<0.12
8/7/2019	<0.27
8/24/2020	<0.27
8/11/2021	<0.27
8/24/2022	<0.27 (U)
8/29/2023	<1.3 (U)

ND substitution: RL or RL/2 if <15% NDs.

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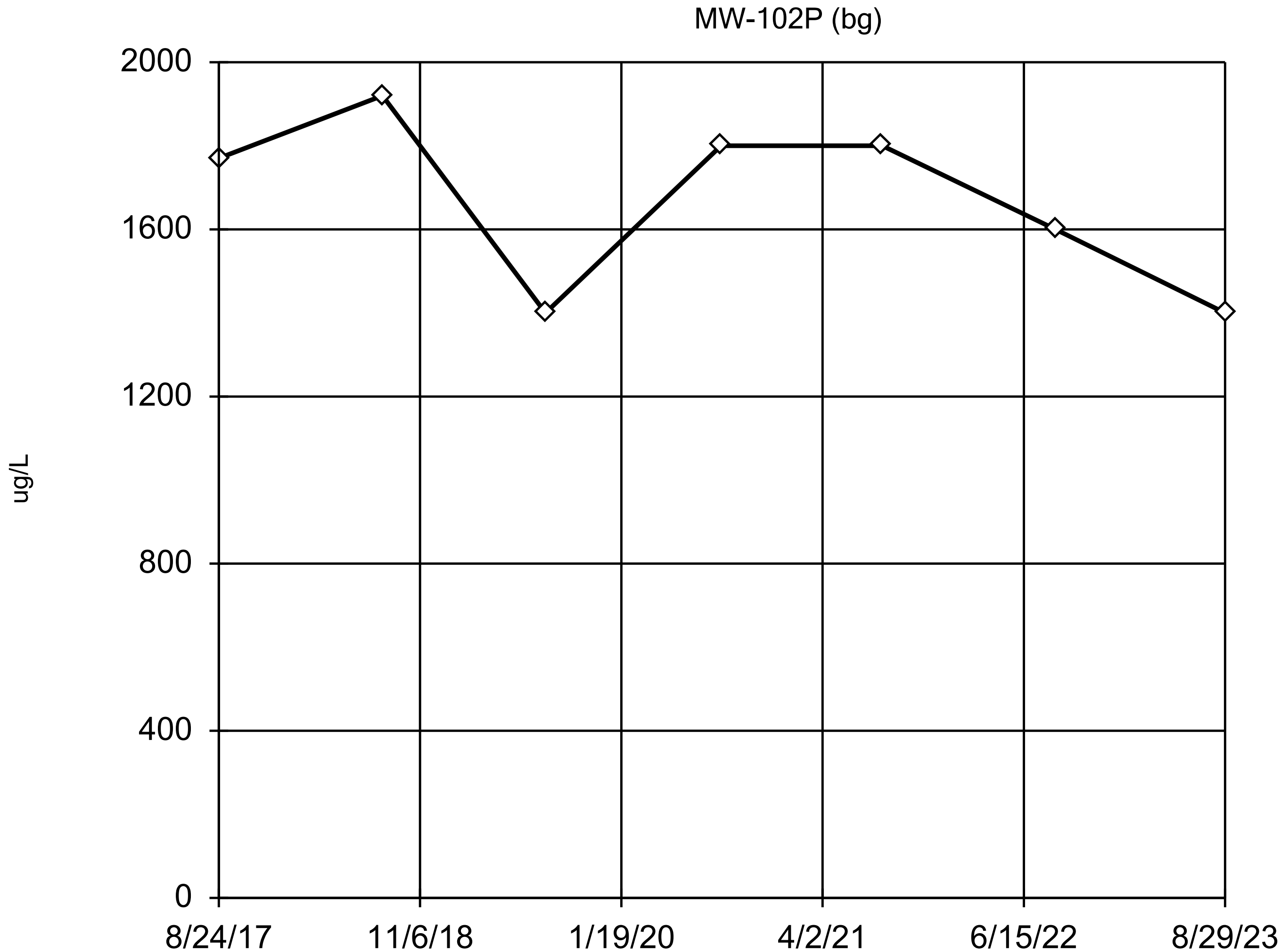
EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 1670, std. dev. 207, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8719
Critical = 0.838
The distribution was found to be normally distributed.

Constituent: Boron Analysis Run 10/9/2023 4:23 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Boron (ug/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	1770
8/16/2018	1920
8/7/2019	1400 (B)
8/24/2020	1800
8/11/2021	1800
8/24/2022	1600
8/29/2023	1400

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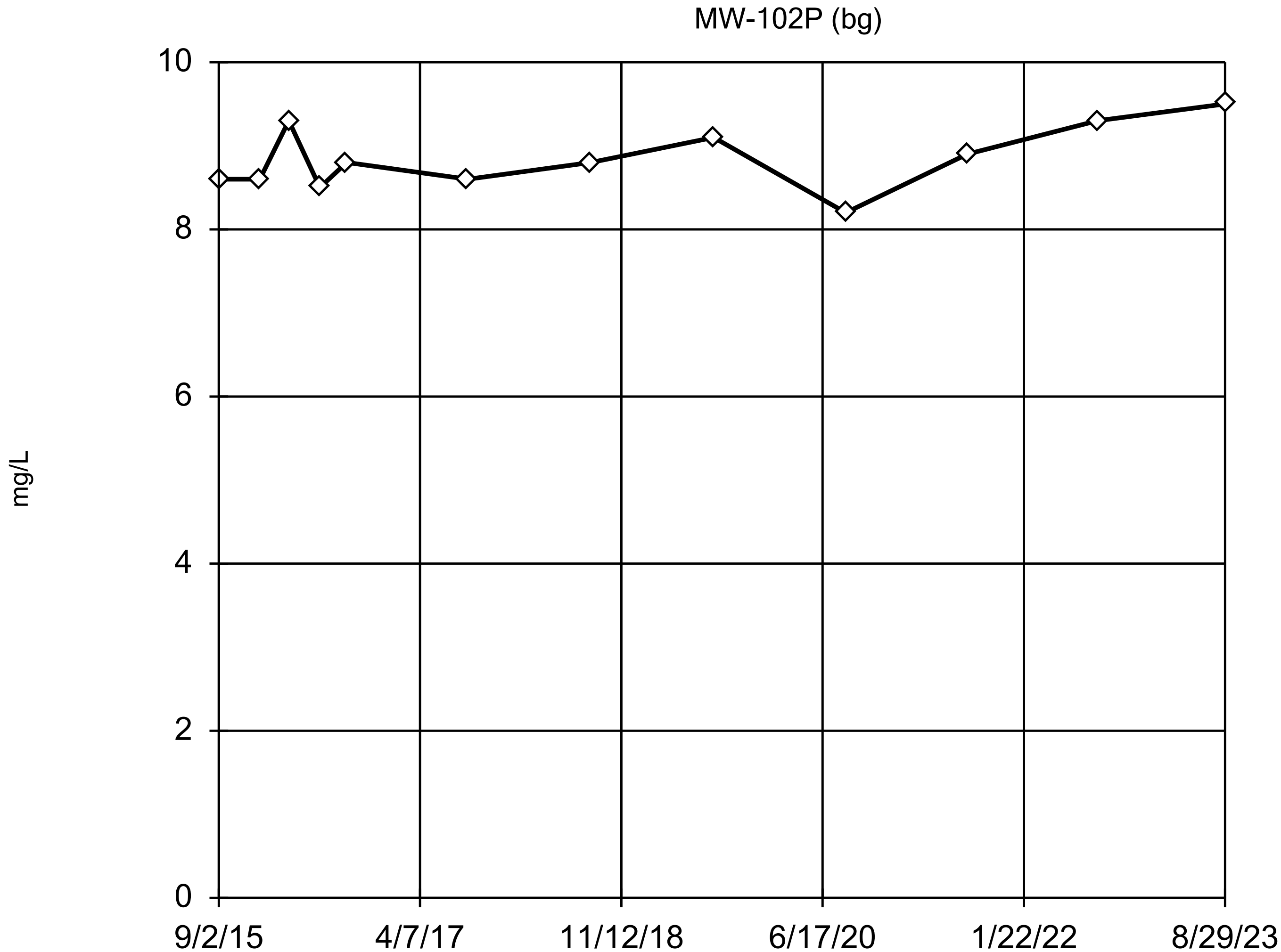
EPA Screening (suspected outliers for Dixon's Test)



n = 12

Dixon's will not be run.
No suspect values identi-
fied or unable to estab-
lish suspect values.
Mean 8.85, std. dev. 0.3849,
critical Tn 2.285

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9571
Critical = 0.883
The distribution was found
to be normally distrib-
uted.

Constituent: Chloride Analysis Run 10/9/2023 4:23 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

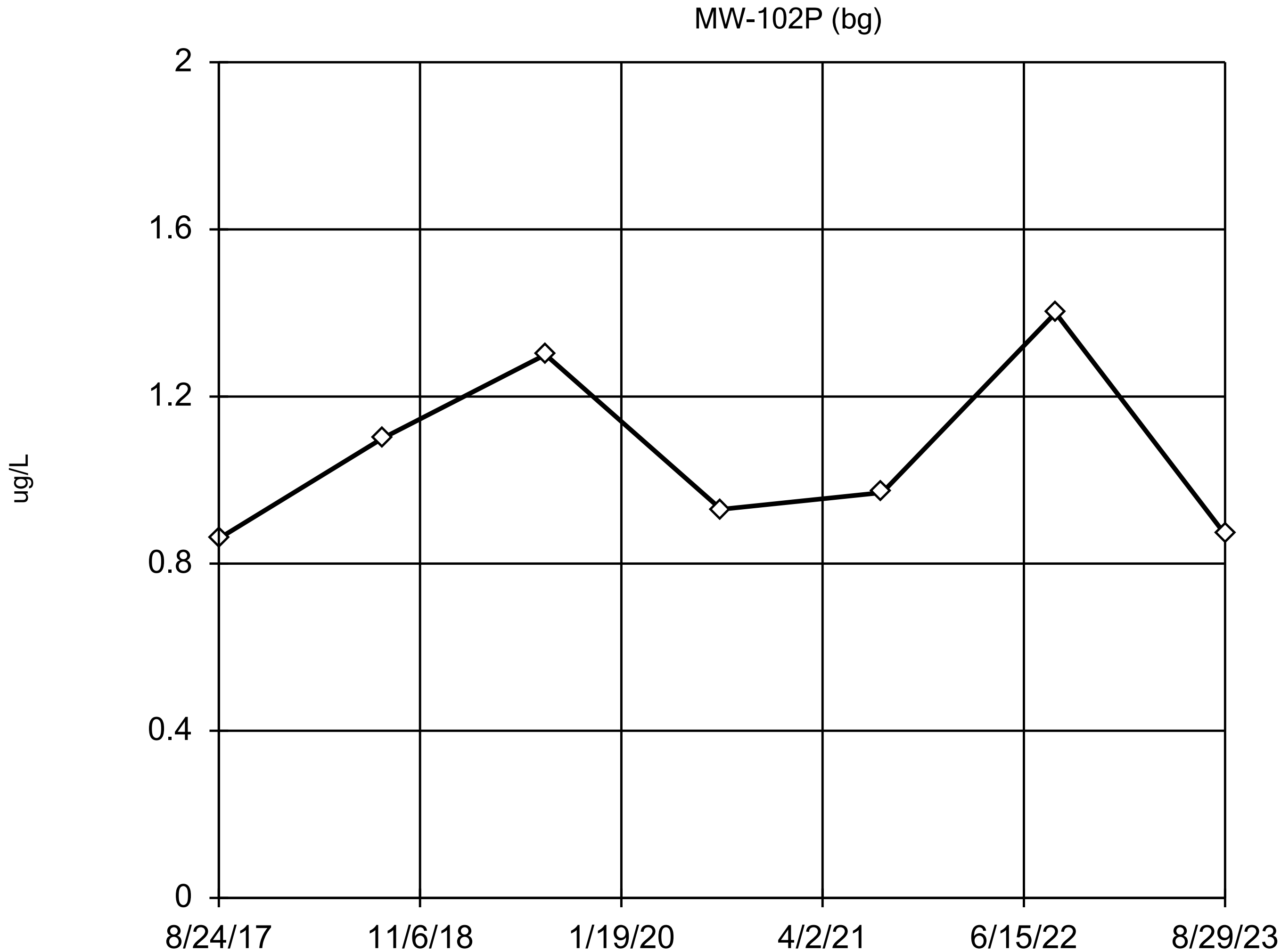
EPA 1989 Outlier Screening

Constituent: Chloride (mg/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/2/2015	8.6
12/30/2015	8.6
3/23/2016	9.3
6/21/2016	8.5
9/7/2016	8.8
8/24/2017	8.6
8/16/2018	8.8
8/7/2019	9.1
8/24/2020	8.2
8/11/2021	8.9
8/24/2022	9.3
8/29/2023	9.5

EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 1.061, std. dev. 0.2144, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8729
Critical = 0.838
The distribution was found to be normally distributed.

Constituent: Cobalt Analysis Run 10/9/2023 4:23 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Cobalt (ug/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	0.86 (J)
8/16/2018	1.1
8/7/2019	1.3 (J)
8/24/2020	0.93
8/11/2021	0.97
8/24/2022	1.4
8/29/2023	0.87

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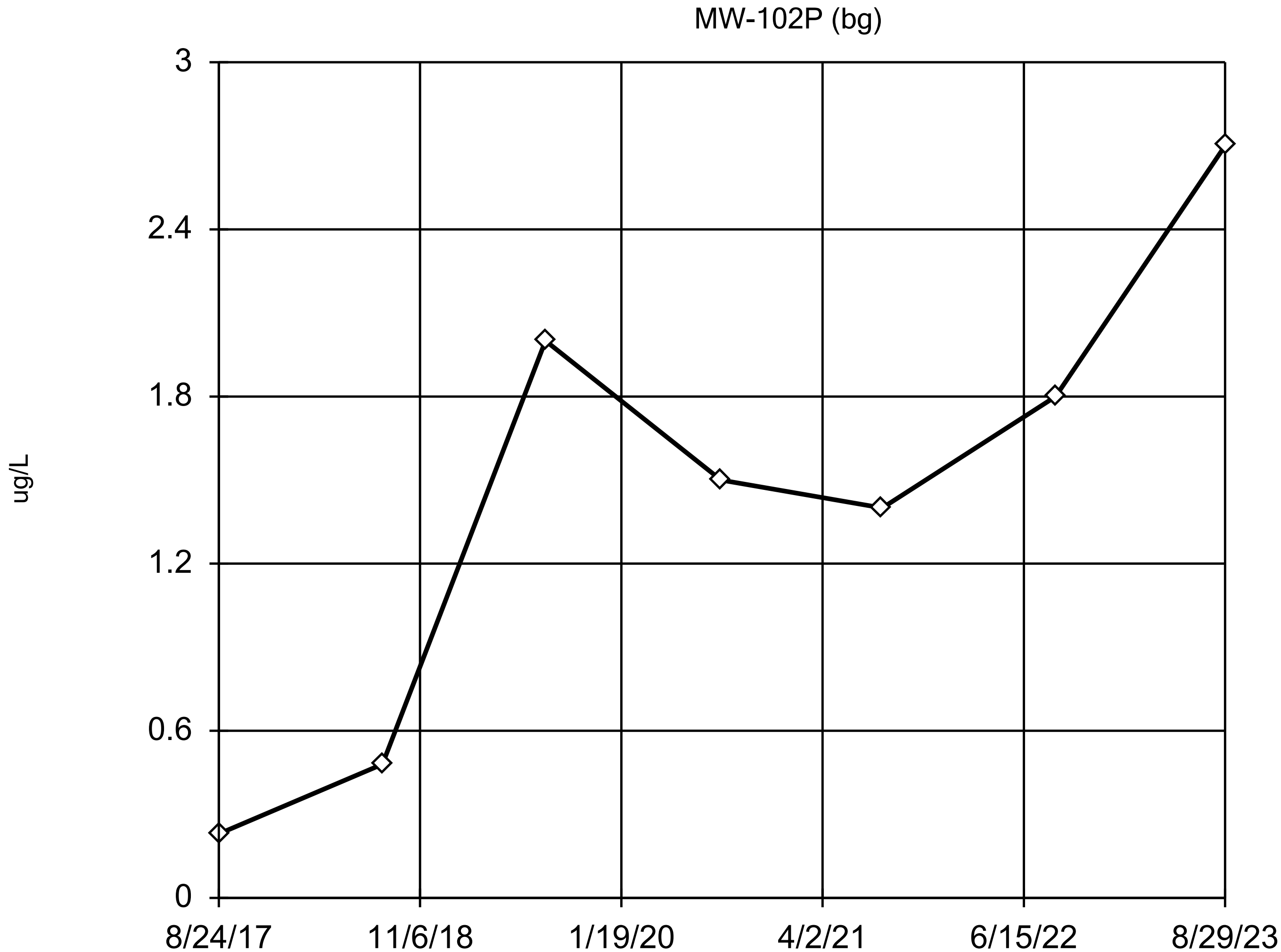
EPA Screening (suspected outliers for Dixon's Test)



n = 7

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 1.444, std. dev. 0.8584, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9563
Critical = 0.838
The distribution was found to be normally distributed.

Constituent: Copper   Analysis Run 10/9/2023 4:23 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Copper (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	0.23 (J)
8/16/2018	<0.48
8/7/2019	<2
8/24/2020	<1.5
8/11/2021	<1.4
8/24/2022	<1.8 (U)
8/29/2023	2.7 (J)

ND substitution: RL or RL/2 if <15% NDs.

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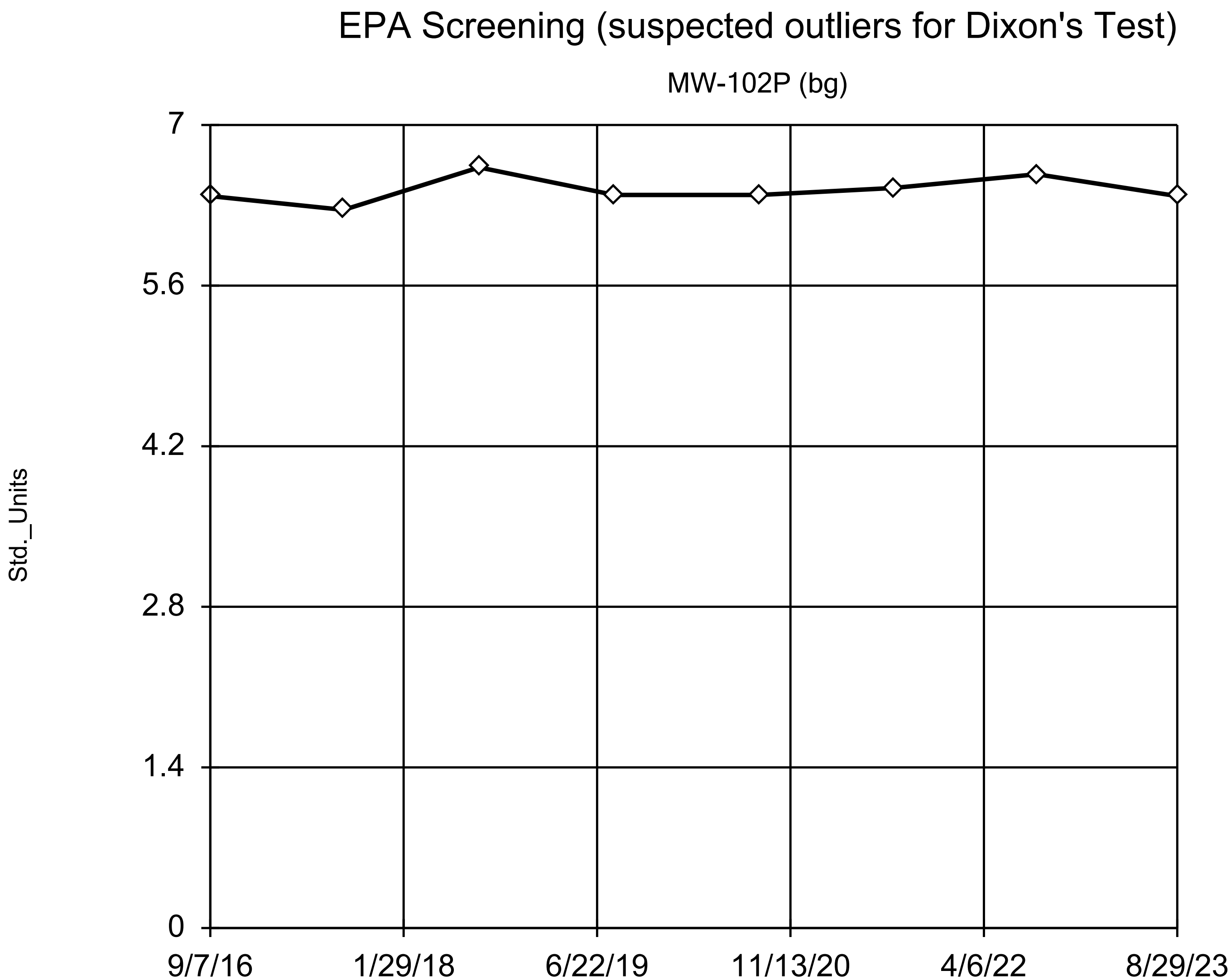

n = 8

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 6.431, std. dev. 0.1178, critical Tn 2.032

Normality test used: Shapiro Wilk@alpha = 0.1 Calculated = 0.9039 Critical = 0.851 The distribution was found to be normally distributed.

Constituent: Field pH   Analysis Run 10/9/2023 4:23 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Field pH (Std._Units)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/7/2016	6.38
8/24/2017	6.26
8/16/2018	6.63
8/7/2019	6.39
8/24/2020	6.39
8/11/2021	6.45
8/24/2022	6.57
8/29/2023	6.38

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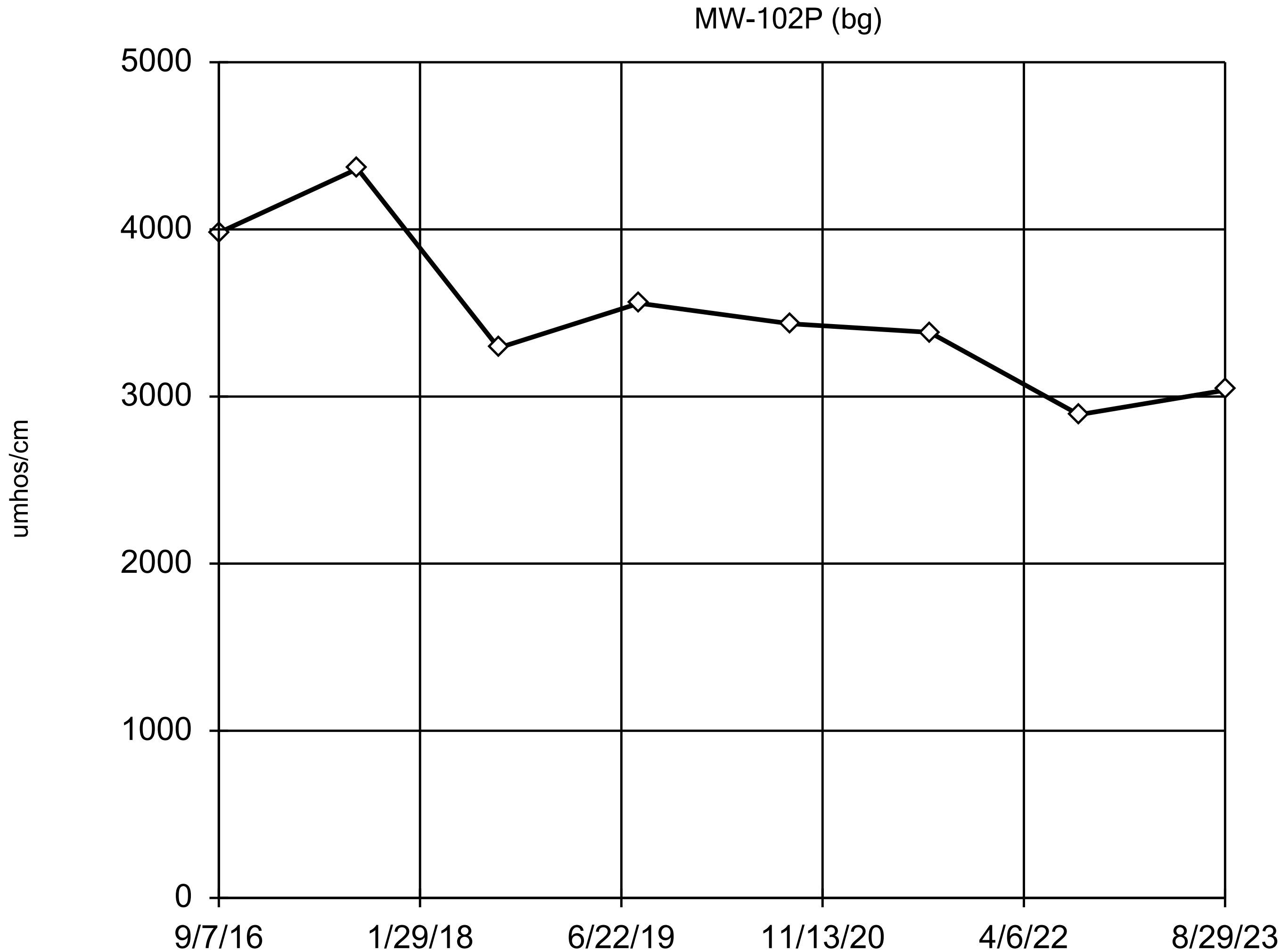
EPA Screening (suspected outliers for Dixon's Test)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 3492, std. dev. 481.5, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9444
Critical = 0.851
The distribution was found to be normally distributed.

Constituent: Field Specific Conductance   Analysis Run 10/9/2023 4:23 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

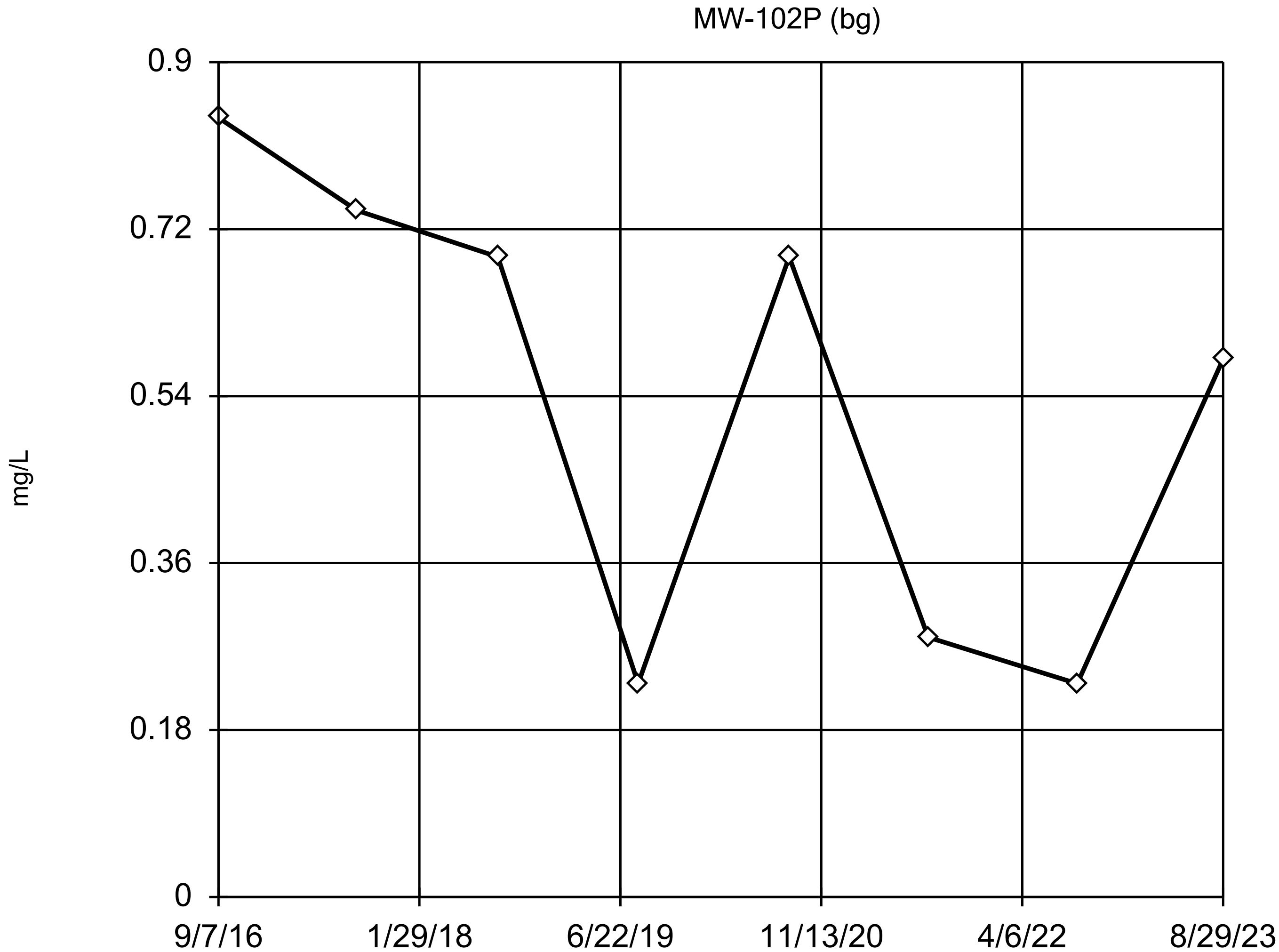
EPA 1989 Outlier Screening

Constituent: Field Specific Conductance (umhos/cm)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/7/2016	3980
8/24/2017	4362
8/16/2018	3291
8/7/2019	3558
8/24/2020	3435
8/11/2021	3384
8/24/2022	2891
8/29/2023	3037

Tukey's Outlier Screening



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 = 1.123, low cutoff = -1.011, based on IQR multiplier of 3.

Constituent: Fluoride   Analysis Run 10/9/2023 4:23 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Fluoride (mg/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

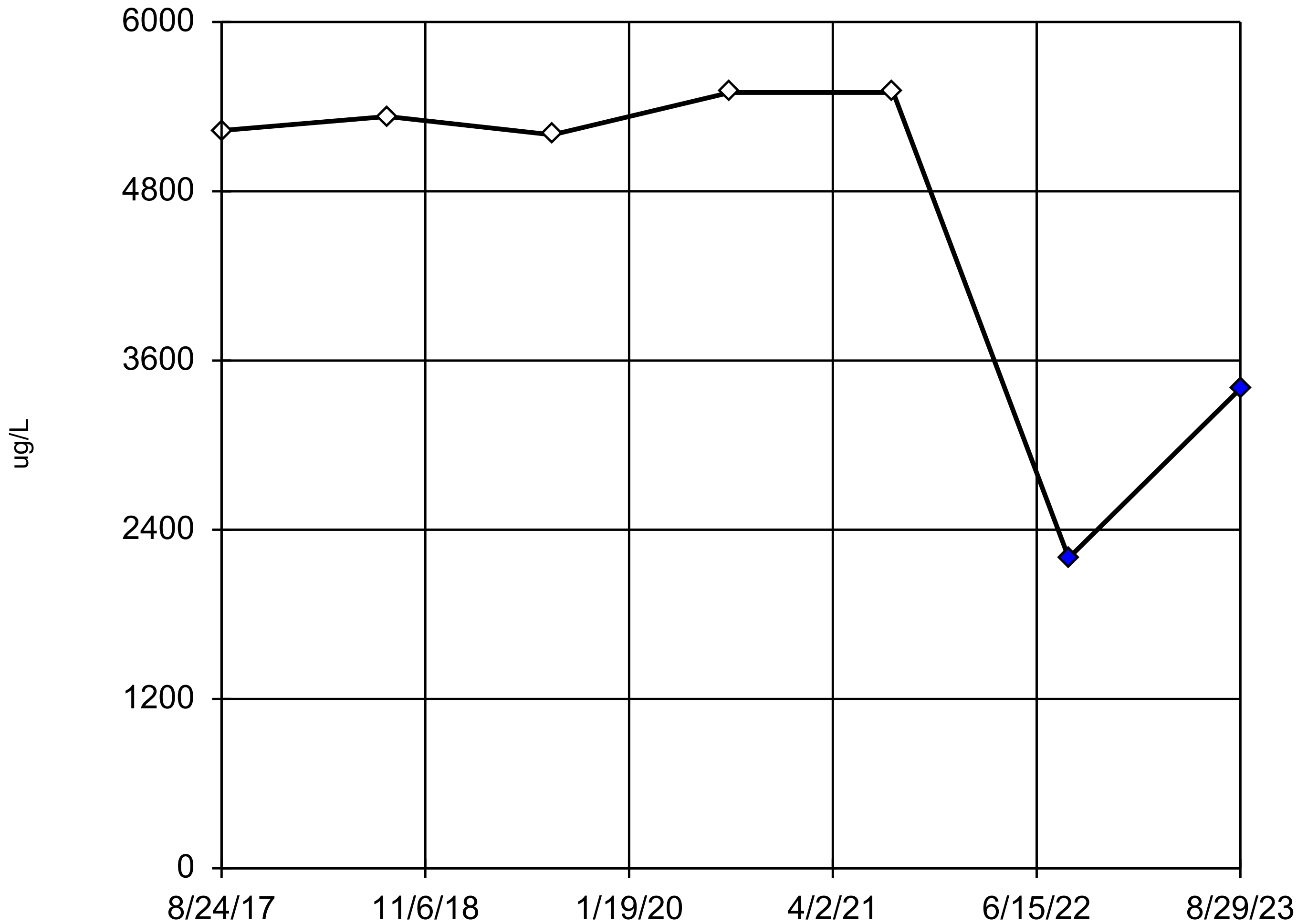
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/7/2016	0.84
8/24/2017	0.74
8/16/2018	0.69
8/7/2019	<0.23
8/24/2020	0.69
8/11/2021	<0.28
8/24/2022	0.23 (J)
8/29/2023	0.58 (J)

ND substitution: RL or RL/2 if <15% NDs.

Dixon's Outlier Test

MW-102P (bg)



n = 7

Statistical outliers are drawn as solid.
Testing for 2 low outliers.
Mean = 4623.
Std. Dev. = 1298.
3400: c = 0.8571
tabl = 0.507.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8505
Critical = 0.806
The distribution, after removal of suspect values, was found to be normally distributed.

Constituent: Iron Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Iron (ug/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	5230
8/16/2018	5330
8/7/2019	5200
8/24/2020	5500
8/11/2021	5500
8/24/2022	2200 (O)
8/29/2023	3400 (O)

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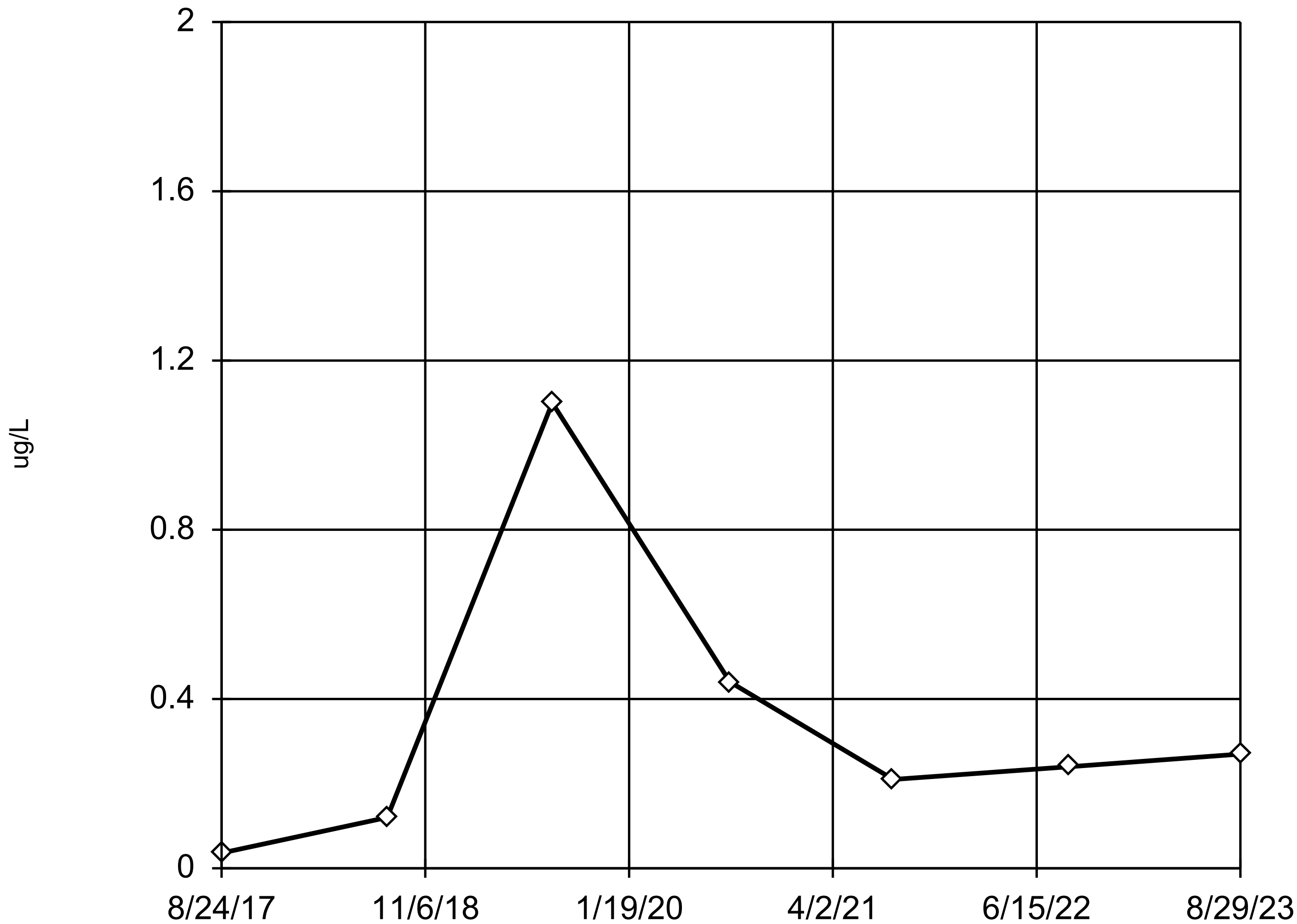
EPA Screening (suspected outliers for Dixon's Test)

MW-102P (bg)



n = 7

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 0.3451, std. dev. 0.3559, critical Tn 1.938

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9692
Critical = 0.838 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Lead   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Lead (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	0.036 (J)
8/16/2018	<0.12
8/7/2019	<1.1
8/24/2020	<0.44
8/11/2021	<0.21
8/24/2022	<0.24 (U)
8/29/2023	0.27 (JB)

ND substitution: RL or RL/2 if <15% NDs.

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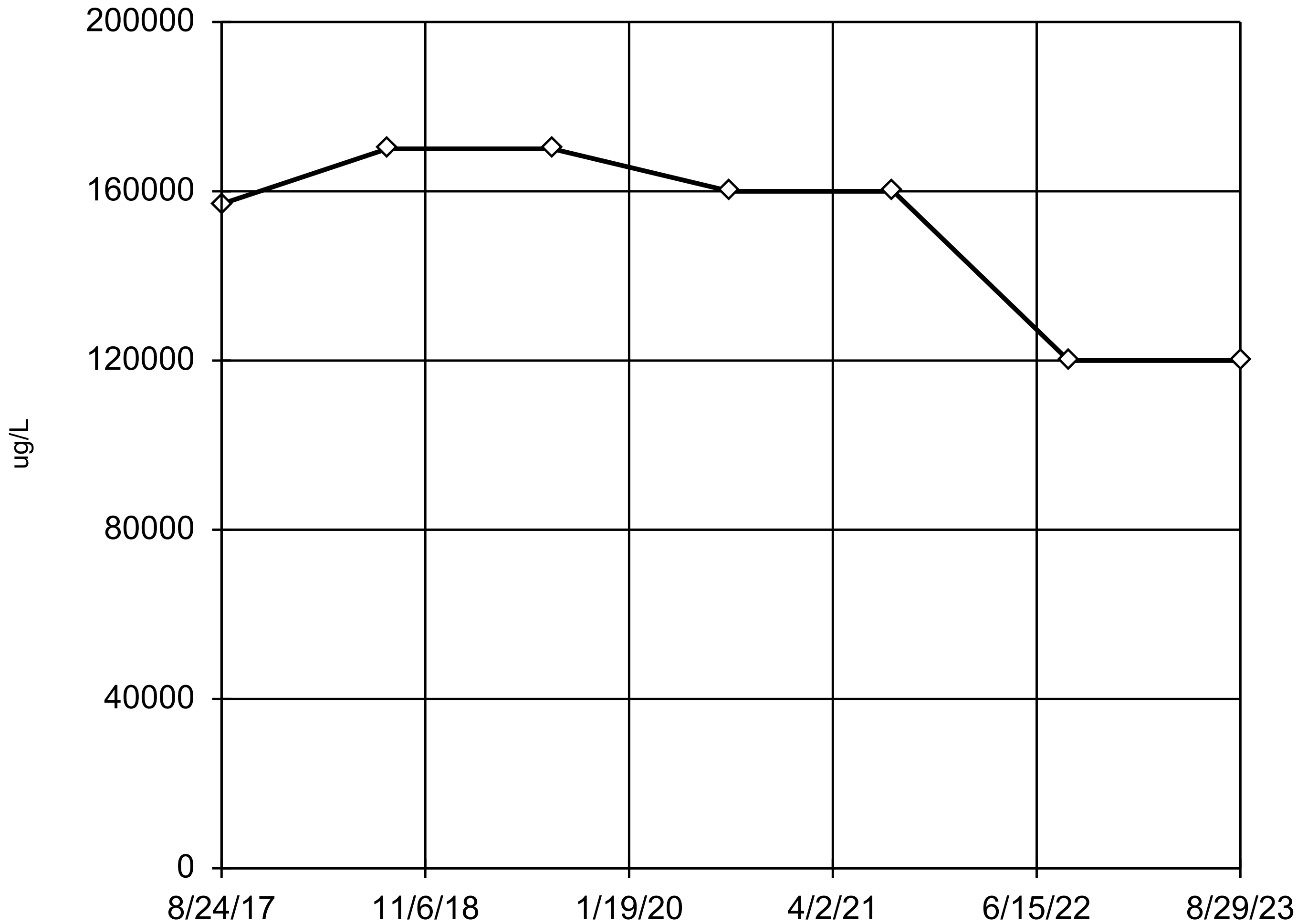
Tukey's Outlier Screening

MW-102P (bg)



n = 7

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 x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 210739, low cutoff = -198117, based on IQR multiplier of 3.

Constituent: Magnesium Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Magnesium (ug/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	157000
8/16/2018	170000
8/7/2019	170000
8/24/2020	160000
8/11/2021	160000
8/24/2022	120000
8/29/2023	120000

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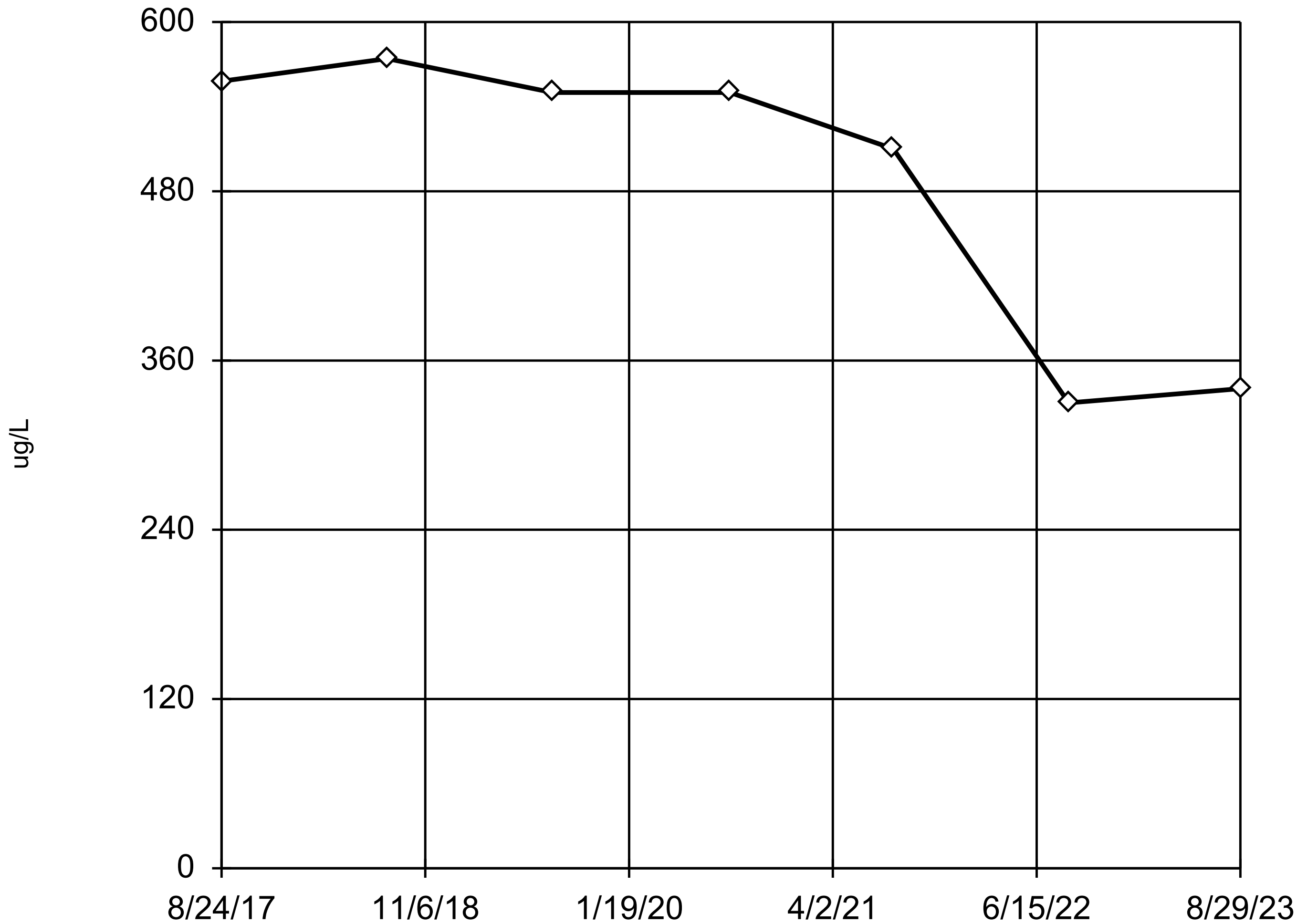
Tukey's Outlier Screening

MW-102P (bg)



n = 7

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 x^6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 698.5, low cutoff = -662.3, based on IQR multiplier of 3.

Constituent: Manganese   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Manganese (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	558
8/16/2018	574
8/7/2019	550
8/24/2020	550
8/11/2021	510
8/24/2022	330
8/29/2023	340

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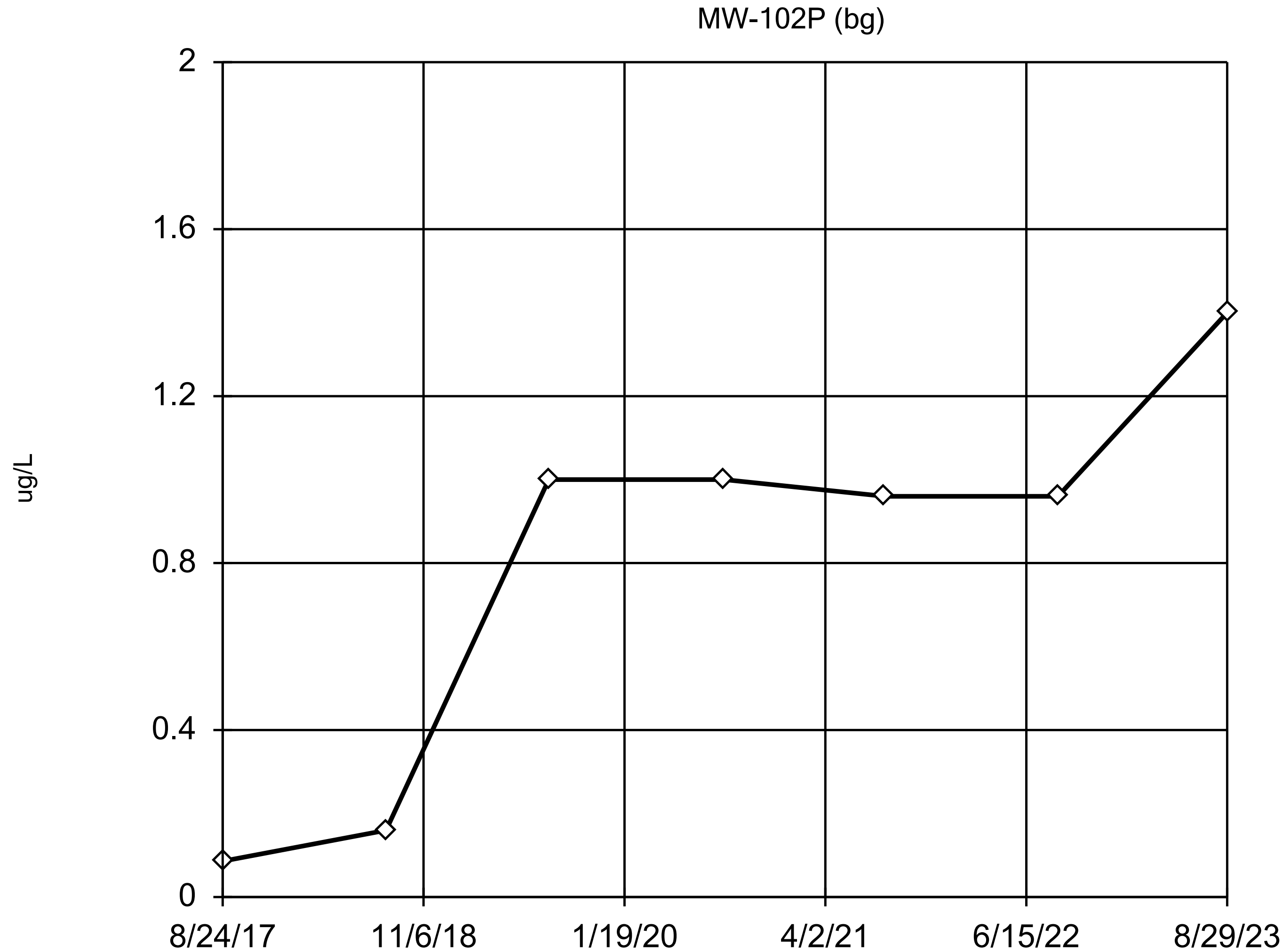
Tukey's Outlier Screening



n = 7

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).

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Selenium   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Tukey's Outlier Screening

Constituent: Selenium (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	<0.086
8/16/2018	<0.16
8/7/2019	<1
8/24/2020	<1
8/11/2021	<0.96
8/24/2022	<0.96 (U)
8/29/2023	<1.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

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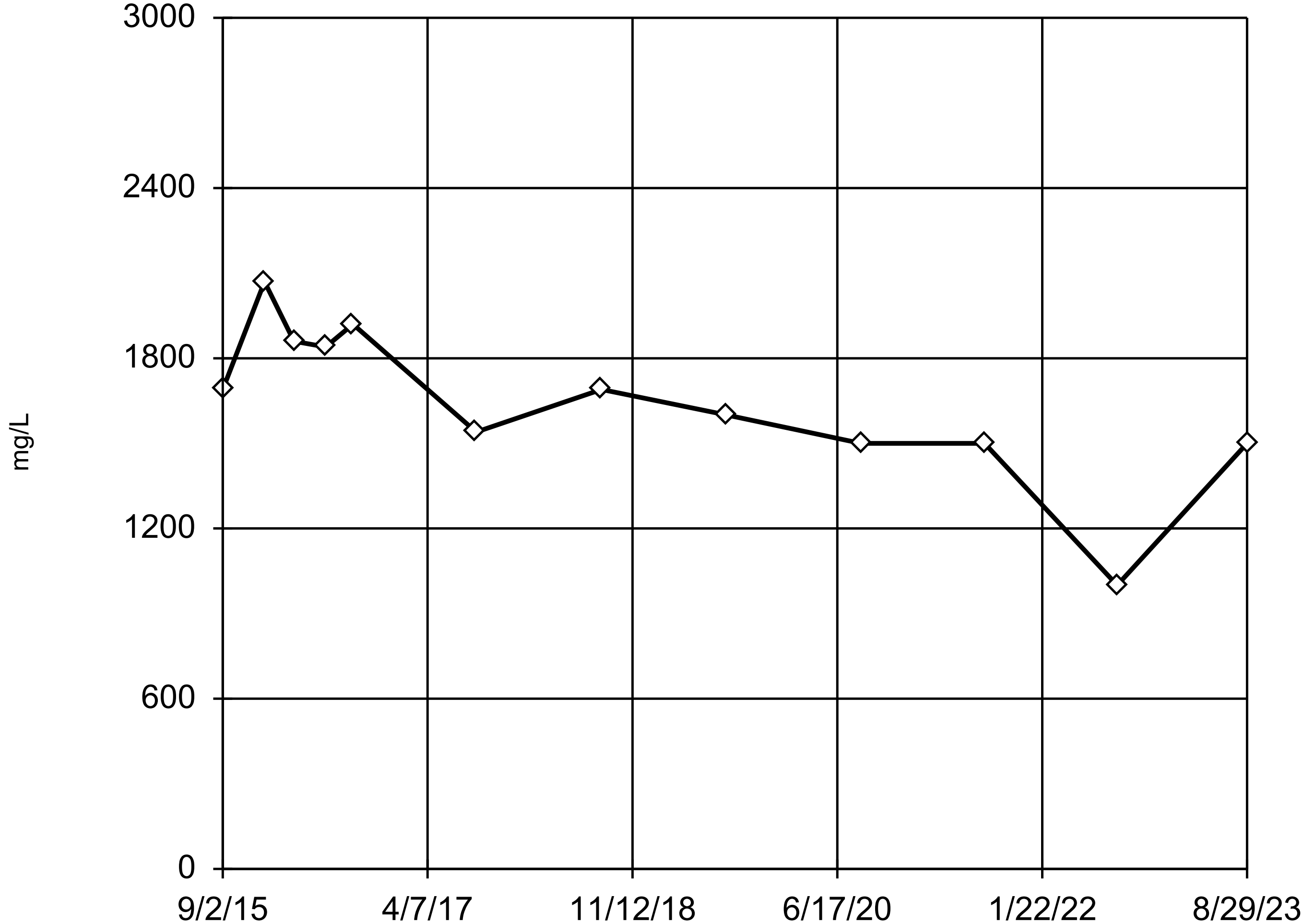
Dixon's Outlier Test

MW-102P (bg)



n = 12

No statistical outliers.
Testing for 1 low outlier.
Mean = 1643.
Std. Dev. = 275.8.
1000: c = 0.5435
tabl = 0.546.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.898
Critical = 0.876
The distribution was found to be normally distributed.

Constituent: Sulfate   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Sulfate (mg/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/2/2015	1690
12/30/2015	2070
3/23/2016	1860
6/21/2016	1840
9/7/2016	1920
8/24/2017	1540
8/16/2018	1690
8/7/2019	1600
8/24/2020	1500
8/11/2021	1500
8/24/2022	1000
8/29/2023	1500

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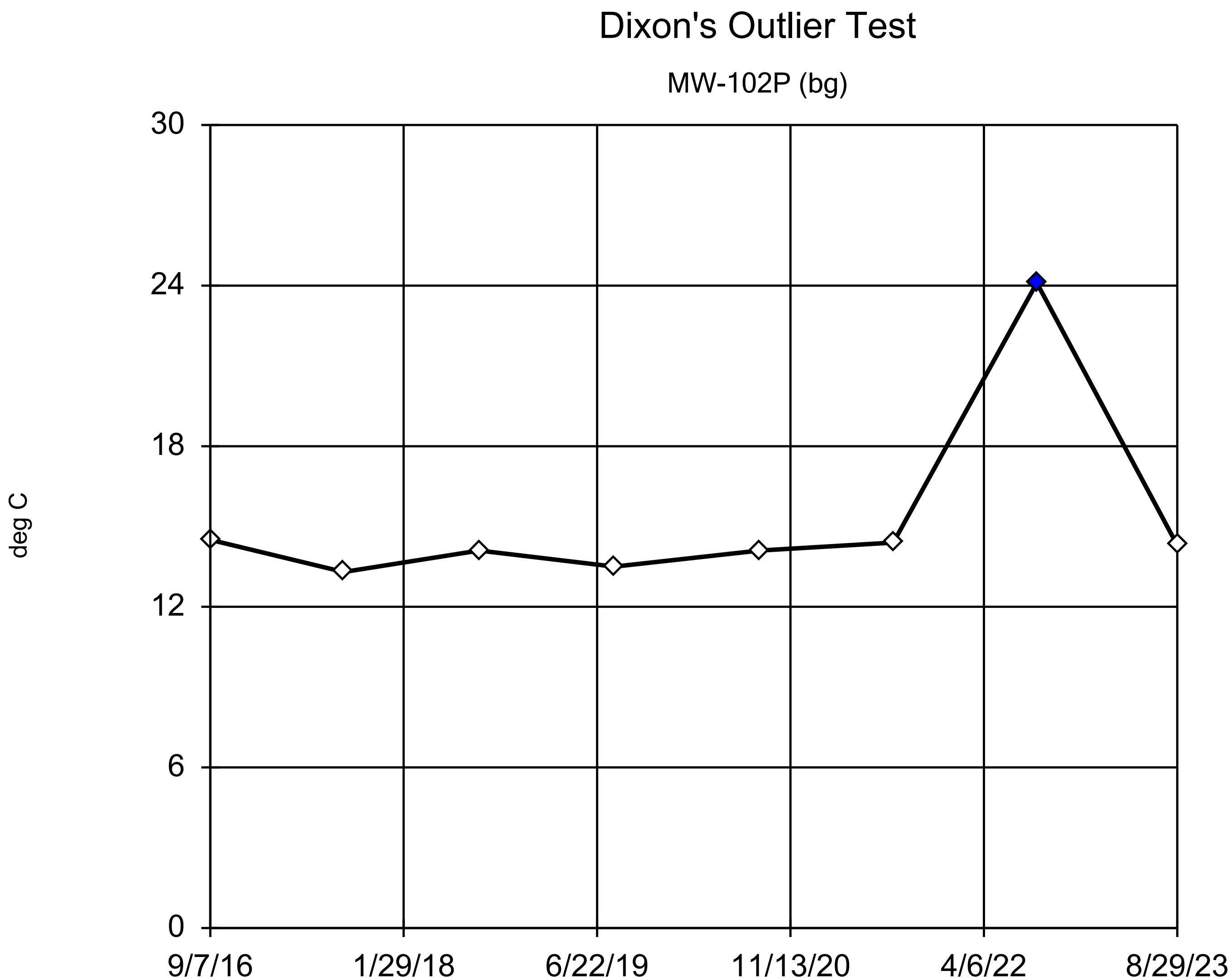

n = 8

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 15.29.
Std. Dev. = 3.586.
24.1: c = 0.9057
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8769
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Temperature, Field   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Temperature, Field (deg C)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/7/2016	14.5
8/24/2017	13.3
8/16/2018	14.1
8/7/2019	13.5
8/24/2020	14.1
8/11/2021	14.4
8/24/2022	24.1 (O)
8/29/2023	14.3

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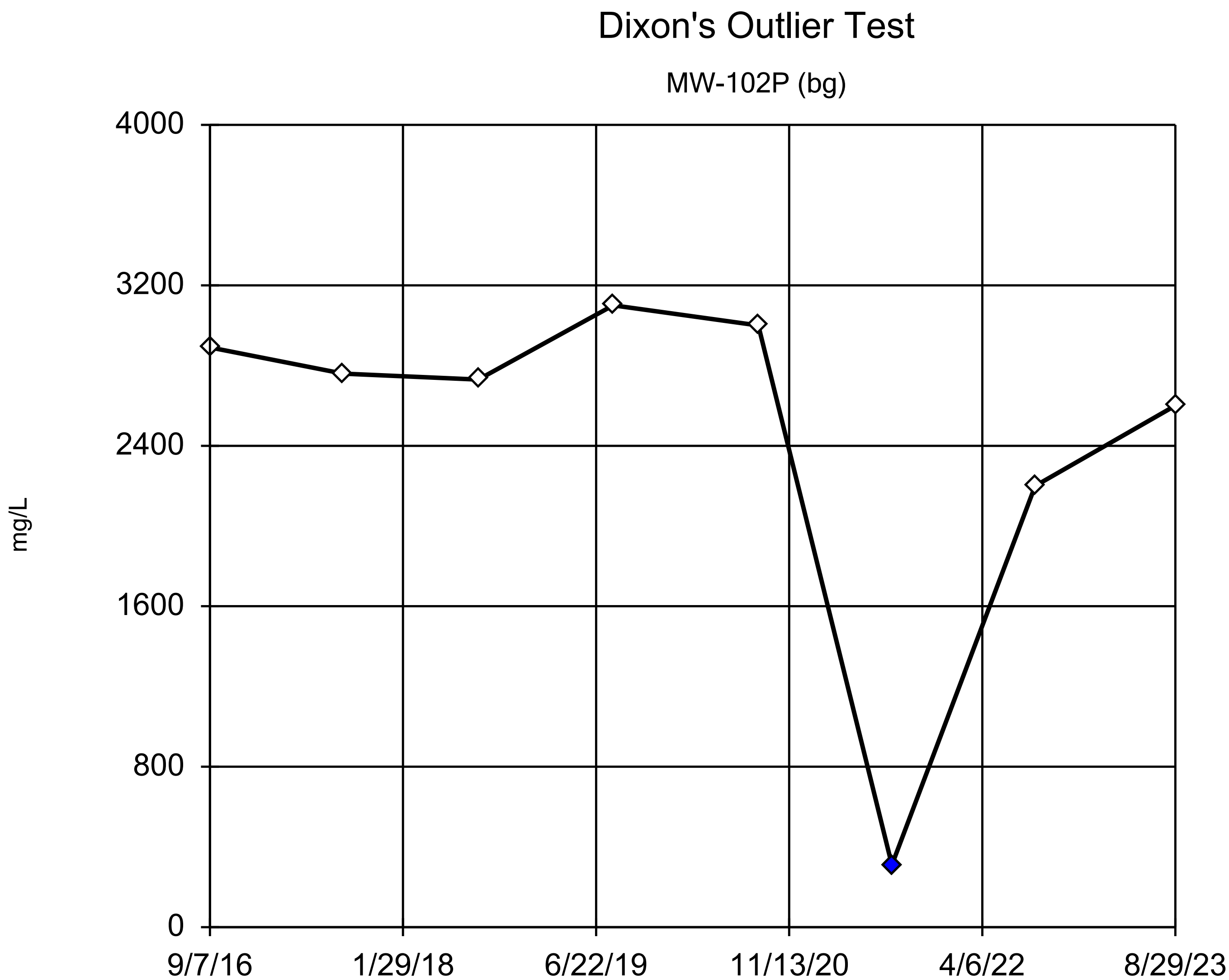

n = 8

Statistical outlier is drawn as solid.
Testing for 1 low outlier.
Mean = 2449.
Std. Dev. = 906.9.
310 (X): c = 0.7026
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9368
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Total Dissolved Solids Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Dixon's Outlier Test

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)
9/7/2016	2890
8/24/2017	2760
8/16/2018	2730
8/7/2019	3100
8/24/2020	3000
8/11/2021	310 (XO)
8/24/2022	2200
8/29/2023	2600

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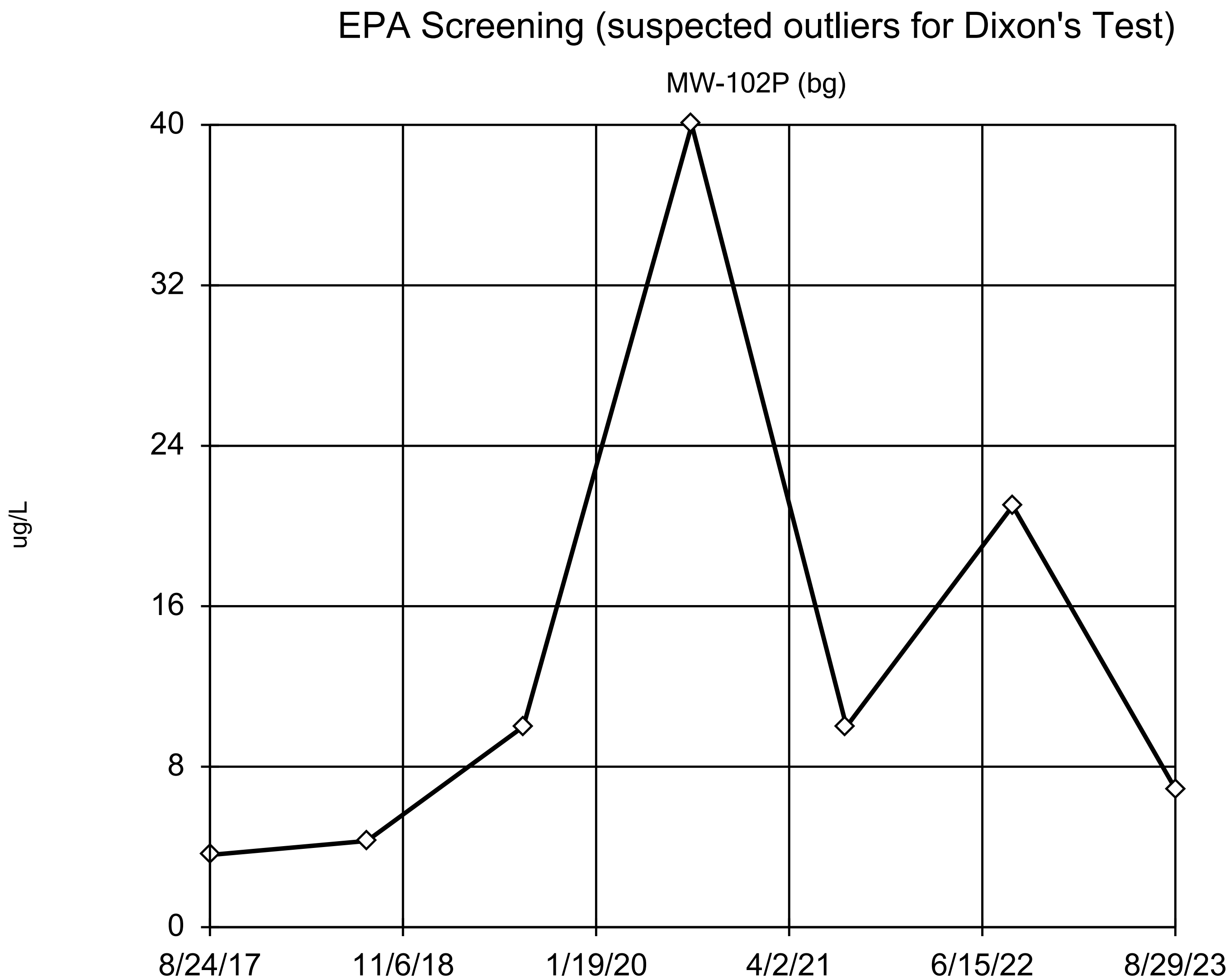

n = 7

Dixon's will not be run. No suspect values identified or unable to establish suspect values. Mean 13.69, std. dev. 12.97, critical Tn 1.938

Normality test used: Shapiro Wilk@alpha = 0.1
Calculated = 0.9475
Critical = 0.838 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Zinc   Analysis Run 10/9/2023 4:24 PM   View: Pennsylvanian Unit
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

EPA 1989 Outlier Screening

Constituent: Zinc (ug/L) Analysis Run 10/9/2023 4:24 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)
8/24/2017	3.6 (J)
8/16/2018	4.3 (J)
8/7/2019	<10
8/24/2020	<40
8/11/2021	<10
8/24/2022	21
8/29/2023	6.9 (J)

ND substitution: RL or RL/2 if <15% NDs.

Attachment D5

Interwell Prediction Limit Analysis Results - Shallow

Prediction Limit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML   Printed 10/6/2023, 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-100R	0.880	n/a	8/29/2023	0.53ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-101R	0.880	n/a	8/29/2023	0.53ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-108	0.880	n/a	8/30/2023	1.7J	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-15R	0.880	n/a	8/30/2023	0.53ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-17	0.880	n/a	8/10/2021	0.75ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Barium (ug/L)	MW-100R	95.6	n/a	8/29/2023	50	No	7	MW-1R	73.86	6.44	0	None	No	0.0007801	Param Inter 1 of 2
Barium (ug/L)	MW-101R	95.6	n/a	8/29/2023	47	No	7	MW-1R	73.86	6.44	0	None	No	0.0007801	Param Inter 1 of 2
Barium (ug/L)	MW-108	95.6	n/a	8/30/2023	34	No	7	MW-1R	73.86	6.44	0	None	No	0.0007801	Param Inter 1 of 2
Barium (ug/L)	MW-15R	95.6	n/a	8/30/2023	31	No	7	MW-1R	73.86	6.44	0	None	No	0.0007801	Param Inter 1 of 2
Barium (ug/L)	MW-17	95.6	n/a	8/10/2021	36	No	7	MW-1R	73.86	6.44	0	None	No	0.0007801	Param Inter 1 of 2
Boron (ug/L)	MW-100R	129	n/a	8/29/2023	76ND	No	7	MW-1R	72.57	16.75	42.86	Kapla...	No	0.0007801	Param Inter 1 of 2
Boron (ug/L)	**MW-101R**	**129**	**n/a**	**8/29/2023**	**620**	**Yes**	**7**	**MW-1R**	**72.57**	**16.75**	**42.86**	**Kapla...**	**No**	**0.0007801**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-108**	**129**	**n/a**	**8/30/2023**	**230**	**Yes**	**7**	**MW-1R**	**72.57**	**16.75**	**42.86**	**Kapla...**	**No**	**0.0007801**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-15R**	**129**	**n/a**	**8/30/2023**	**590**	**Yes**	**7**	**MW-1R**	**72.57**	**16.75**	**42.86**	**Kapla...**	**No**	**0.0007801**	**Param Inter 1 of 2**
Boron (ug/L)	**MW-17**	**129**	**n/a**	**8/10/2021**	**650**	**Yes**	**7**	**MW-1R**	**72.57**	**16.75**	**42.86**	**Kapla...**	**No**	**0.0007801**	**Param Inter 1 of 2**
Chloride (mg/L)	MW-100R	287	n/a	8/29/2023	32	No	35	MW-1R	4.211	1.142	0	None	x^(1/3)	0.0007801	Param Inter 1 of 2
Chloride (mg/L)	MW-101R	287	n/a	8/29/2023	6.9	No	35	MW-1R	4.211	1.142	0	None	x^(1/3)	0.0007801	Param Inter 1 of 2
Chloride (mg/L)	MW-108	287	n/a	8/30/2023	1.15ND	No	35	MW-1R	4.211	1.142	0	None	x^(1/3)	0.0007801	Param Inter 1 of 2
Chloride (mg/L)	MW-15R	287	n/a	8/30/2023	9.2	No	35	MW-1R	4.211	1.142	0	None	x^(1/3)	0.0007801	Param Inter 1 of 2
Chloride (mg/L)	MW-17	287	n/a	8/10/2021	4.4J	No	35	MW-1R	4.211	1.142	0	None	x^(1/3)	0.0007801	Param Inter 1 of 2
Cobalt (ug/L)	MW-100R	0.370	n/a	8/29/2023	0.17ND	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	MW-101R	0.370	n/a	8/29/2023	0.34J	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Cobalt (ug/L)	**MW-108**	**0.370**	**n/a**	**8/30/2023**	**3.5**	**Yes**	**7**	**MW-1R**	**n/a**	**n/a**	**57.14**	**n/a**	**n/a**	**0.02167**	**NP Inter (NDs) 1 of 2**
Cobalt (ug/L)	**MW-15R**	**0.370**	**n/a**	**8/30/2023**	**4.1**	**Yes**	**7**	**MW-1R**	**n/a**	**n/a**	**57.14**	**n/a**	**n/a**	**0.02167**	**NP Inter (NDs) 1 of 2**
Cobalt (ug/L)	**MW-17**	**0.370**	**n/a**	**8/10/2021**	**3.4**	**Yes**	**7**	**MW-1R**	**n/a**	**n/a**	**57.14**	**n/a**	**n/a**	**0.02167**	**NP Inter (NDs) 1 of 2**
Copper (ug/L)	MW-100R	2.10	n/a	8/29/2023	1.8J	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-101R	2.10	n/a	8/29/2023	1.8ND	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-108	2.10	n/a	8/30/2023	2J	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-15R	2.10	n/a	8/30/2023	1.8ND	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-17	2.10	n/a	8/10/2021	1.4ND	No	7	MW-1R	n/a	n/a	57.14	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	MW-100R	1.1	n/a	8/29/2023	0.19ND	No	8	MW-1R	0.4475	0.2133	12.5	None	No	0.0007801	Param Inter 1 of 2
Fluoride (mg/L)	MW-101R	1.1	n/a	8/29/2023	0.42J	No	8	MW-1R	0.4475	0.2133	12.5	None	No	0.0007801	Param Inter 1 of 2
Fluoride (mg/L)	MW-108	1.1	n/a	8/30/2023	0.19ND	No	8	MW-1R	0.4475	0.2133	12.5	None	No	0.0007801	Param Inter 1 of 2
Fluoride (mg/L)	MW-15R	1.1	n/a	8/30/2023	0.19ND	No	8	MW-1R	0.4475	0.2133	12.5	None	No	0.0007801	Param Inter 1 of 2
Fluoride (mg/L)	MW-17	1.1	n/a	8/10/2021	0.46J	No	8	MW-1R	0.4475	0.2133	12.5	None	No	0.0007801	Param Inter 1 of 2
Iron (ug/L)	MW-100R	665	n/a	8/29/2023	36ND	No	7	MW-1R	7.448	5.433	42.86	Kapla...	sqrt(x)	0.0007801	Param Inter 1 of 2
Iron (ug/L)	MW-101R	665	n/a	8/29/2023	130	No	7	MW-1R	7.448	5.433	42.86	Kapla...	sqrt(x)	0.0007801	Param Inter 1 of 2
Iron (ug/L)	**MW-108**	**665**	**n/a**	**8/30/2023**	**2200**	**Yes**	**7**	**MW-1R**	**7.448**	**5.433**	**42.86**	**Kapla...**	**sqrt(x)**	**0.0007801**	**Param Inter 1 of 2**
Iron (ug/L)	MW-15R	665	n/a	8/30/2023	540	No	7	MW-1R	7.448	5.433	42.86	Kapla...	sqrt(x)	0.0007801	Param Inter 1 of 2
Iron (ug/L)	MW-17	665	n/a	8/10/2021	48J	No	7	MW-1R	7.448	5.433	42.86	Kapla...	sqrt(x)	0.0007801	Param Inter 1 of 2
Lead (ug/L)	MW-100R	1.32	n/a	8/29/2023	0.24J	No	7	MW-1R	0.3743	0.2796	42.86	Kapla...	No	0.0007801	Param Inter 1 of 2
Lead (ug/L)	MW-101R	1.32	n/a	8/29/2023	0.44J	No	7	MW-1R	0.3743	0.2796	42.86	Kapla...	No	0.0007801	Param Inter 1 of 2
Lead (ug/L)	MW-108	1.32	n/a	8/30/2023	0.24ND	No	7	MW-1R	0.3743	0.2796	42.86	Kapla...	No	0.0007801	Param Inter 1 of 2
Lead (ug/L)	MW-15R	1.32	n/a	8/30/2023	0.48J	No	7	MW-1R	0.3743	0.2796	42.86	Kapla...	No	0.0007801	Param Inter 1 of 2
Lead (ug/L)	MW-17	1.32	n/a	8/10/2021	0.21ND	No	7	MW-1R	0.3743	0.2796	42.86	Kapla...	No	0.0007801	Param Inter 1 of 2
Magnesium (ug/L)	MW-100R	48100	n/a	8/29/2023	35000	No	7	MW-1R	n/a	n/a	0	n/a	n/a	0.02167	NP Inter (normality) ...
Magnesium (ug/L)	**MW-101R**	**48100**	**n/a**	**8/29/2023**	**58000**	**Yes**	**7**	**MW-1R**	**n/a**	**n/a**	**0**	**n/a**	**n/a**	**0.02167**	**NP Inter (normality) ...**
Magnesium (ug/L)	MW-108	48100	n/a	8/30/2023	13000	No	7	MW-1R	n/a	n/a	0	n/a	n/a	0.02167	NP Inter (normality) ...
Magnesium (ug/L)	**MW-15R**	**48100**	**n/a**	**8/30/2023**	**110000**	**Yes**	**7**	**MW-1R**	**n/a**	**n/a**	**0**	**n/a**	**n/a**	**0.02167**	**NP Inter (normality) ...**
Magnesium (ug/L)	MW-17	48100	n/a	8/10/2021	25000	No	7	MW-1R	n/a	n/a	0	n/a	n/a	0.02167	NP Inter (normality) ...

Prediction Limit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML   Printed 10/6/2023, 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
Manganese (ug/L)	MW-100R	33	n/a	8/29/2023	3.6ND	No	7	MW-1R	1.58	0.4818	42.86	Kapla...	x^(1/3)	0.0007801	Param Inter 1 of 2
Manganese (ug/L)	**MW-101R**	**33**	**n/a**	**8/29/2023**	**84**	**Yes**	**7**	**MW-1R**	**1.58**	**0.4818**	**42.86**	**Kapla...**	**x^(1/3)**	**0.0007801**	**Param Inter 1 of 2**
Manganese (ug/L)	**MW-108**	**33**	**n/a**	**8/30/2023**	**620**	**Yes**	**7**	**MW-1R**	**1.58**	**0.4818**	**42.86**	**Kapla...**	**x^(1/3)**	**0.0007801**	**Param Inter 1 of 2**
Manganese (ug/L)	**MW-15R**	**33**	**n/a**	**8/30/2023**	**840**	**Yes**	**7**	**MW-1R**	**1.58**	**0.4818**	**42.86**	**Kapla...**	**x^(1/3)**	**0.0007801**	**Param Inter 1 of 2**
Manganese (ug/L)	**MW-17**	**33**	**n/a**	**8/10/2021**	**2200**	**Yes**	**7**	**MW-1R**	**1.58**	**0.4818**	**42.86**	**Kapla...**	**x^(1/3)**	**0.0007801**	**Param Inter 1 of 2**
Selenium (ug/L)	MW-100R	3.45	n/a	8/29/2023	1.4J	No	7	MW-1R	1.474	0.5866	28.57	Kapla...	No	0.0007801	Param Inter 1 of 2
Selenium (ug/L)	MW-101R	3.45	n/a	8/29/2023	4.1J	No	7	MW-1R	1.474	0.5866	28.57	Kapla...	No	0.0007801	Param Inter 1 of 2
Selenium (ug/L)	MW-108	3.45	n/a	8/30/2023	1.9J	No	7	MW-1R	1.474	0.5866	28.57	Kapla...	No	0.0007801	Param Inter 1 of 2
Selenium (ug/L)	MW-15R	3.45	n/a	8/30/2023	1.4ND	No	7	MW-1R	1.474	0.5866	28.57	Kapla...	No	0.0007801	Param Inter 1 of 2
Selenium (ug/L)	MW-17	3.45	n/a	8/10/2021	0.96ND	No	7	MW-1R	1.474	0.5866	28.57	Kapla...	No	0.0007801	Param Inter 1 of 2
Sulfate (mg/L)	MW-100R	483	n/a	8/29/2023	190	No	25	MW-1R	226.5	117.9	0	None	No	0.0007801	Param Inter 1 of 2
Sulfate (mg/L)	**MW-101R**	**483**	**n/a**	**8/29/2023**	**490**	**Yes**	**25**	**MW-1R**	**226.5**	**117.9**	**0**	**None**	**No**	**0.0007801**	**Param Inter 1 of 2**
Sulfate (mg/L)	MW-108	483	n/a	8/30/2023	140	No	25	MW-1R	226.5	117.9	0	None	No	0.0007801	Param Inter 1 of 2
Sulfate (mg/L)	**MW-15R**	**483**	**n/a**	**8/30/2023**	**680**	**Yes**	**25**	**MW-1R**	**226.5**	**117.9**	**0**	**None**	**No**	**0.0007801**	**Param Inter 1 of 2**
Sulfate (mg/L)	MW-17	483	n/a	8/10/2021	280	No	25	MW-1R	226.5	117.9	0	None	No	0.0007801	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-100R	1130	n/a	8/29/2023	600	No	8	MW-1R	584.4	179.5	0	None	No	0.0007801	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-101R	1130	n/a	8/29/2023	1000	No	8	MW-1R	584.4	179.5	0	None	No	0.0007801	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-108	1130	n/a	8/30/2023	290	No	8	MW-1R	584.4	179.5	0	None	No	0.0007801	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	**MW-15R**	**1130**	**n/a**	**8/30/2023**	**1300**	**Yes**	**8**	**MW-1R**	**584.4**	**179.5**	**0**	**None**	**No**	**0.0007801**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	MW-17	1130	n/a	8/10/2021	530	No	8	MW-1R	584.4	179.5	0	None	No	0.0007801	Param Inter 1 of 2
Zinc (ug/L)	MW-100R	10.0	n/a	8/29/2023	6.4ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-101R	10.0	n/a	8/29/2023	6.4ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Zinc (ug/L)	**MW-108**	**10.0**	**n/a**	**8/30/2023**	**40**	**Yes**	**7**	**MW-1R**	**n/a**	**n/a**	**85.71**	**n/a**	**n/a**	**0.02167**	**NP Inter (NDs) 1 of 2**
Zinc (ug/L)	MW-15R	10.0	n/a	8/30/2023	6.4ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2
Zinc (ug/L)	MW-17	10.0	n/a	8/10/2021	10ND	No	7	MW-1R	n/a	n/a	85.71	n/a	n/a	0.02167	NP Inter (NDs) 1 of 2

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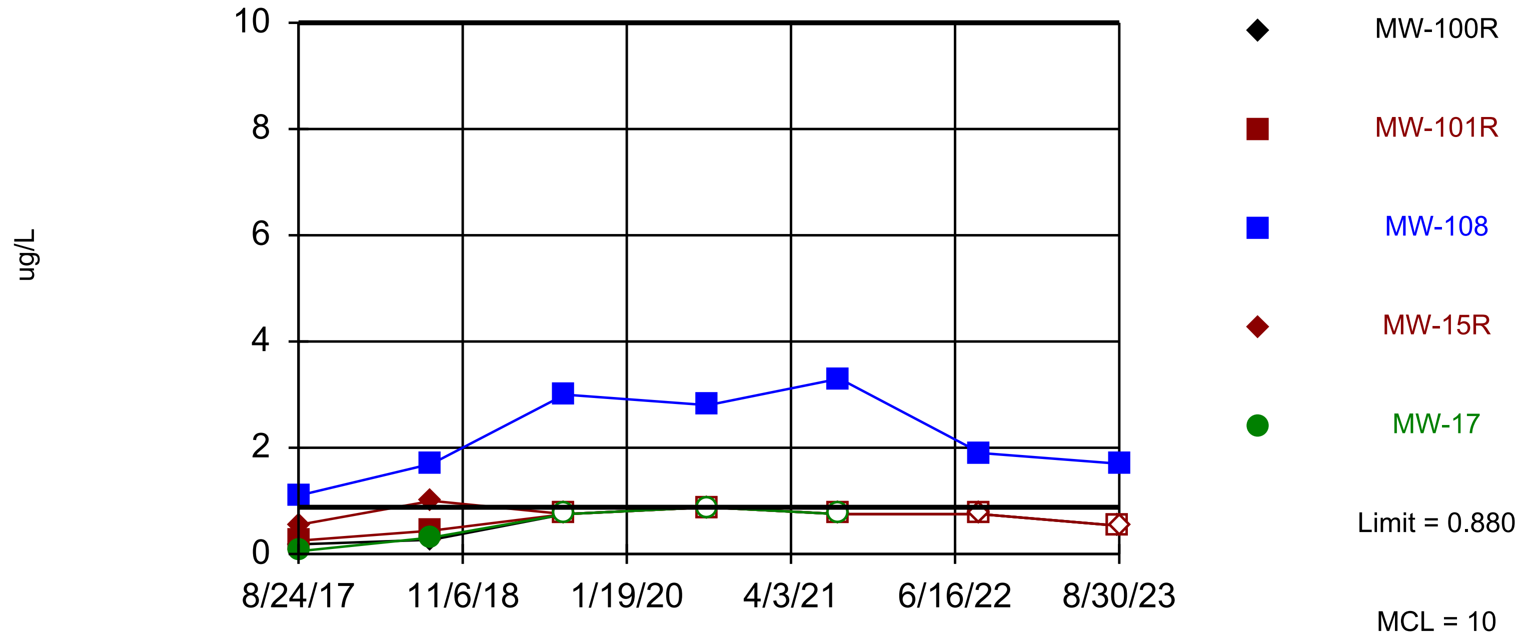
Hollow symbols indicate censored values.

Within Limit

Arsenic

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 85.71% NDs. Annual per-constituent alpha = 0.179. Individual comparison alpha = 0.02167 (1 of 2). Comparing 5 points to limit. Assumes 4 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/6/2023 11:30 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Prediction Limit

Constituent: Arsenic (ug/L)   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-17	MW-15R	MW-1R (bg)	MW-108	MW-101R
8/24/2017	0.18 (J)	0.052 (J)	0.55 (J)	0.2 (J)	1.1	0.25 (J)
8/16/2018	0.27 (J)	0.31 (J)	1		1.7	0.44 (J)
4/6/2019				<0.75		
8/7/2019	<0.75	<0.75	<0.75	<0.75	3	<0.75
8/24/2020	<0.88	<0.88		<0.88	2.8	<0.88
8/25/2020			<0.88			
8/10/2021		<0.75		<0.75		
8/11/2021	<0.75				3.3	<0.75
8/12/2021			<0.75			
8/23/2022				<0.75 (U)		
8/24/2022	<0.75 (U)		<0.75 (U)		1.9 (J)	<0.75 (U)
8/29/2023	<0.53 (U)			<0.53 (U)		<0.53 (U)
8/30/2023			<0.53 (U)		1.7 (J)	

ND substitution: RL or RL/2 if <15% NDs.

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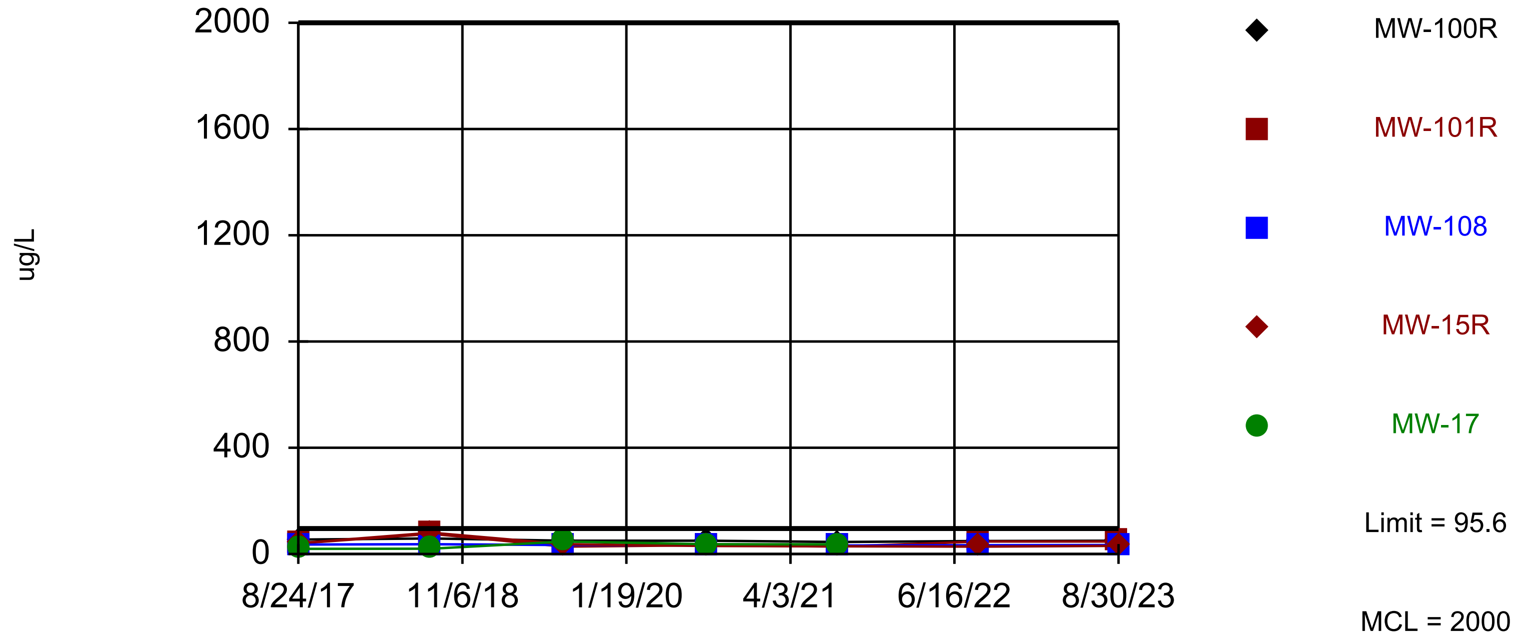
Within Limit

Barium

Interwell Parametric



Background Data Summary: Mean=73.86, Std. Dev.=6.44, n=7. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8716, critical = 0.73. Kappa = 3.376 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Barium (ug/L)   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	54.2	40	35.4	40.6	19.4	61
8/16/2018	58.4	75.9	37.1	80.5	20.2	
4/6/2019						81
8/7/2019	50	28	34	37	47	75
8/24/2020	50	33	33		37	76
8/25/2020				30		
8/10/2021					36 (B)	71 (B)
8/11/2021	45 (B)	28 (B)	32 (B)			
8/12/2021				29 (B)		
8/23/2022						78
8/24/2022	49	47	33	28		
8/29/2023	50	47				75
8/30/2023			34	31		

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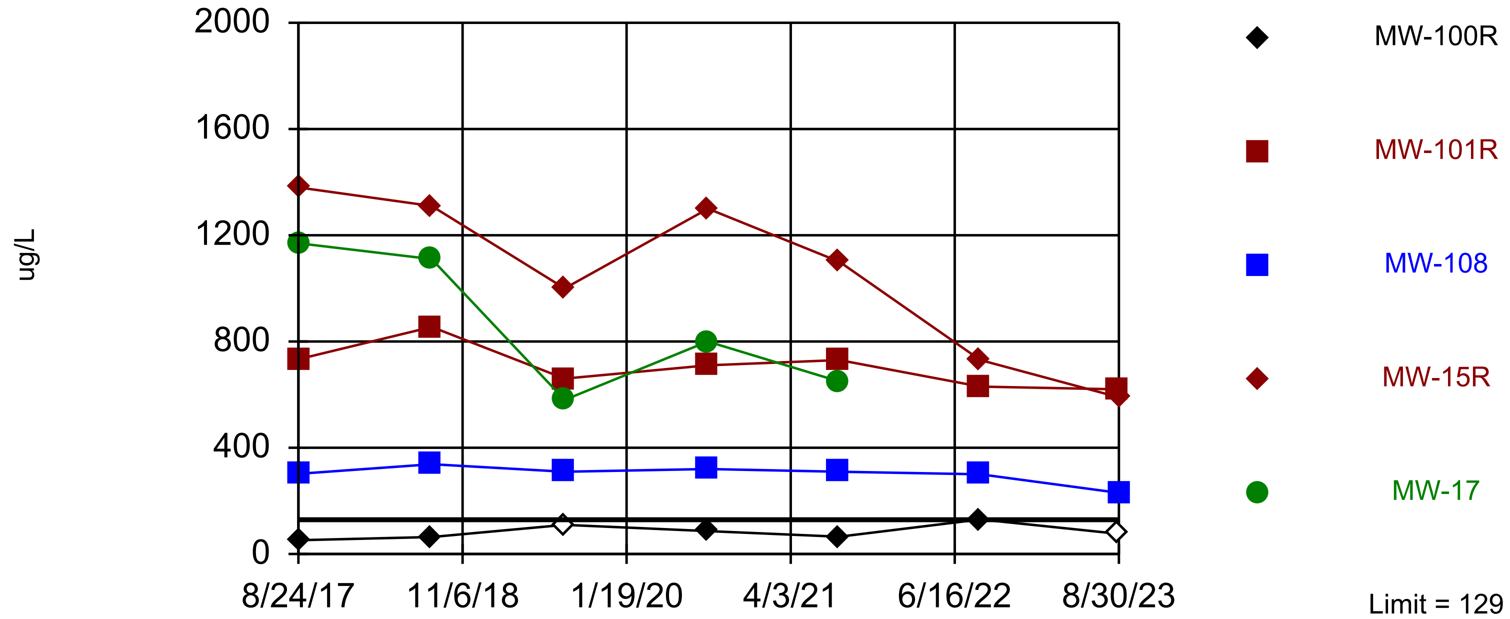
Hollow symbols indicate censored values.

Exceeds Limit: MW-101R, MW-108, MW-15R, MW-17

Boron

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=72.57, Std. Dev.=16.75, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.866, critical = 0.73. Kappa = 3.376 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Boron (ug/L)   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	51.8 (J)	733	302	1380	1170	76 (J)
8/16/2018	64.2 (J)	855	338	1310	1110	
4/6/2019						110 (J)
8/7/2019	<110	660 (B)	310 (B)	1000 (B)	580 (B)	110 (J,B)
8/24/2020	86 (J)	710	320		800	<80
8/25/2020				1300		
8/10/2021					650	<58
8/11/2021	65 (J)	730	310			
8/12/2021				1100		
8/23/2022						65 (J)
8/24/2022	130	630	300	730		
8/29/2023	<76 (U)	620				<76 (U)
8/30/2023			230	590		

ND substitution: RL or RL/2 if <15% NDs.

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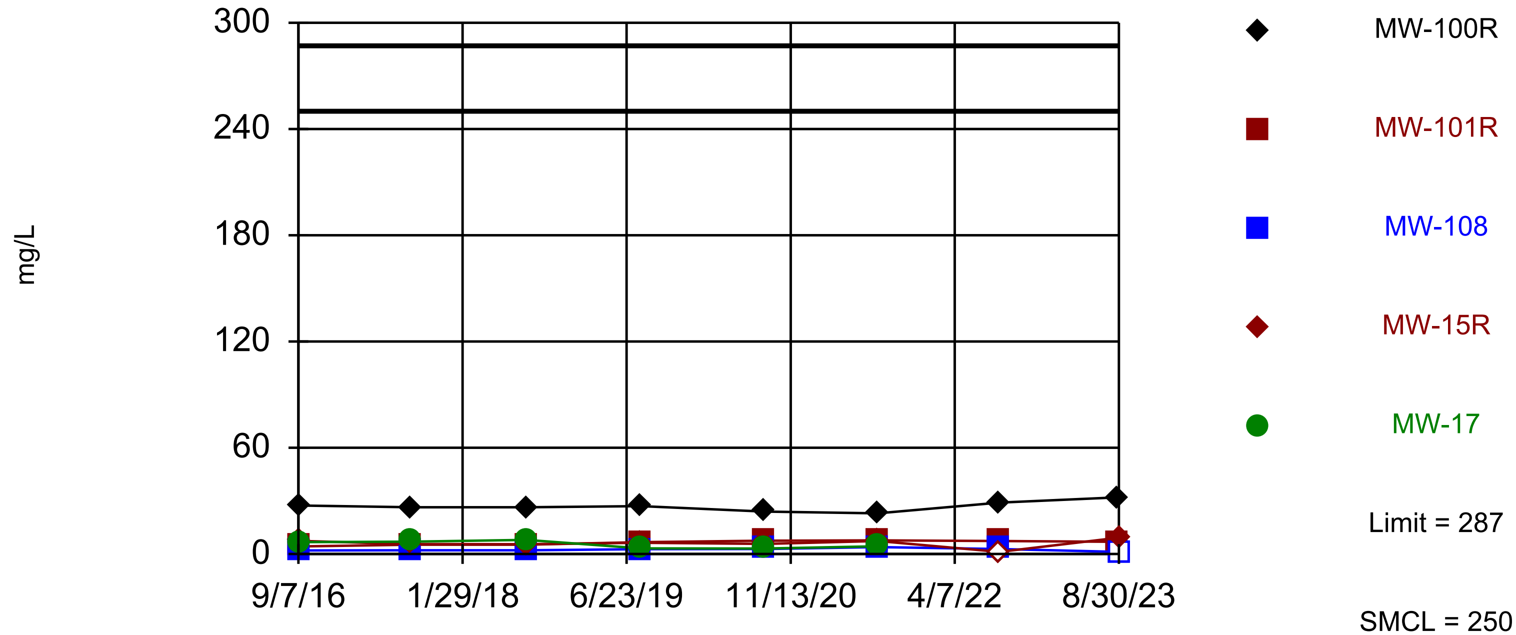
Hollow symbols indicate censored values.

Within Limit

Chloride

Interwell Parametric



Background Data Summary (based on cube root transformation): Mean=4.211, Std. Dev.=1.142, n=35. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9158, critical = 0.91. Kappa = 2.091 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Chloride (mg/L) Analysis Run 10/6/2023 11:31 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/10/1995						170
10/6/1995						150
1/25/1996						174
4/26/1996						121
7/19/1996						138.3
10/21/1996						106
4/28/1997						98
10/6/1997						120
4/22/1998						120
10/7/1998						580 (X)
9/29/1999						110
9/13/2000						89.6
9/19/2001						53.3
9/11/2002						59.5
9/10/2003						64.8
9/15/2004						37.9
9/14/2005						60
9/13/2006						35.9
9/12/2007						34.5
9/17/2008						70.4
9/16/2009						84.9
8/31/2010						164
9/13/2011						113
9/18/2012						74.4
9/27/2013						54.7
9/10/2014						26.6
9/2/2015						62.4
9/7/2016	27.4	4.3	2	7.4	6.7	64.9
8/24/2017	26.4	5.3	2.1	5.6	7	60.6
8/16/2018	26.4	5.3	2.1	5.5	8	
4/6/2019						24
8/7/2019	27	6.7	2.7 (J)	6.3	3.2 (J)	25
8/24/2020	24	7.5	2.8 (J)		3.1 (J)	22
8/25/2020				5.7		
8/10/2021					4.4 (J)	23
8/11/2021	23	7.7	3.9 (J)			
8/12/2021				7.3		
8/23/2022						13
8/24/2022	29	7.3	2.8 (J)	<2.3 (U)		
8/29/2023	32	6.9				26
8/30/2023			<2.3 (U)	9.2		

ND substitution: RL or RL/2 if <15% NDs.

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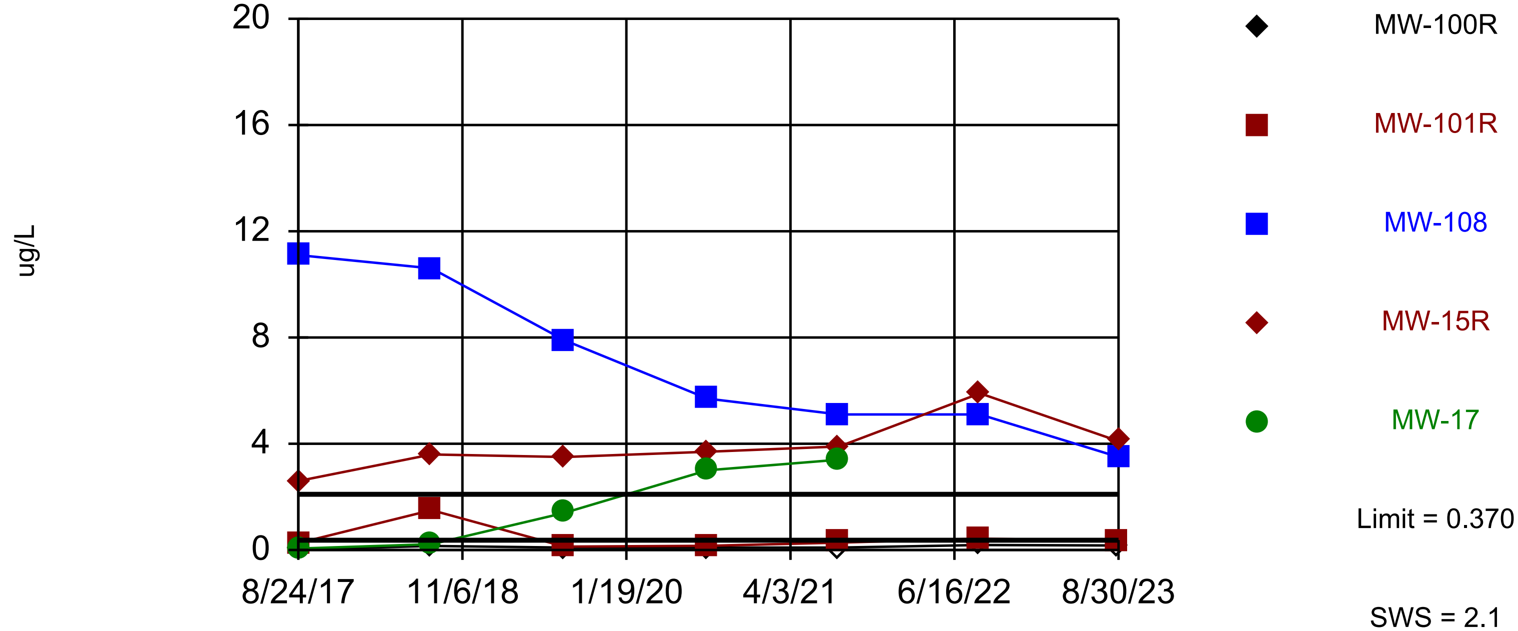
Hollow symbols indicate censored values.

Exceeds Limit: MW-108, MW-15R, MW-17

Cobalt

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 57.14% NDs. Annual per-constituent alpha = 0.179. Individual comparison alpha = 0.02167 (1 of 2). Comparing 5 points to limit. Assumes 4 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Cobalt (ug/L)   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-17	MW-15R	MW-1R (bg)	MW-108	MW-101R
8/24/2017	0.028 (J)	0.054 (J)	2.6	0.049 (J)	11.1	0.26 (J)
8/16/2018	<0.15	0.22 (J)	3.6		10.6	1.5
4/6/2019				0.37 (J)		
8/7/2019	<0.091	1.4	3.5	<0.091	7.9	0.13 (J)
8/24/2020	<0.091	3		0.22 (J)	5.7	0.16 (J)
8/25/2020			3.7			
8/10/2021		3.4		<0.091		
8/11/2021	<0.091				5.1	0.28 (J)
8/12/2021			3.9			
8/23/2022				<0.19 (U)		
8/24/2022	<0.19 (U)		5.9		5.1	0.43 (J)
8/29/2023	<0.17 (U)			<0.17 (U)		0.34 (J)
8/30/2023			4.1		3.5	

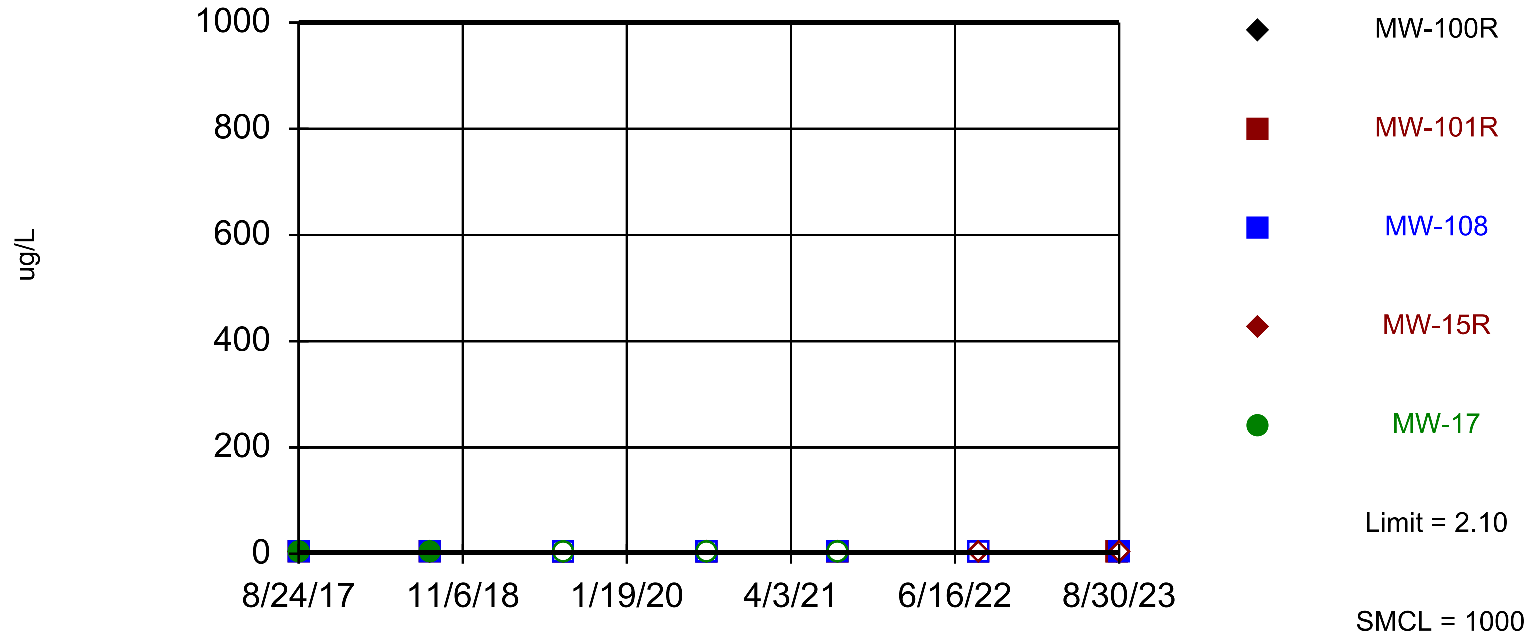
ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.

Within Limit

Copper

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 57.14% NDs. Annual per-constituent alpha = 0.179. Individual comparison alpha = 0.02167 (1 of 2). Comparing 5 points to limit. Assumes 4 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Copper (ug/L)   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-17	MW-15R	MW-1R (bg)	MW-108	MW-101R
8/24/2017	0.32 (J)	0.52 (J)	0.38 (J)	0.99 (J)	0.61 (J)	0.92 (J)
8/16/2018	0.74 (J)	0.66 (J)	2.7		0.57 (J)	2.6
4/6/2019				2.1 (J)		
8/7/2019	<2	<2	<2	<2	<2	<2
8/24/2020	<1.5	<1.5		1.6 (J)	<1.5	<1.5
8/25/2020			<1.5			
8/10/2021		<1.4		<1.4		
8/11/2021	<1.4				1.7 (J)	<1.4
8/12/2021			2.5 (J)			
8/23/2022				<1.8 (U)		
8/24/2022	<1.8 (U)		<1.8 (U)		<1.8 (U)	<1.8 (U)
8/29/2023	1.8 (J)			<1.8 (U)		<1.8 (U)
8/30/2023			<1.8 (U)		2 (J)	

ND substitution: RL or RL/2 if <15% NDs.

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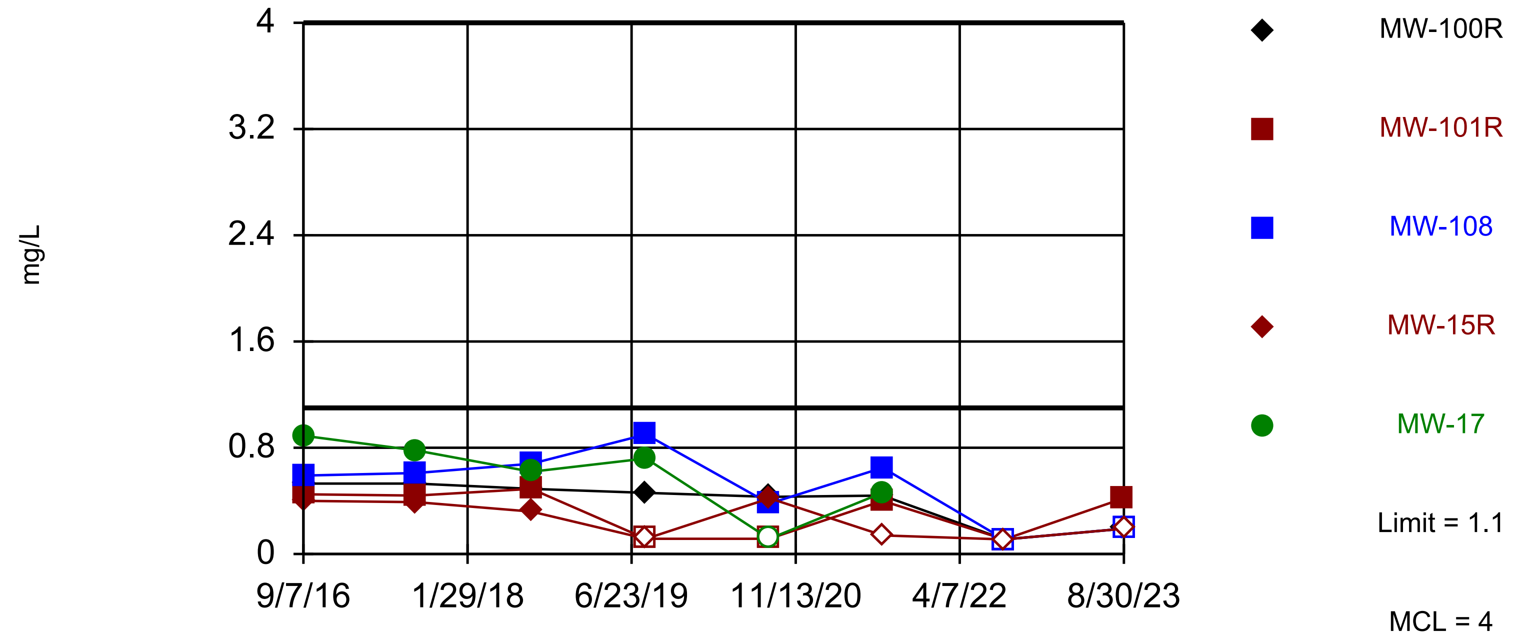
Hollow symbols indicate censored values.

Within Limit

Fluoride

Interwell Parametric



Background Data Summary: Mean=0.4475, Std. Dev.=0.2133, n=8, 12.5% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9515, critical = 0.749. Kappa = 3.05 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Fluoride (mg/L)   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	0.53	0.45	0.59	0.4	0.89	0.48
8/24/2017	0.53	0.44	0.61	0.39	0.78	0.58
8/16/2018	0.49	0.49	0.68	0.32	0.62	
4/6/2019						0.35 (J)
8/7/2019	0.46 (J)	<0.23	0.9	<0.23	0.72	0.85
8/24/2020	0.43 (J)	<0.23	0.38 (J)		<0.23	0.47 (J)
8/25/2020				0.42 (J)		
8/10/2021					0.46 (J)	0.34 (J)
8/11/2021	0.44 (J)	0.4 (J)	0.65			
8/12/2021				<0.28		
8/23/2022						<0.22 (U)
8/24/2022	<0.22 (U)	<0.22 (U)	<0.22 (U)	<0.22 (U)		
8/29/2023	<0.38 (U)	0.42 (J)				0.4 (J)
8/30/2023			<0.38 (U)	<0.38 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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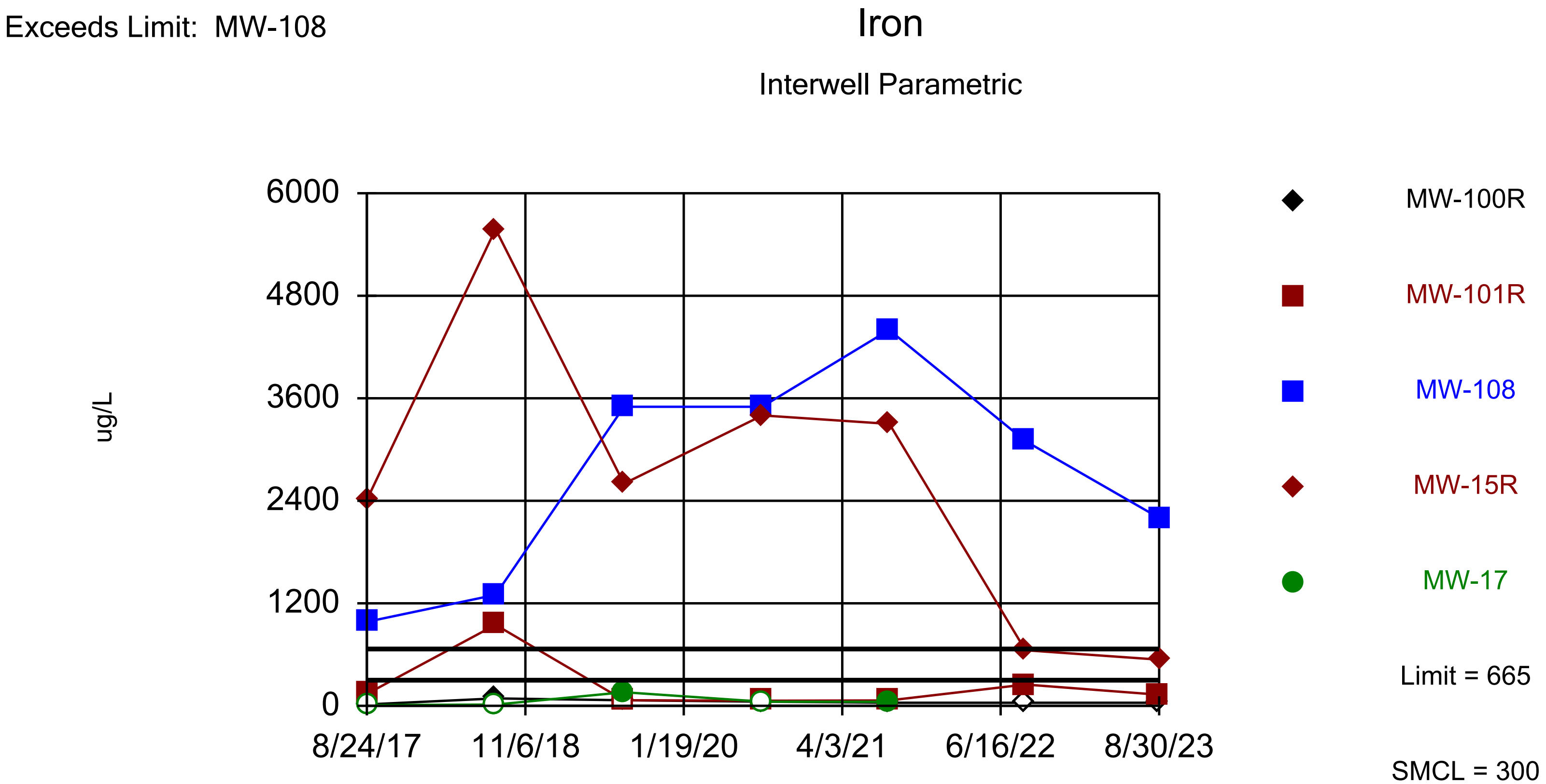
Hollow symbols indicate censored values.



Background Data Summary (based on square root transformation) (after Kaplan-Meier Adjustment): Mean=7.448, Std. Dev.=5.433, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7986, critical = 0.73. Kappa = 3.376 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Iron (ug/L)   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	16.2 (J)	140	983	2410	<9.6	12.5 (J)
8/16/2018	86.3	949	1300	5580	<14.9	
4/6/2019						380
8/7/2019	<66	<66	3500	2600	160	<66
8/24/2020	<50	60 (J)	3500		<50	88 (J)
8/25/2020				3400		
8/10/2021					48 (J)	<36
8/11/2021	<36	64 (J)	4400			
8/12/2021				3300		
8/23/2022						64 (J)
8/24/2022	<36 (U)	250	3100	650		
8/29/2023	<36 (U)	130				<36 (U)
8/30/2023			2200	540		

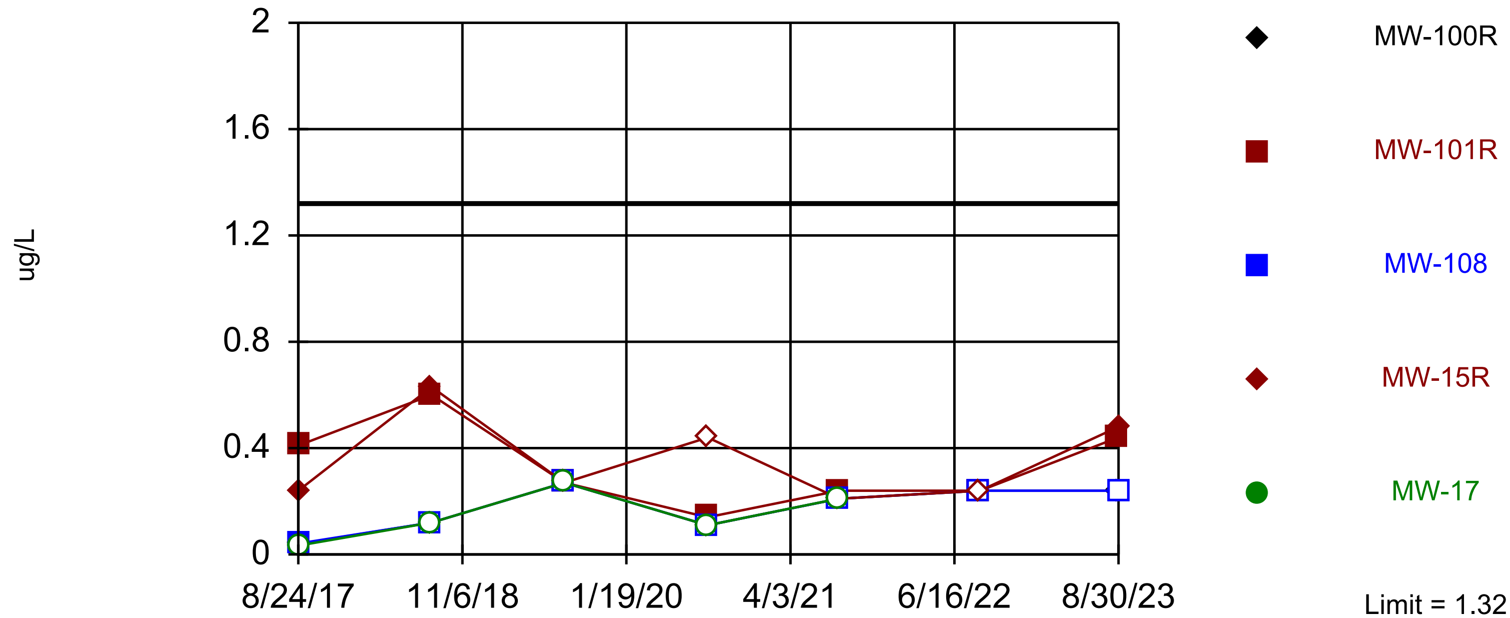
ND substitution: RL or RL/2 if <15% NDs.

Sanitas™ v.9.6.37 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.

Within Limit

Lead

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.3743, Std. Dev.=0.2796, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7602, critical = 0.73. Kappa = 3.376 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Lead (ug/L)   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.039 (J)	0.41 (J)	0.041 (J)	0.24 (J)	<0.033	0.18 (J)
8/16/2018	<0.12	0.6 (J)	<0.12	0.63 (J)	<0.12	
4/6/2019						0.71
8/7/2019	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
8/24/2020	<0.11	0.14 (J)	<0.11		<0.11	0.9
8/25/2020				<0.44		
8/10/2021					<0.21	<0.21
8/11/2021	<0.21	0.24 (J)	<0.21			
8/12/2021				<0.21		
8/23/2022						<0.24 (U)
8/24/2022	<0.24 (U)	<0.24 (U)	<0.24 (U)	<0.24 (U)		
8/29/2023	0.24 (JB)	0.44 (JB)				0.29 (JB)
8/30/2023			<0.24 (U)	0.48 (JB)		

ND substitution: RL or RL/2 if <15% NDs.

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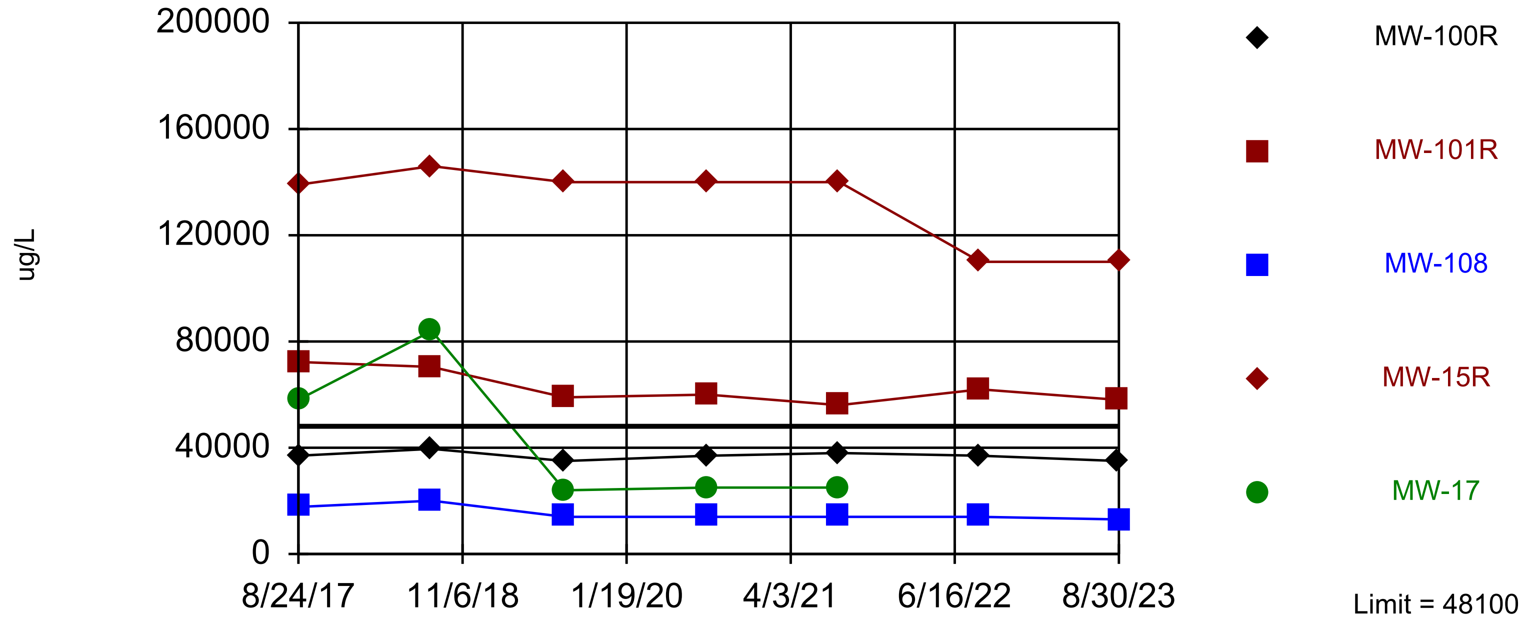
Exceeds Limit: MW-101R, MW-15R

Magnesium

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 0.01 alpha level. Limit is highest of 7 background values. Annual per-constituent alpha = 0.179. Individual comparison alpha = 0.02167 (1 of 2). Comparing 5 points to limit. Assumes 4 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Magnesium (ug/L)   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-17	MW-15R	MW-1R (bg)	MW-108	MW-101R
8/24/2017	37000	58100	139000	48100	17700	72300
8/16/2018	39600	84000	146000		20100	70400
4/6/2019				31000		
8/7/2019	35000	24000	140000	30000	14000	59000
8/24/2020	37000	25000		31000	14000	60000
8/25/2020			140000			
8/10/2021		25000		30000		
8/11/2021	38000				14000	56000
8/12/2021			140000			
8/23/2022				31000		
8/24/2022	37000		110000		14000	62000
8/29/2023	35000			29000		58000
8/30/2023			110000		13000	

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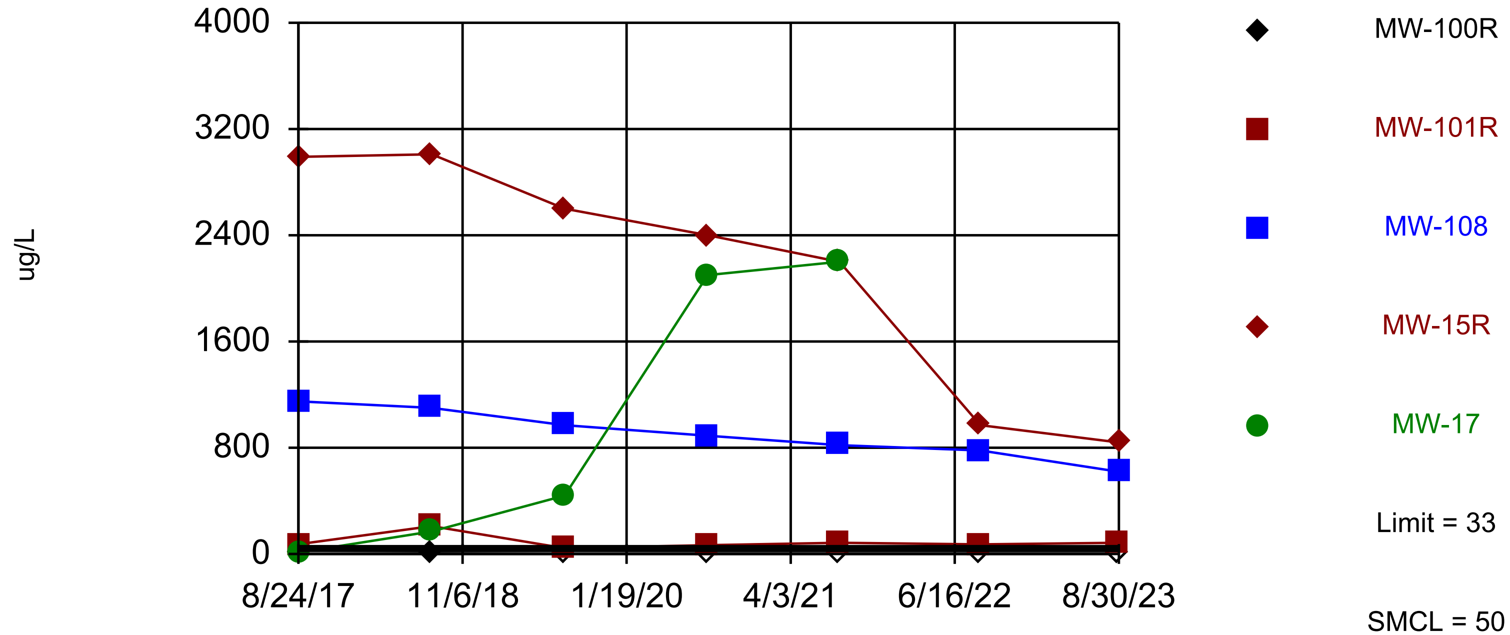
Hollow symbols indicate censored values.

Exceeds Limit: MW-101R, MW-108, MW-15R, MW-17

Manganese

Interwell Parametric



Background Data Summary (based on cube root transformation) (after Kaplan-Meier Adjustment): Mean=1.58, Std. Dev.=0.4818, n=7, 42.86% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7355, critical = 0.73. Kappa = 3.376 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:30 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Manganese (ug/L) Analysis Run 10/6/2023 11:32 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.9 (J)	74.1	1150	2990	10.8	2
8/16/2018	5.6	210	1100	3010	170	
4/6/2019						20
8/7/2019	<2.5	44	970	2600	440	2.8 (J)
8/24/2020	<4	66	890		2100	4.7 (J)
8/25/2020				2400		
8/10/2021					2200	<4.4
8/11/2021	<4.4	84	820			
8/12/2021				2200		
8/23/2022						<3.6 (U)
8/24/2022	<3.6 (U)	73	780	970		
8/29/2023	<3.6 (U)	84				<3.6 (U)
8/30/2023			620	840		

ND substitution: RL or RL/2 if <15% NDs.

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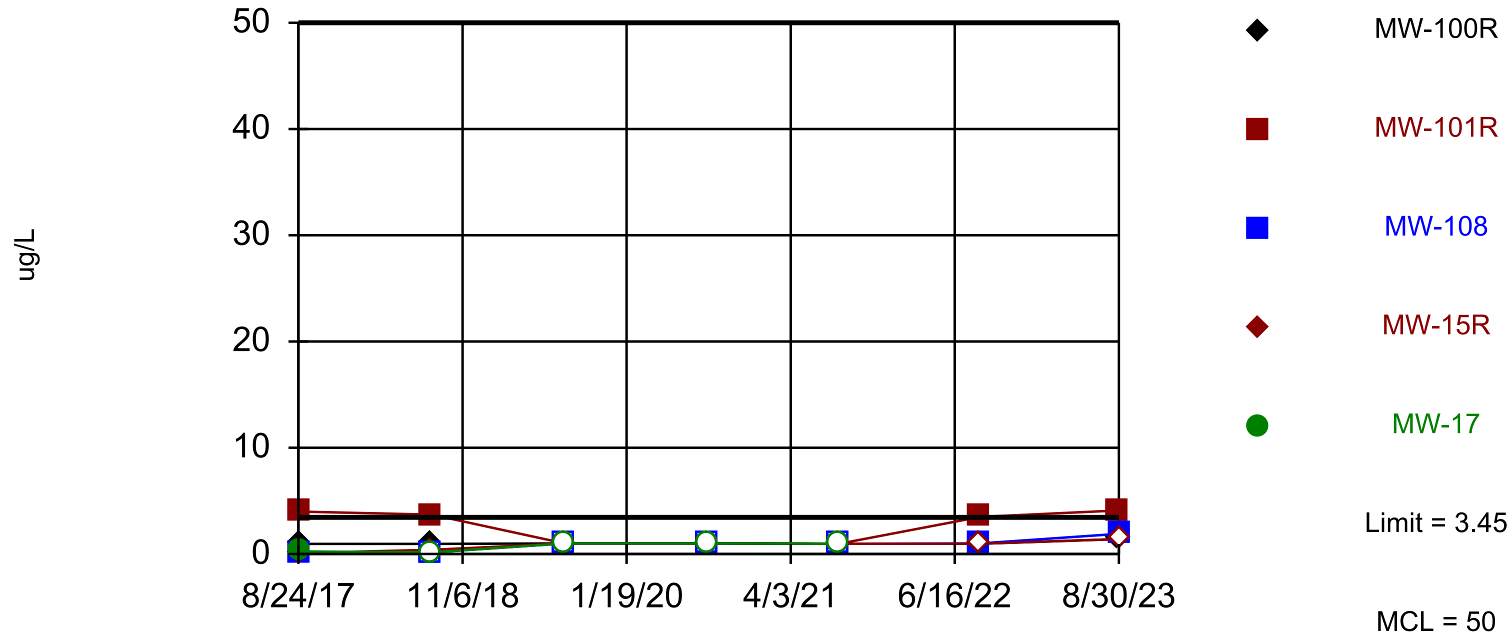
Hollow symbols indicate censored values.

Within Limit

Selenium

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=1.474, Std. Dev.=0.5866, n=7, 28.57% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8247, critical = 0.73. Kappa = 3.376 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Prediction Limit

Constituent: Selenium (ug/L)   Analysis Run 10/6/2023 11:32 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
8/24/2017	0.95 (J)	4	0.089 (J)	<0.086	0.25 (J)	1.1
8/16/2018	0.95 (J)	3.7	<0.16	0.4 (J)	<0.16	
4/6/2019						<1
8/7/2019	<1	1 (J)	<1	<1	<1	1.4 (J)
8/24/2020	<1	<1	<1		<1	2.1 (J)
8/25/2020				<1		
8/10/2021					<0.96	1.2 (J)
8/11/2021	<0.96	<0.96	<0.96			
8/12/2021				<0.96		
8/23/2022						<0.96 (U)
8/24/2022	0.97 (J)	3.5 (J)	1 (J)	<0.96 (U)		
8/29/2023	1.4 (J)	4.1 (J)				2.6 (J)
8/30/2023			1.9 (J)	<1.4 (U)		

ND substitution: RL or RL/2 if <15% NDs.

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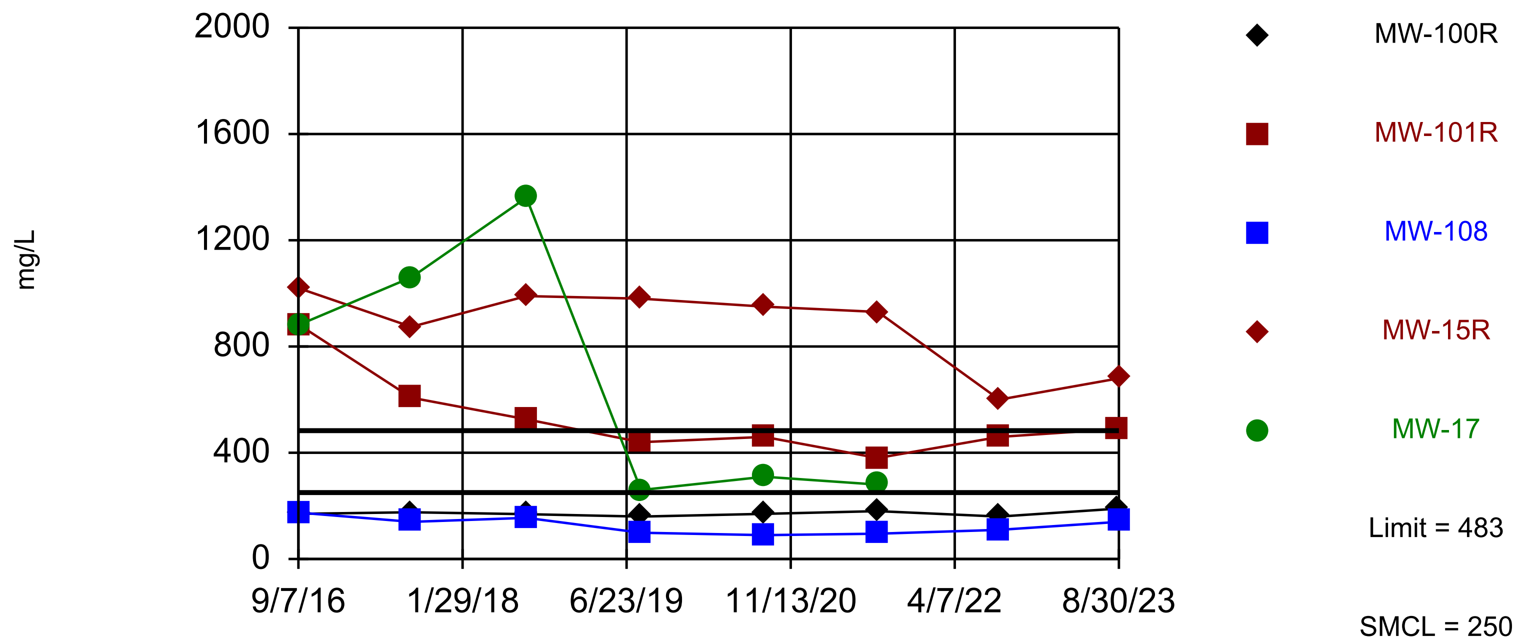
Exceeds Limit: MW-101R, MW-15R

Sulfate

Interwell Parametric



Background Data Summary: Mean=226.5, Std. Dev.=117.9, n=25. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9127, critical = 0.888. Kappa = 2.174 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Prediction Limit

Constituent: Sulfate (mg/L)   Analysis Run 10/6/2023 11:32 AM   View: Shallow

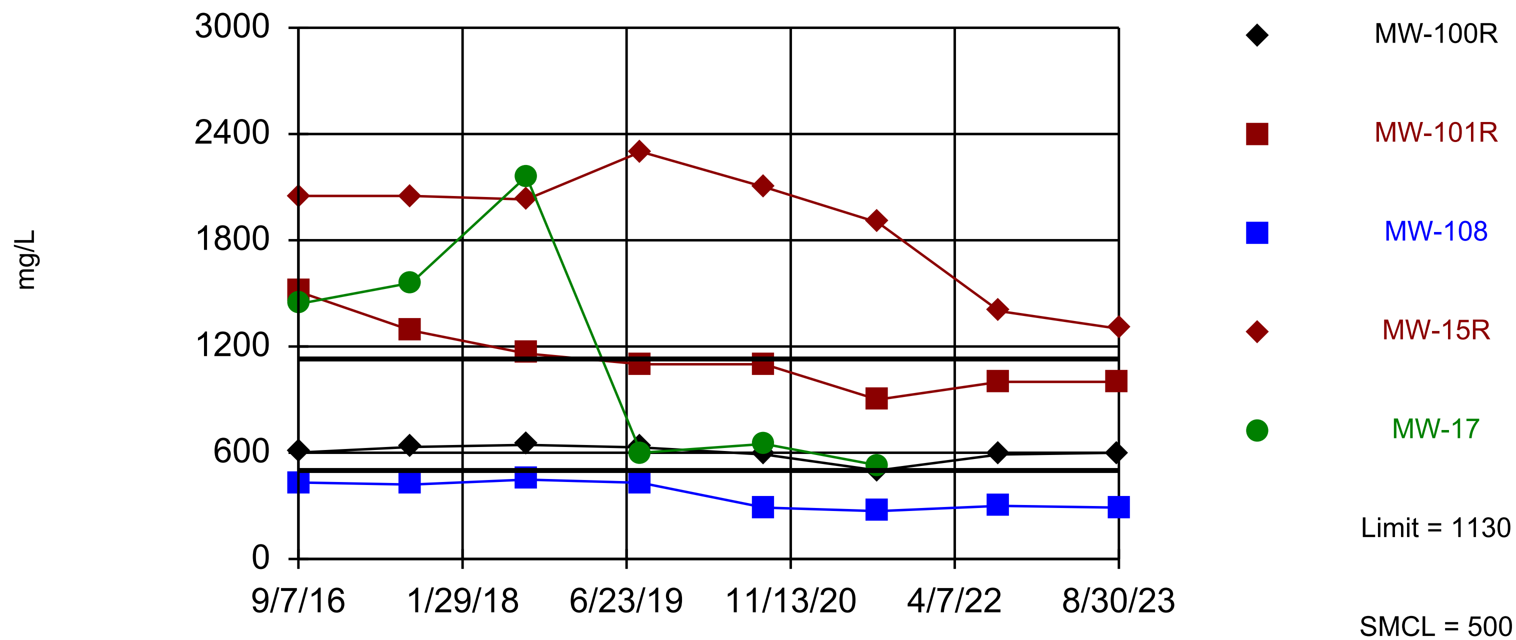
Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/29/1999						350
9/13/2000						340
9/19/2001						210
9/11/2002						320
9/10/2003						260
9/15/2004						160
9/14/2005						260
9/13/2006						157
9/12/2007						138
9/17/2008						291
9/16/2009						298
8/31/2010						403
9/13/2011						374
9/18/2012						318
9/27/2013						264
9/10/2014						97.8
9/2/2015						312
9/7/2016	170	883	175	1020	881	323
8/24/2017	176	607	140	874	1060	346
8/16/2018	169	526	155	990	1360	
4/6/2019						190
8/7/2019	160	440	99	980	260	60
8/24/2020	170	460	90		310	50
8/25/2020				950		
8/10/2021					280	53
8/11/2021	180	380	95			
8/12/2021				930		
8/23/2022						28
8/24/2022	160	460	110	600		
8/29/2023	190	490				60
8/30/2023			140	680		

Exceeds Limit: MW-15R

Total Dissolved Solids

Interwell Parametric



Background Data Summary: Mean=584.4, Std. Dev.=179.5, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8596, critical = 0.749. Kappa = 3.05 (c=15, w=9, 1 of 2, event alpha = 0.1). Report alpha = 0.006999. Individual comparison alpha = 0.0007801. Comparing 5 points to limit. Assumes 4 future values.

Prediction Limit Analysis Run 10/6/2023 11:31 AM View: Shallow

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Total Dissolved Solids (mg/L) Analysis Run 10/6/2023 11:32 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-101R	MW-108	MW-15R	MW-17	MW-1R (bg)
9/7/2016	601	1510	432	2050	1440	808
8/24/2017	633	1290	420	2050	1560	887
8/16/2018	644	1160	448	2030	2160	
4/6/2019						640
8/7/2019	630	1100	430	2300	600	530
8/24/2020	590	1100	290		650	420
8/25/2020				2100		
8/10/2021					530	420
8/11/2021	500	900	270			
8/12/2021				1900		
8/23/2022						440
8/24/2022	590	1000	300	1400		
8/29/2023	600	1000				530
8/30/2023			290	1300		

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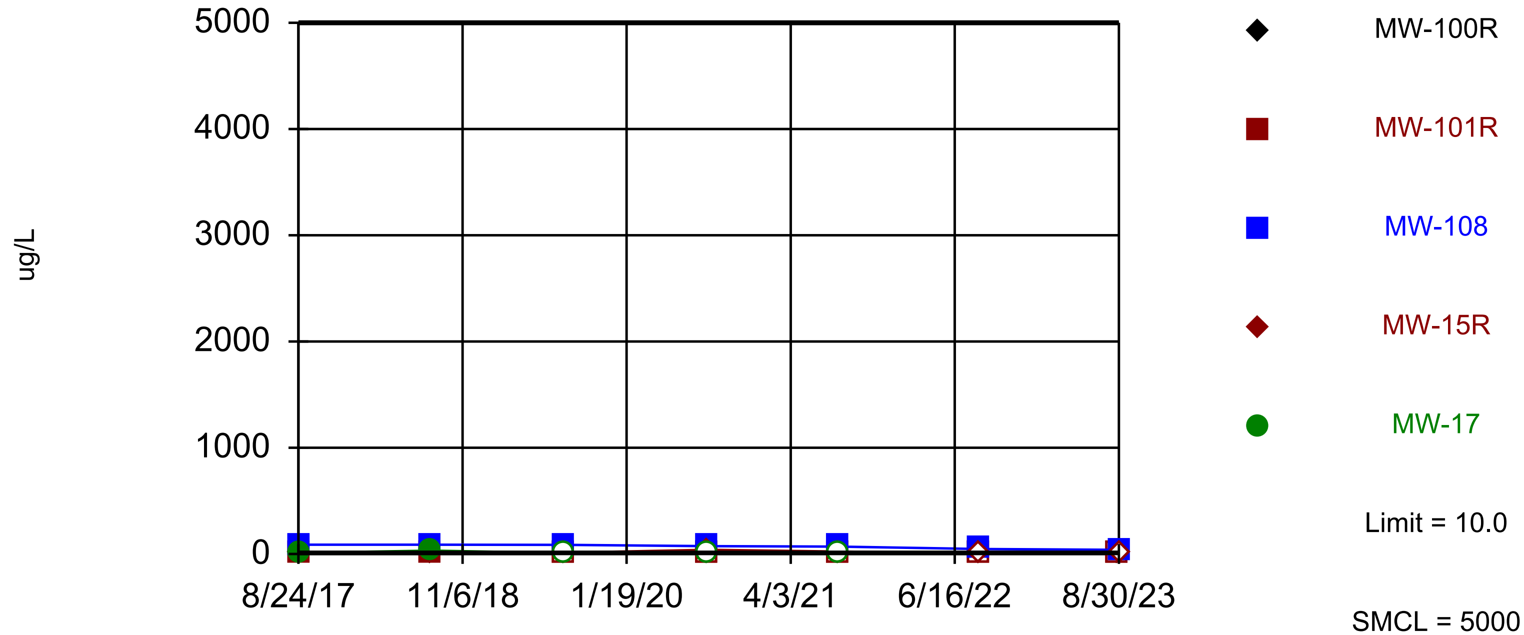
Hollow symbols indicate censored values.

Exceeds Limit: MW-108

Zinc

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 85.71% NDs. Annual per-constituent alpha = 0.179. Individual comparison alpha = 0.02167 (1 of 2). Comparing 5 points to limit. Assumes 4 future values. Insufficient data to test for seasonality; data will not be deseasonalized.

Prediction Limit   Analysis Run 10/6/2023 11:31 AM   View: Shallow

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Prediction Limit

Constituent: Zinc (ug/L) Analysis Run 10/6/2023 11:32 AM View: Shallow
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-100R	MW-17	MW-15R	MW-1R (bg)	MW-108	MW-101R
8/24/2017	0.88 (J)	10.4	1.5 (J)	2.4 (J)	87.8	1.8 (J)
8/16/2018	<3.7	31.4	6 (J)		88.1	6.7 (J)
4/6/2019				<10		
8/7/2019	<10	<10	13 (J)	<10	86	<10
8/24/2020	<10	<10		<10	74	<10
8/25/2020			<40			
8/10/2021		<10		<10		
8/11/2021	<10				70	<10
8/12/2021			23			
8/23/2022				<10 (U)		
8/24/2022	<10 (U)		<10 (U)		47	<10 (U)
8/29/2023	<6.4 (U)			<6.4 (U)		<6.4 (U)
8/30/2023			<6.4 (U)		40	

ND substitution: RL or RL/2 if <15% NDs.

Attachment D6

Interwell Prediction Limit Analysis Results - Pennsylvanian

Prediction Limit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML   Printed 10/10/2023, 1:14 PM

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-12	0.880	n/a	8/29/2023	0.53ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	MW-13	0.880	n/a	8/30/2023	0.53ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Arsenic (ug/L)	**MW-14**	**0.880**	**n/a**	**8/30/2023**	**2.6**	**Yes**	**7**	**MW-102P**	**n/a**	**n/a**	**71.43**	**n/a**	**n/a**	**0.02354**	**NP Inter (NDs) 1 of 2**
Arsenic (ug/L)	MW-16R	0.880	n/a	8/29/2023	0.53ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Barium (ug/L)	MW-12	28	n/a	8/29/2023	18	No	7	MW-102P	23.84	1.631	0	None	No	0.002922	Param Inter 1 of 2
Barium (ug/L)	MW-13	28	n/a	8/30/2023	19	No	7	MW-102P	23.84	1.631	0	None	No	0.002922	Param Inter 1 of 2
Barium (ug/L)	MW-14	28	n/a	8/30/2023	22	No	7	MW-102P	23.84	1.631	0	None	No	0.002922	Param Inter 1 of 2
Barium (ug/L)	**MW-16R**	**28**	**n/a**	**8/29/2023**	**41**	**Yes**	**7**	**MW-102P**	**23.84**	**1.631**	**0**	**None**	**No**	**0.002922**	**Param Inter 1 of 2**
Beryllium (ug/L)	MW-12	1.30	n/a	8/29/2023	0.33ND	No	7	MW-102P	n/a	n/a	85.71	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-13	1.30	n/a	8/30/2023	0.33ND	No	7	MW-102P	n/a	n/a	85.71	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-14	1.30	n/a	8/30/2023	0.33ND	No	7	MW-102P	n/a	n/a	85.71	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Beryllium (ug/L)	MW-16R	1.30	n/a	8/29/2023	0.33ND	No	7	MW-102P	n/a	n/a	85.71	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Boron (ug/L)	MW-12	2190	n/a	8/29/2023	1200	No	7	MW-102P	1670	207	0	None	No	0.002922	Param Inter 1 of 2
Boron (ug/L)	MW-13	2190	n/a	8/30/2023	1700	No	7	MW-102P	1670	207	0	None	No	0.002922	Param Inter 1 of 2
Boron (ug/L)	MW-14	2190	n/a	8/30/2023	1700	No	7	MW-102P	1670	207	0	None	No	0.002922	Param Inter 1 of 2
Boron (ug/L)	MW-16R	2190	n/a	8/29/2023	1800	No	7	MW-102P	1670	207	0	None	No	0.002922	Param Inter 1 of 2
Chloride (mg/L)	**MW-12**	**9.63**	**n/a**	**8/29/2023**	**48**	**Yes**	**12**	**MW-102P**	**8.85**	**0.3849**	**0**	**None**	**No**	**0.002922**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-13**	**9.63**	**n/a**	**8/30/2023**	**12**	**Yes**	**12**	**MW-102P**	**8.85**	**0.3849**	**0**	**None**	**No**	**0.002922**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-14**	**9.63**	**n/a**	**8/30/2023**	**20**	**Yes**	**12**	**MW-102P**	**8.85**	**0.3849**	**0**	**None**	**No**	**0.002922**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-16R**	**9.63**	**n/a**	**8/29/2023**	**20**	**Yes**	**12**	**MW-102P**	**8.85**	**0.3849**	**0**	**None**	**No**	**0.002922**	**Param Inter 1 of 2**
Cobalt (ug/L)	MW-12	1.6	n/a	8/29/2023	0.085ND	No	7	MW-102P	1.061	0.2144	0	None	No	0.002922	Param Inter 1 of 2
Cobalt (ug/L)	MW-13	1.6	n/a	8/30/2023	1.3	No	7	MW-102P	1.061	0.2144	0	None	No	0.002922	Param Inter 1 of 2
Cobalt (ug/L)	MW-14	1.6	n/a	8/30/2023	0.5	No	7	MW-102P	1.061	0.2144	0	None	No	0.002922	Param Inter 1 of 2
Cobalt (ug/L)	MW-16R	1.6	n/a	8/29/2023	0.99	No	7	MW-102P	1.061	0.2144	0	None	No	0.002922	Param Inter 1 of 2
Copper (ug/L)	MW-12	2.70	n/a	8/29/2023	1.8ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-13	2.70	n/a	8/30/2023	1.8ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-14	2.70	n/a	8/30/2023	1.8ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Copper (ug/L)	MW-16R	2.70	n/a	8/29/2023	1.8ND	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	**MW-12**	**1.06**	**n/a**	**8/29/2023**	**2.6**	**Yes**	**8**	**MW-102P**	**0.4822**	**0.247**	**25**	**Kapla...**	**No**	**0.002922**	**Param Inter 1 of 2**
Fluoride (mg/L)	MW-13	1.06	n/a	8/30/2023	0.7J	No	8	MW-102P	0.4822	0.247	25	Kapla...	No	0.002922	Param Inter 1 of 2
Fluoride (mg/L)	MW-14	1.06	n/a	8/30/2023	0.75J	No	8	MW-102P	0.4822	0.247	25	Kapla...	No	0.002922	Param Inter 1 of 2
Fluoride (mg/L)	MW-16R	1.06	n/a	8/29/2023	0.46J	No	8	MW-102P	0.4822	0.247	25	Kapla...	No	0.002922	Param Inter 1 of 2
Iron (ug/L)	MW-12	5500	n/a	8/29/2023	18ND	No	7	MW-102P	n/a	n/a	0	n/a	n/a	0.02354	NP Inter (normality) ...
Iron (ug/L)	MW-13	5500	n/a	8/30/2023	18ND	No	7	MW-102P	n/a	n/a	0	n/a	n/a	0.02354	NP Inter (normality) ...
Iron (ug/L)	MW-14	5500	n/a	8/30/2023	18ND	No	7	MW-102P	n/a	n/a	0	n/a	n/a	0.02354	NP Inter (normality) ...
Iron (ug/L)	MW-16R	5500	n/a	8/29/2023	320	No	7	MW-102P	n/a	n/a	0	n/a	n/a	0.02354	NP Inter (normality) ...
Lead (ug/L)	MW-12	1.10	n/a	8/29/2023	0.3J	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-13	1.10	n/a	8/30/2023	0.37J	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-14	1.10	n/a	8/30/2023	0.34J	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Lead (ug/L)	MW-16R	1.10	n/a	8/29/2023	0.36J	No	7	MW-102P	n/a	n/a	71.43	n/a	n/a	0.02354	NP Inter (NDs) 1 of 2
Magnesium (ug/L)	MW-12	206000	n/a	8/29/2023	6500	No	7	MW-102P	151000	21764	0	None	No	0.002922	Param Inter 1 of 2
Magnesium (ug/L)	MW-13	206000	n/a	8/30/2023	54000	No	7	MW-102P	151000	21764	0	None	No	0.002922	Param Inter 1 of 2
Magnesium (ug/L)	MW-14	206000	n/a	8/30/2023	31000	No	7	MW-102P	151000	21764	0	None	No	0.002922	Param Inter 1 of 2
Magnesium (ug/L)	MW-16R	206000	n/a	8/29/2023	36000	No	7	MW-102P	151000	21764	0	None	No	0.002922	Param Inter 1 of 2
Manganese (ug/L)	MW-12	755	n/a	8/29/2023	50	No	7	MW-102P	487.4	105.9	0	None	No	0.002922	Param Inter 1 of 2
Manganese (ug/L)	MW-13	755	n/a	8/30/2023	260	No	7	MW-102P	487.4	105.9	0	None	No	0.002922	Param Inter 1 of 2
Manganese (ug/L)	MW-14	755	n/a	8/30/2023	140	No	7	MW-102P	487.4	105.9	0	None	No	0.002922	Param Inter 1 of 2
Manganese (ug/L)	MW-16R	755	n/a	8/29/2023	260	No	7	MW-102P	487.4	105.9	0	None	No	0.002922	Param Inter 1 of 2
Sulfate (mg/L)	MW-12	2200	n/a	8/29/2023	810	No	12	MW-102P	1643	275.8	0	None	No	0.002922	Param Inter 1 of 2
Sulfate (mg/L)	MW-13	2200	n/a	8/30/2023	1400	No	12	MW-102P	1643	275.8	0	None	No	0.002922	Param Inter 1 of 2

Prediction Limit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML Printed 10/10/2023, 1:14 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Sulfate (mg/L)	MW-14	2200	n/a	8/30/2023	810	No	12	MW-102P	1643	275.8	0	None	No	0.002922	Param Inter 1 of 2
Sulfate (mg/L)	MW-16R	2200	n/a	8/29/2023	960	No	12	MW-102P	1643	275.8	0	None	No	0.002922	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-12	3510	n/a	8/29/2023	1800	No	7	MW-102P	2754	297.2	0	None	No	0.002922	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-13	3510	n/a	8/30/2023	2100	No	7	MW-102P	2754	297.2	0	None	No	0.002922	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-14	3510	n/a	8/30/2023	1800	No	7	MW-102P	2754	297.2	0	None	No	0.002922	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	MW-16R	3510	n/a	8/29/2023	2200	No	7	MW-102P	2754	297.2	0	None	No	0.002922	Param Inter 1 of 2
Zinc (ug/L)	MW-12	23.1	n/a	8/29/2023	6.4ND	No	7	MW-102P	7.611	6.126	42.86	Kapla...	No	0.002922	Param Inter 1 of 2
Zinc (ug/L)	MW-13	23.1	n/a	8/30/2023	6.4ND	No	7	MW-102P	7.611	6.126	42.86	Kapla...	No	0.002922	Param Inter 1 of 2
Zinc (ug/L)	MW-14	23.1	n/a	8/30/2023	6.4ND	No	7	MW-102P	7.611	6.126	42.86	Kapla...	No	0.002922	Param Inter 1 of 2
Zinc (ug/L)	MW-16R	23.1	n/a	8/29/2023	6.4ND	No	7	MW-102P	7.611	6.126	42.86	Kapla...	No	0.002922	Param Inter 1 of 2

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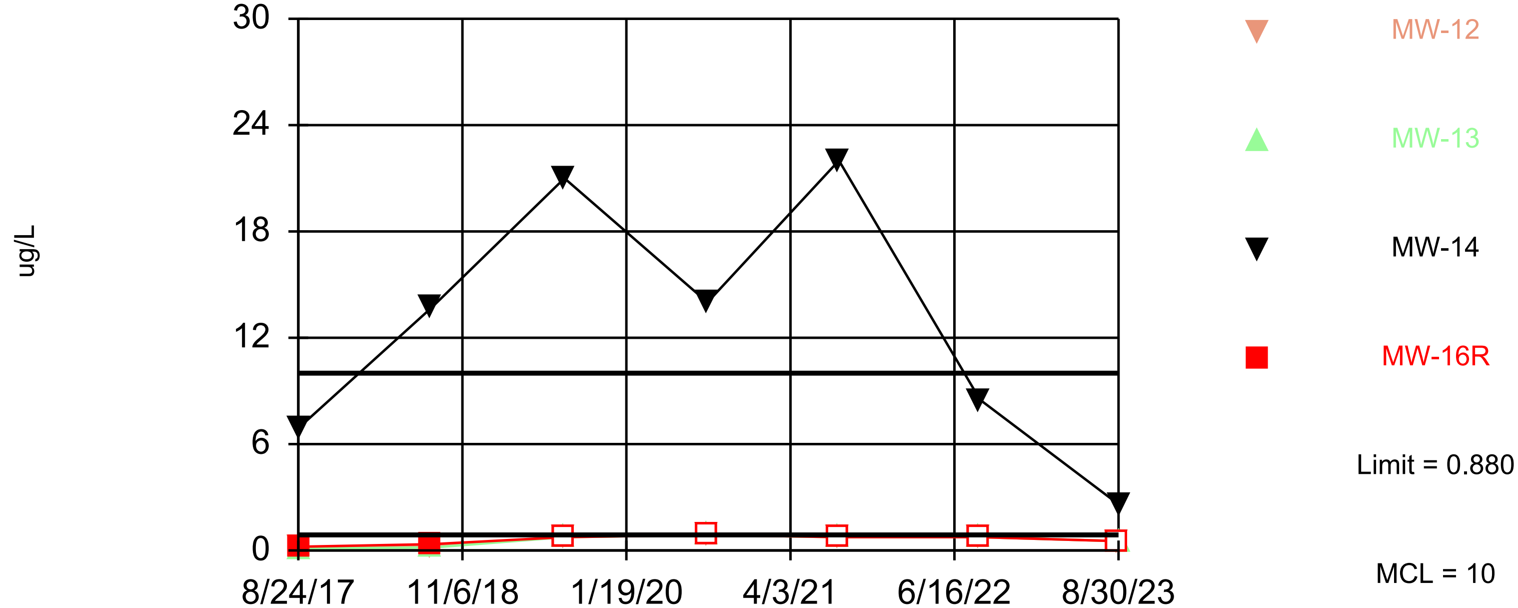
Hollow symbols indicate censored values.

Exceeds Limit: MW-14

Arsenic

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 71.43% NDs. Annual per-constituent alpha = 0.1332. Individual comparison alpha = 0.02354 (1 of 2). Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Arsenic (ug/L) Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	0.61 (J)	0.21 (J)	0.19 (J)	6.9	0.12 (J)
8/16/2018	0.66 (J)	0.35 (J)	0.27 (J)	13.7	0.16 (J)
8/7/2019	<0.75	<0.75	<0.75	21	<0.75
8/24/2020	<0.88		<0.88	14	<0.88
8/25/2020		<0.88			
8/10/2021			<0.75		
8/11/2021	<0.75	<0.75		22	<0.75
8/24/2022	<0.75 (U)	<0.75 (U)	<0.75 (U)	8.5	<0.75 (U)
8/29/2023	<0.53 (U)	<0.53 (U)	<0.53 (U)		
8/30/2023				2.6	<0.53 (U)

ND substitution: RL or RL/2 if <15% NDs.

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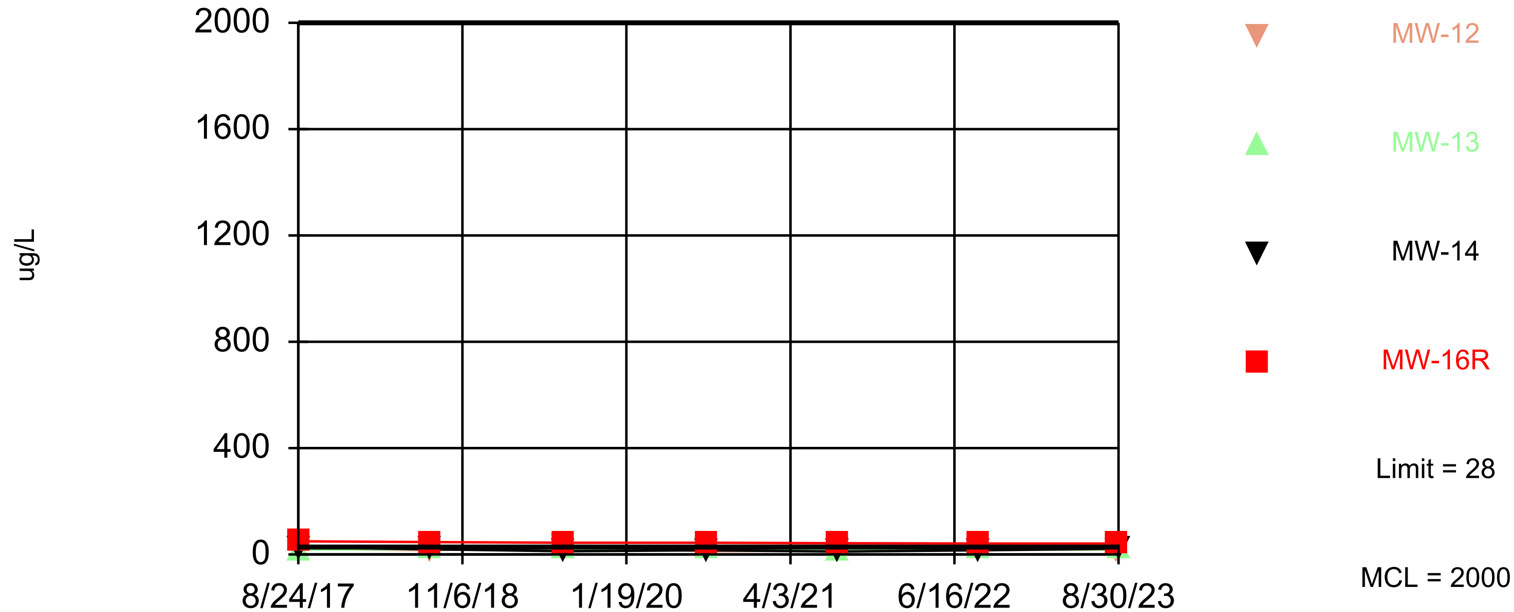
Exceeds Limit: MW-16R

Barium

Interwell Parametric



Background Data Summary: Mean=23.84, Std. Dev.=1.631, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.898, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Barium (ug/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	22.7	49.7	21	26.8	18.2
8/16/2018	25.2	46.4	15.5	19.3	19.9
8/7/2019	24	44	32	12	19
8/24/2020	22		12	16	20
8/25/2020		44			
8/10/2021			15 (B)		
8/11/2021	22 (B)	42 (B)		11 (B)	16 (B)
8/24/2022	26	41	17	16	19
8/29/2023	25	41	18		
8/30/2023				22	19

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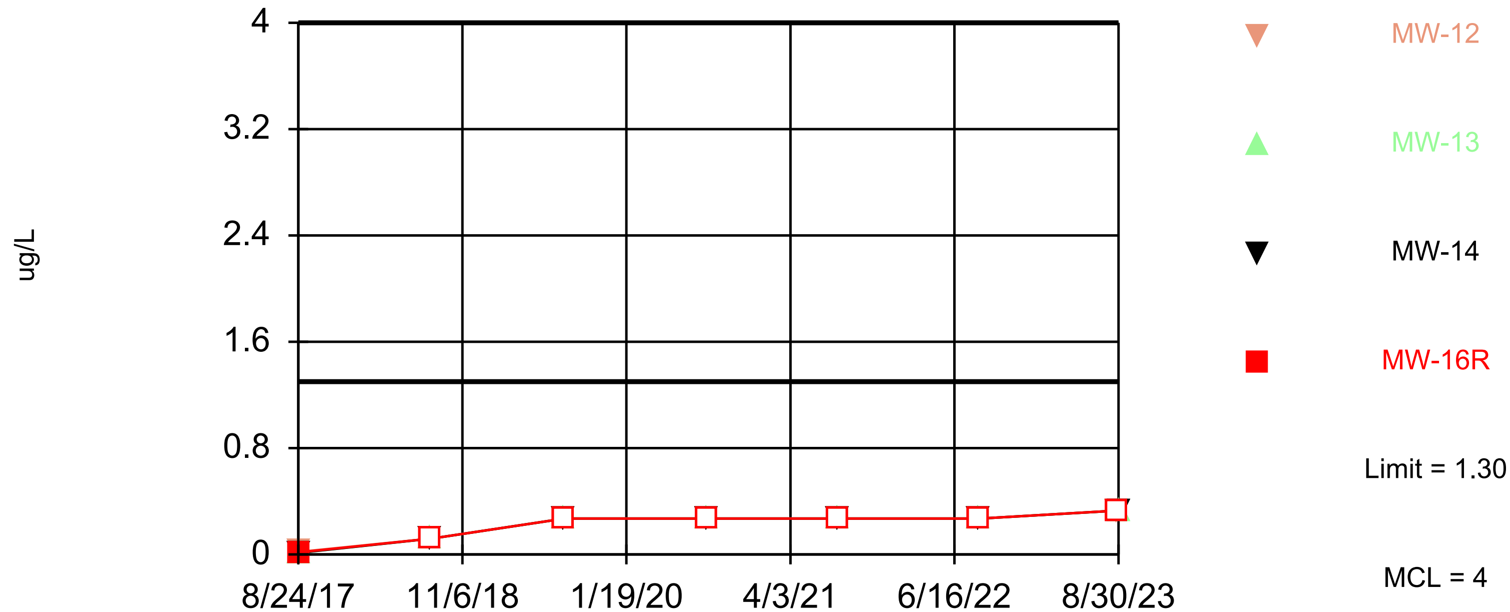
Hollow symbols indicate censored values.

Within Limit

Beryllium

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 85.71% NDs. Annual per-constituent alpha = 0.1332. Individual comparison alpha = 0.02354 (1 of 2). Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Beryllium (ug/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

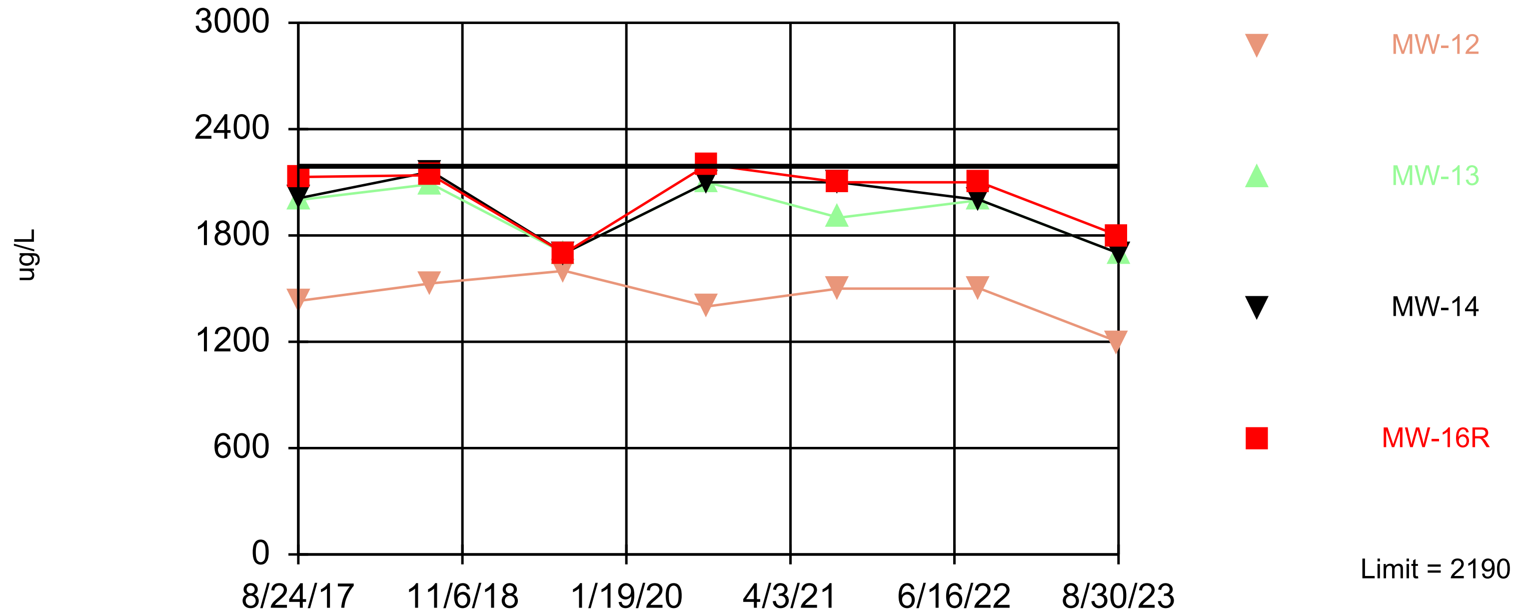
	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	0.013 (J)	0.016 (J)	0.019 (J)	<0.012	<0.012
8/16/2018	<0.12	<0.12	<0.12	<0.12	<0.12
8/7/2019	<0.27	<0.27	<0.27	<0.27	<0.27
8/24/2020	<0.27		<0.27	<0.27	<0.27
8/25/2020		<0.27			
8/10/2021			<0.27		
8/11/2021	<0.27	<0.27		<0.27	<0.27
8/24/2022	<0.27 (U)	<0.27 (U)	<0.27 (U)	<0.27 (U)	<0.27 (U)
8/29/2023	<1.3 (U)	<0.33 (U)	<0.33 (U)		
8/30/2023				<0.33 (U)	<0.33 (U)

ND substitution: RL or RL/2 if <15% NDs.

Within Limit

Boron

Interwell Parametric



Background Data Summary: Mean=1670, Std. Dev.=207, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8719, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit

Constituent: Boron (ug/L) Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	1770	2130	1430	2010	2000
8/16/2018	1920	2140	1530	2160	2090
8/7/2019	1400 (B)	1700 (B)	1600 (B)	1700 (B)	1700 (B)
8/24/2020	1800		1400	2100	2100
8/25/2020		2200			
8/10/2021			1500		
8/11/2021	1800	2100		2100	1900
8/24/2022	1600	2100	1500	2000	2000
8/29/2023	1400	1800	1200		
8/30/2023				1700	1700

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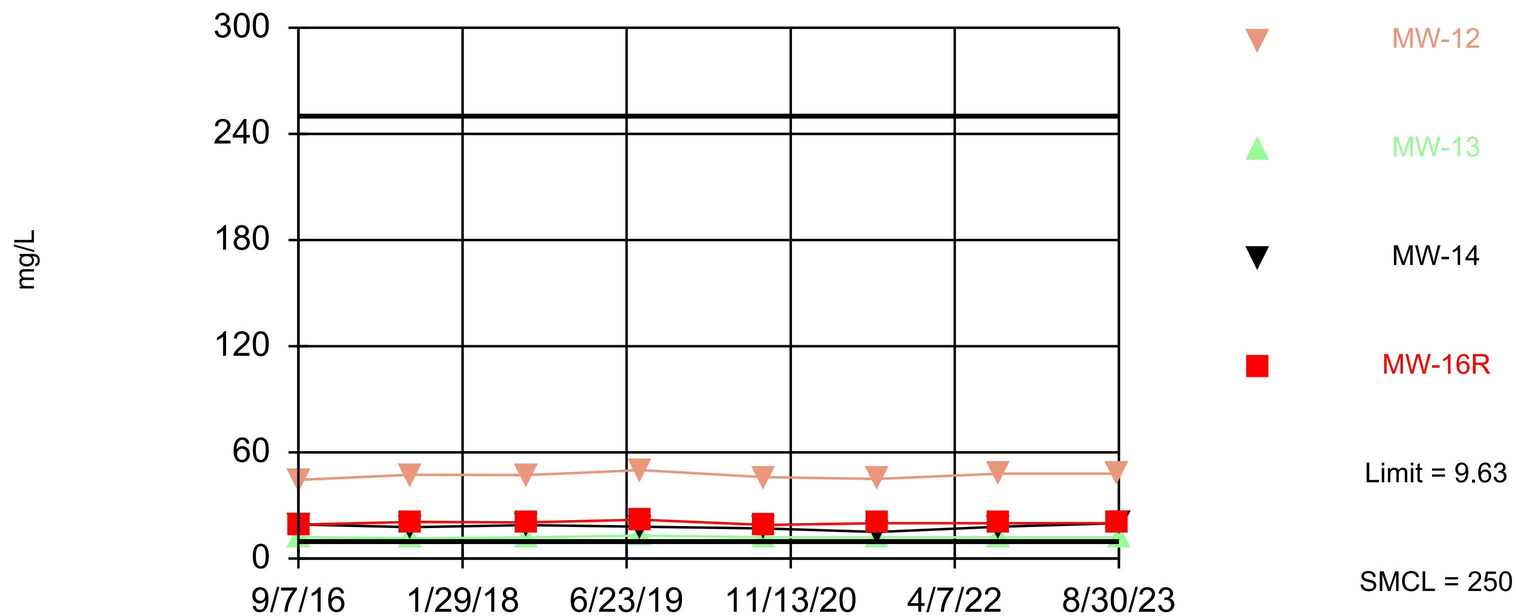
Exceeds Limit: MW-12, MW-13, MW-14, MW-16R

Chloride

Interwell Parametric



Background Data Summary: Mean=8.85, Std. Dev.=0.3849, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9571, critical = 0.805. Kappa = 2.038 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Chloride (mg/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-14	MW-13	MW-12
9/2/2015	8.6				
12/30/2015	8.6				
3/23/2016	9.3				
6/21/2016	8.5				
9/7/2016	8.8	19.2	19.3	12.1	44.5
8/24/2017	8.6	20.7	17.7	11.5	47.4
8/16/2018	8.8	20.4	18.9	11.9	47.2
8/7/2019	9.1	22	18	13	50
8/24/2020	8.2		17	12	46
8/25/2020		19			
8/10/2021					45
8/11/2021	8.9	20	15	12	
8/24/2022	9.3	20	18	12	48
8/29/2023	9.5	20			48
8/30/2023			20	12	

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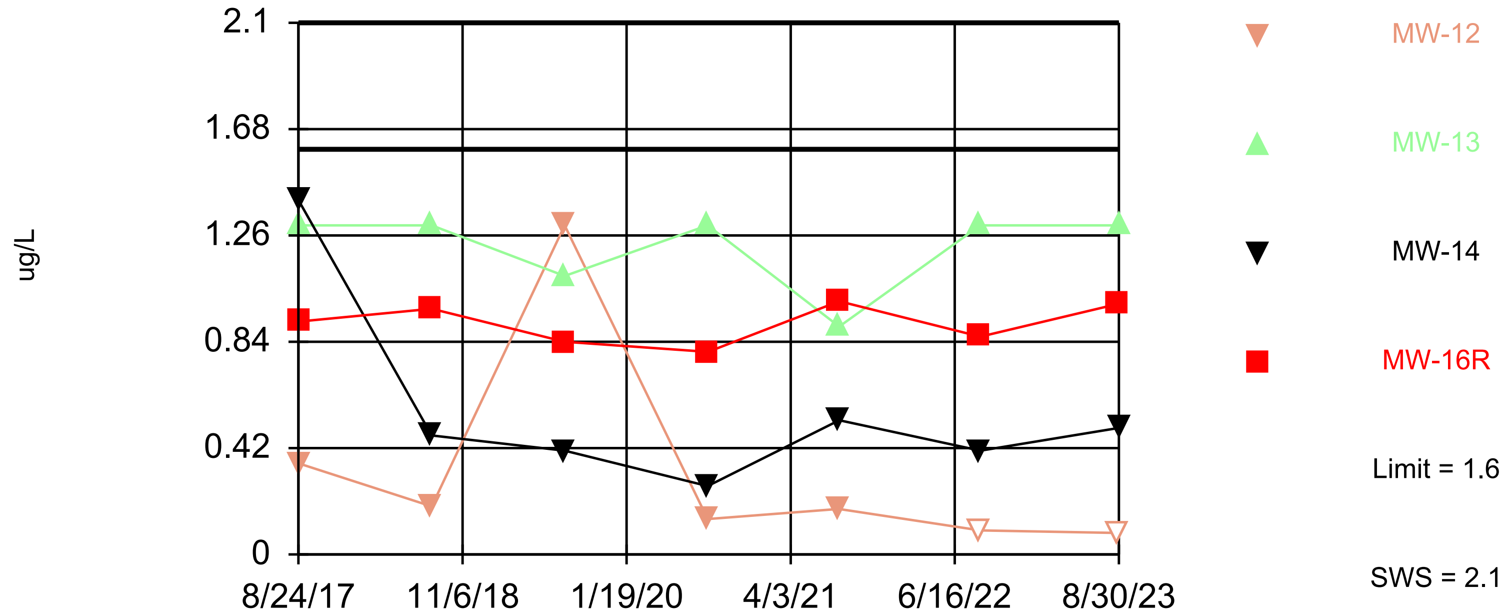
Hollow symbols indicate censored values.

Within Limit

Cobalt

Interwell Parametric



Background Data Summary: Mean=1.061, Std. Dev.=0.2144, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8729, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Cobalt (ug/L) Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	0.86 (J)	0.92 (J)	0.36 (J)	1.4	1.3
8/16/2018	1.1	0.97 (J)	0.19 (J)	0.47 (J)	1.3
8/7/2019	1.3 (J)	0.84	1.3	0.41 (J)	1.1
8/24/2020	0.93		0.14 (J)	0.27 (J)	1.3
8/25/2020		0.8			
8/10/2021			0.18 (J)		
8/11/2021	0.97	1		0.53	0.9
8/24/2022	1.4	0.86	<0.19 (U)	0.41 (J)	1.3
8/29/2023	0.87	0.99	<0.17 (U)		
8/30/2023				0.5	1.3

ND substitution: RL or RL/2 if <15% NDs.

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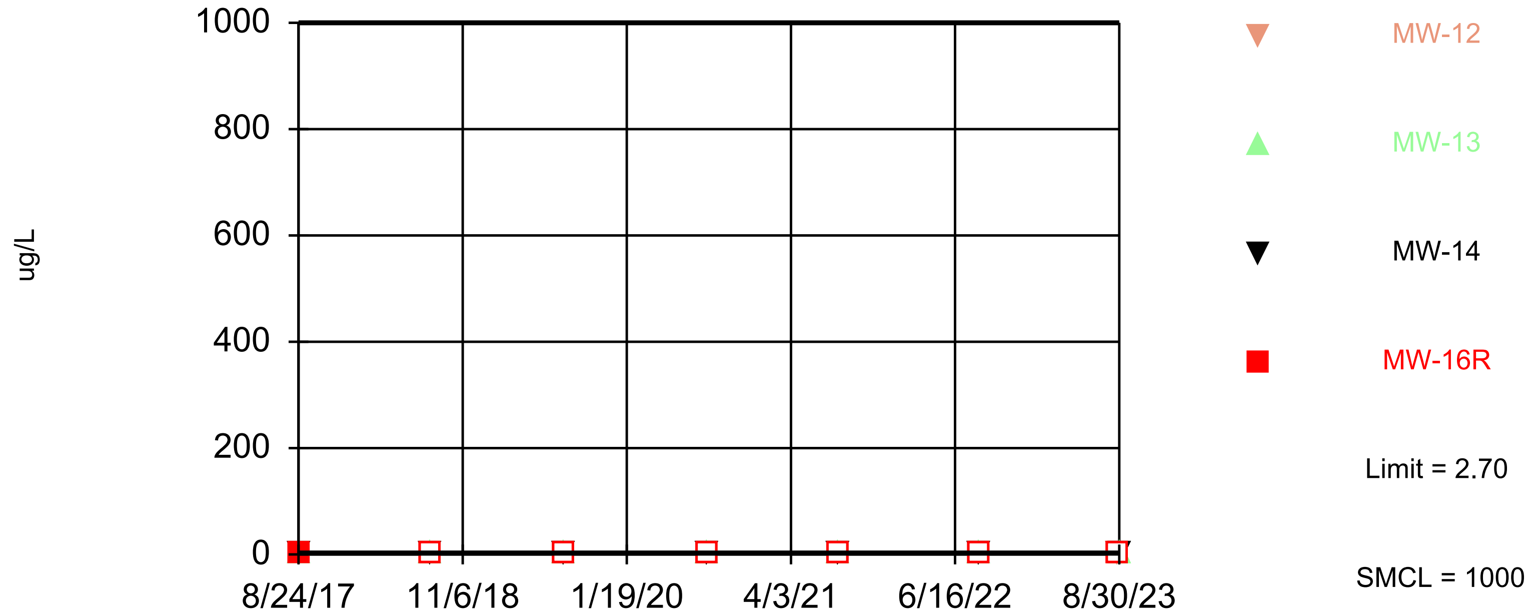
Hollow symbols indicate censored values.

Within Limit

Copper

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 71.43% NDs. Annual per-constituent alpha = 0.1332. Individual comparison alpha = 0.02354 (1 of 2). Comparing 4 points to limit.

Prediction Limit   Analysis Run 10/10/2023 1:13 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

Prediction Limit

Constituent: Copper (ug/L) Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	0.23 (J)	0.97 (J)	0.94 (J)	0.54 (J)	0.62 (J)
8/16/2018	<0.48	<0.48	<0.48	0.6 (J)	<0.48
8/7/2019	<2	<2	<2	<2	<2
8/24/2020	<1.5		<1.5	<1.5	<1.5
8/25/2020		<1.5			
8/10/2021			<1.4		
8/11/2021	<1.4	<1.4		<1.4	<1.4
8/24/2022	<1.8 (U)	<1.8 (U)	<1.8 (U)	<1.8 (U)	<1.8 (U)
8/29/2023	2.7 (J)	<1.8 (U)	<1.8 (U)		
8/30/2023				<1.8 (U)	<1.8 (U)

ND substitution: RL or RL/2 if <15% NDs.

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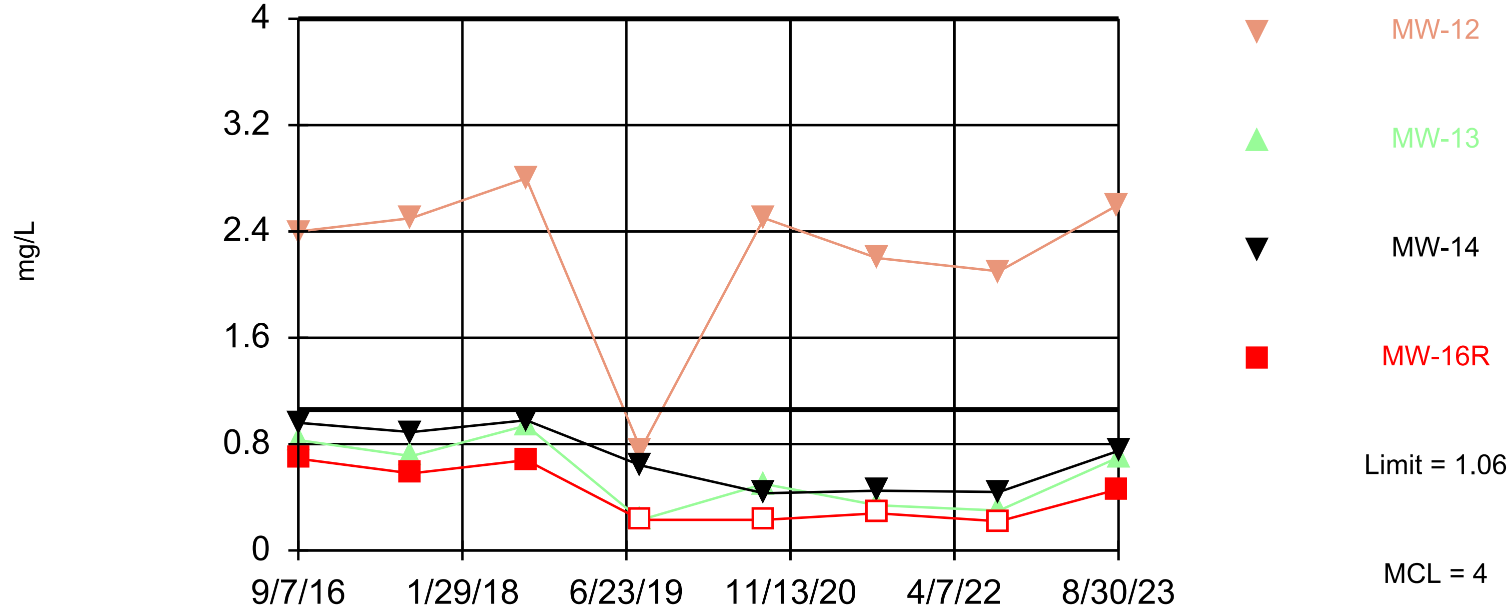
Hollow symbols indicate censored values.

Exceeds Limit: MW-12

Fluoride

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.4822, Std. Dev.=0.247, n=8, 25% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8479, critical = 0.749. Kappa = 2.338 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Fluoride (mg/L) Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-14	MW-16R	MW-12	MW-13
9/7/2016	0.84	0.96	0.69	2.4	0.83
8/24/2017	0.74	0.89	0.58	2.5	0.71
8/16/2018	0.69	0.98	0.68	2.8	0.94
8/7/2019	<0.23	0.64	<0.23	0.76	<0.23
8/24/2020	0.69	0.43 (J)		2.5	0.5
8/25/2020			<0.23		
8/10/2021				2.2	
8/11/2021	<0.28	0.45 (J)	<0.28		0.34 (J)
8/24/2022	0.23 (J)	0.44 (J)	<0.22 (U)	2.1	0.3 (J)
8/29/2023	0.58 (J)		0.46 (J)	2.6	
8/30/2023		0.75 (J)			0.7 (J)

ND substitution: RL or RL/2 if <15% NDs.

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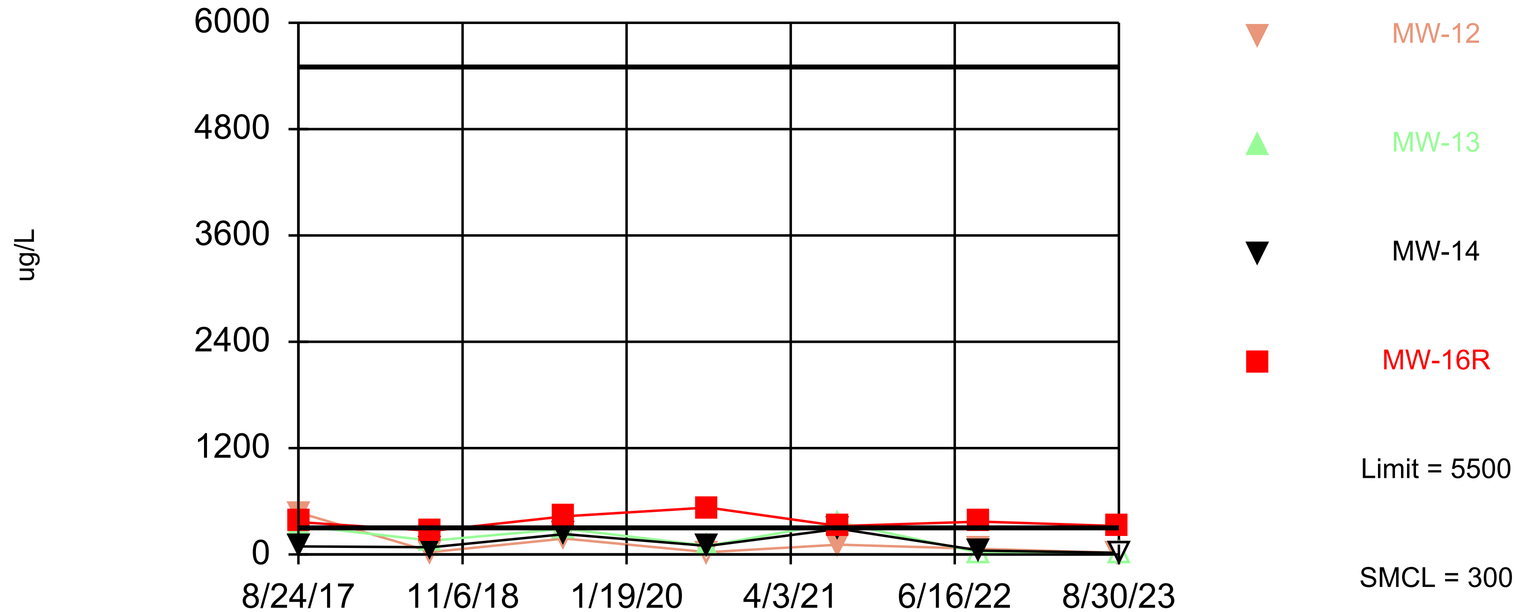
Hollow symbols indicate censored values.

Within Limit

Iron

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 0.01 alpha level. Limit is highest of 7 background values. Annual per-constituent alpha = 0.1332. Individual comparison alpha = 0.02354 (1 of 2). Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit
Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Iron (ug/L) Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	5230	365	473	91.5	324
8/16/2018	5330	266	27.1 (J)	81.8	155
8/7/2019	5200	430	180	230	290
8/24/2020	5500		<50	97 (J)	98 (J)
8/25/2020		530			
8/10/2021			110		
8/11/2021	5500	320		290	360
8/24/2022	2200	370	63 (J)	43 (J)	<36 (U)
8/29/2023	3400	320	<36 (U)		
8/30/2023				<36 (U)	<36 (U)

ND substitution: RL or RL/2 if <15% NDs.

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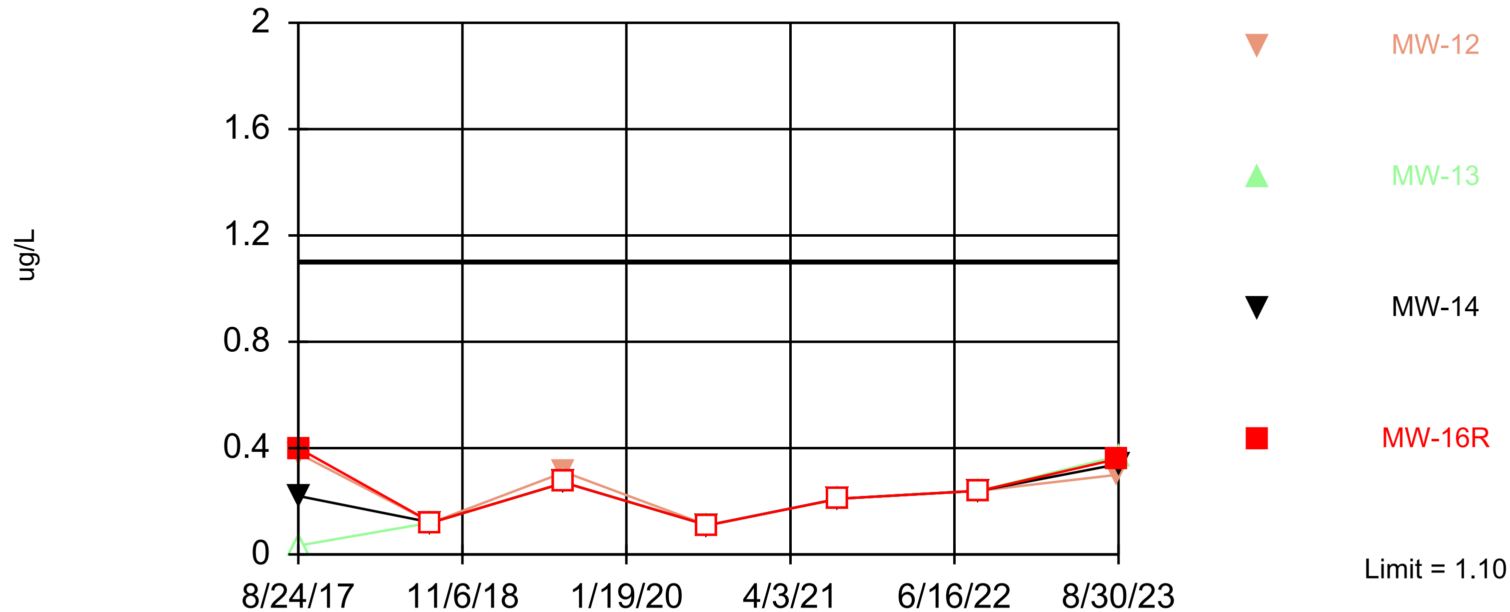
Hollow symbols indicate censored values.

Within Limit

Lead

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 7 background values. 71.43% NDs. Annual per-constituent alpha = 0.1332. Individual comparison alpha = 0.02354 (1 of 2). Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Lead (ug/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	0.036 (J)	0.4 (J)	0.38 (J)	0.22 (J)	<0.033
8/16/2018	<0.12	<0.12	<0.12	0.12 (J)	<0.12
8/7/2019	<1.1	<0.27	0.31 (J)	<0.27	<0.27
8/24/2020	<0.44		<0.11	<0.11	<0.11
8/25/2020		<0.11			
8/10/2021			0.21 (J)		
8/11/2021	<0.21	<0.21		<0.21	<0.21
8/24/2022	<0.24 (U)	<0.24 (U)	<0.24 (U)	<0.24 (U)	<0.24 (U)
8/29/2023	0.27 (JB)	0.36 (JB)	0.3 (JB)		
8/30/2023				0.34 (JB)	0.37 (JB)

ND substitution: RL or RL/2 if <15% NDs.

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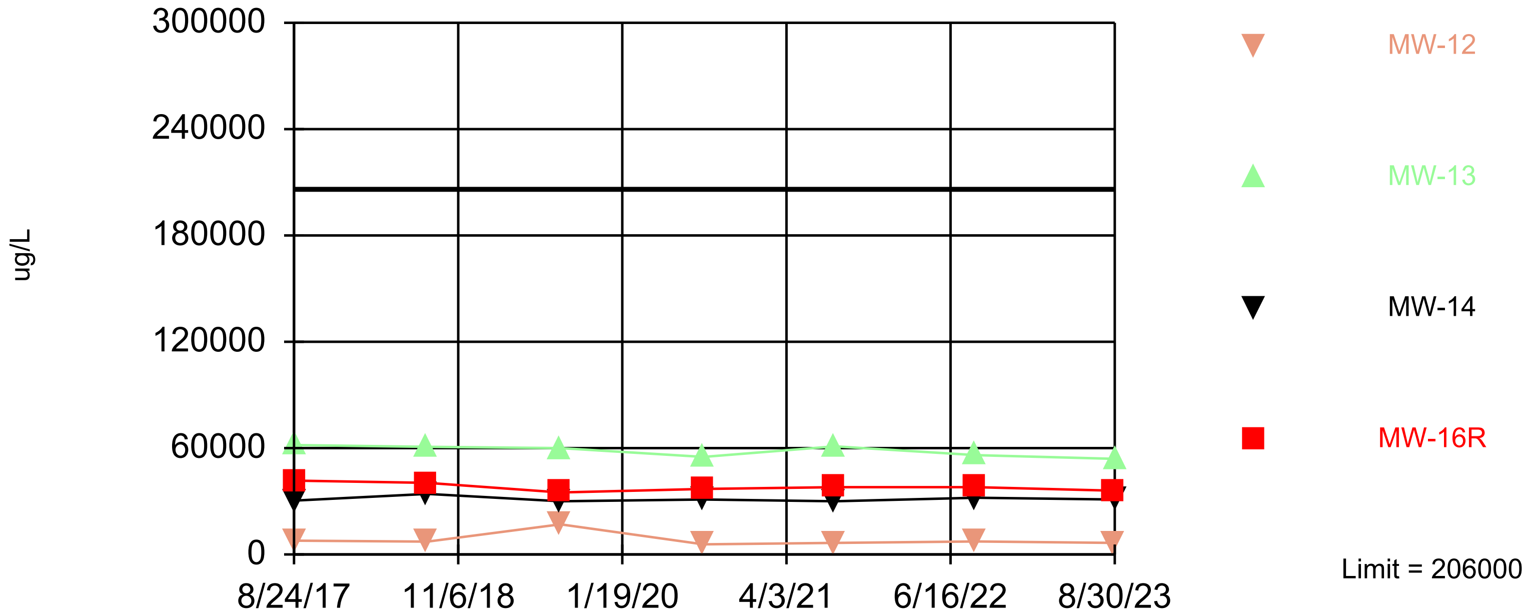
Within Limit

Magnesium

Interwell Parametric



Background Data Summary: Mean=151000, Std. Dev.=21764, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7687, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Magnesium (ug/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	157000	41700	7830	30400	61700
8/16/2018	170000	40400	7230	34200	60700
8/7/2019	170000	35000	17000	30000	60000
8/24/2020	160000		5700	31000	55000
8/25/2020		37000			
8/10/2021			6500		
8/11/2021	160000	38000		30000	61000
8/24/2022	120000	38000	7300	32000	56000
8/29/2023	120000	36000	6500		
8/30/2023				31000	54000

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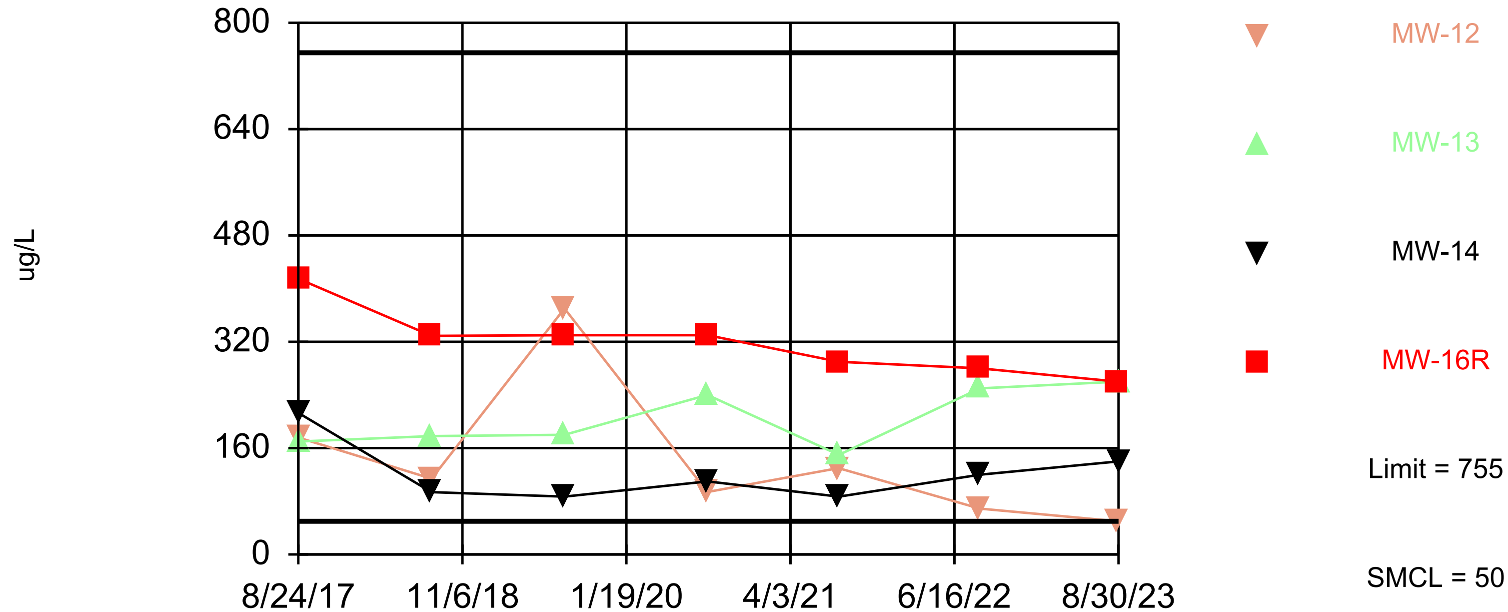
Within Limit

Manganese

Interwell Parametric



Background Data Summary: Mean=487.4, Std. Dev.=105.9, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7436, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Manganese (ug/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	558	415	176	213	170
8/16/2018	574	329	114	93.7	178
8/7/2019	550	330	370	87	180
8/24/2020	550		94	110	240
8/25/2020		330			
8/10/2021			130		
8/11/2021	510	290		87	150
8/24/2022	330	280	69	120	250
8/29/2023	340	260	50		
8/30/2023				140	260

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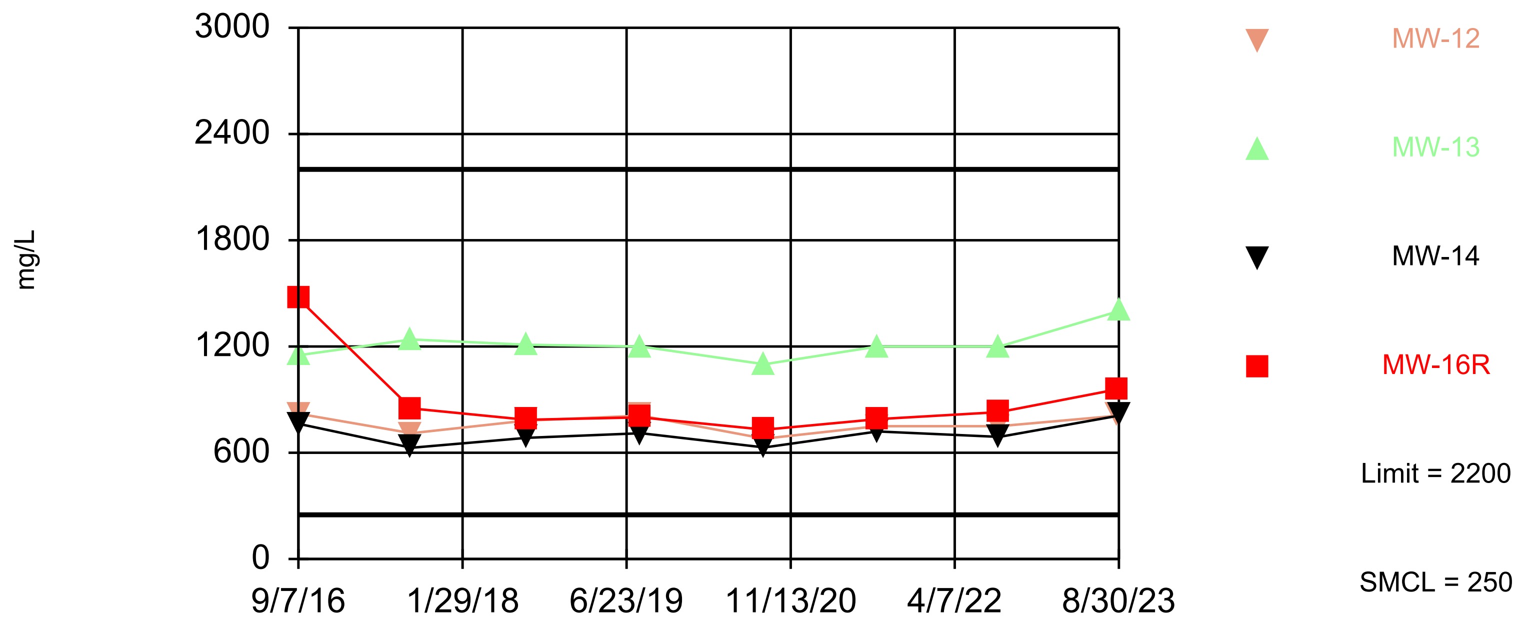
Within Limit

Sulfate

Interwell Parametric



Background Data Summary: Mean=1643, Std. Dev.=275.8, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9266, critical = 0.805. Kappa = 2.038 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Sulfate (mg/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-14	MW-13	MW-12
9/2/2015	1690				
12/30/2015	2070				
3/23/2016	1860				
6/21/2016	1840				
9/7/2016	1920	1470	764	1150	821
8/24/2017	1540	850	628	1240	710
8/16/2018	1690	786	684	1210	782
8/7/2019	1600	800	710	1200	810
8/24/2020	1500		630	1100	680
8/25/2020		730			
8/10/2021					750
8/11/2021	1500	790	720	1200	
8/24/2022	1000	830	690	1200	750
8/29/2023	1500	960			810
8/30/2023			810	1400	

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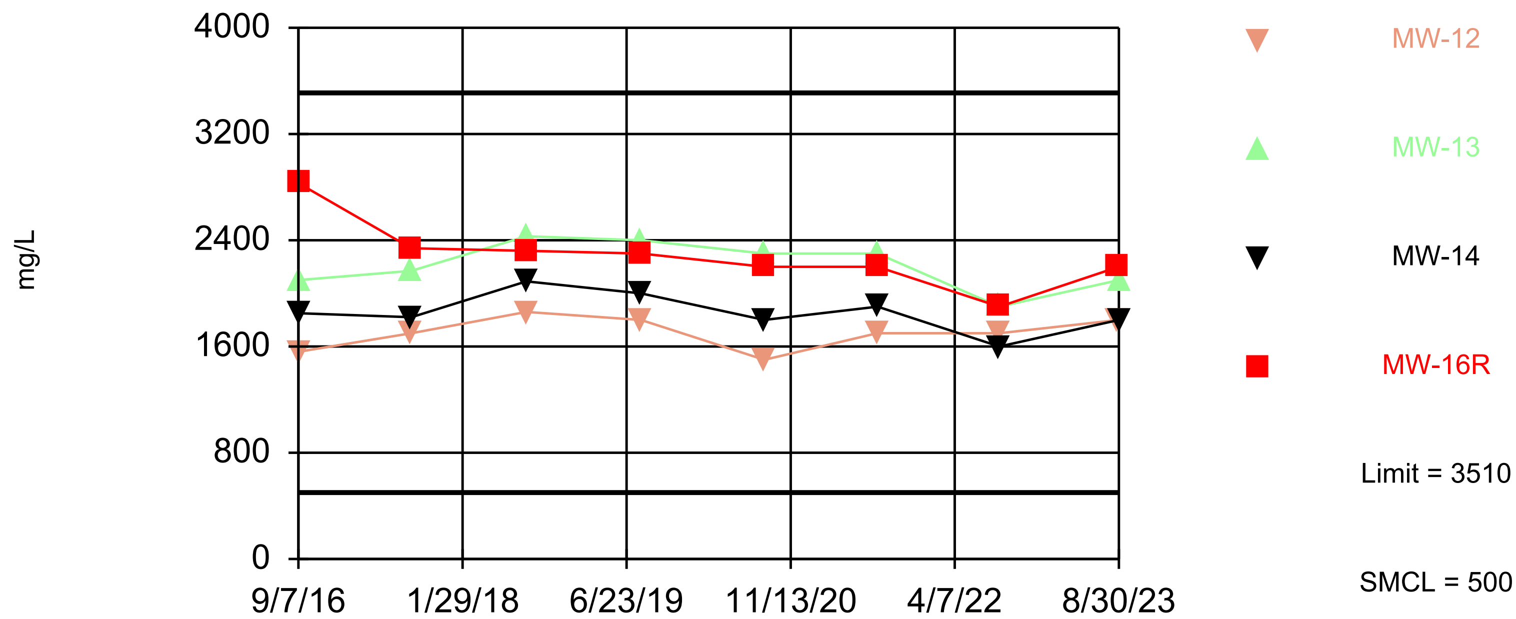
Within Limit

Total Dissolved Solids

Interwell Parametric



Background Data Summary: Mean=2754, Std. Dev.=297.2, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9368, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:13 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-13	MW-16R	MW-12	MW-14
9/7/2016	2890	2100	2830	1560	1850
8/24/2017	2760	2170	2340	1700	1820
8/16/2018	2730	2430	2320	1860	2090
8/7/2019	3100	2400	2300	1800	2000
8/24/2020	3000	2300		1500	1800
8/25/2020			2200		
8/10/2021				1700	
8/11/2021	310 (X)	2300	2200		1900
8/24/2022	2200	1900	1900	1700	1600
8/29/2023	2600		2200	1800	
8/30/2023		2100			1800

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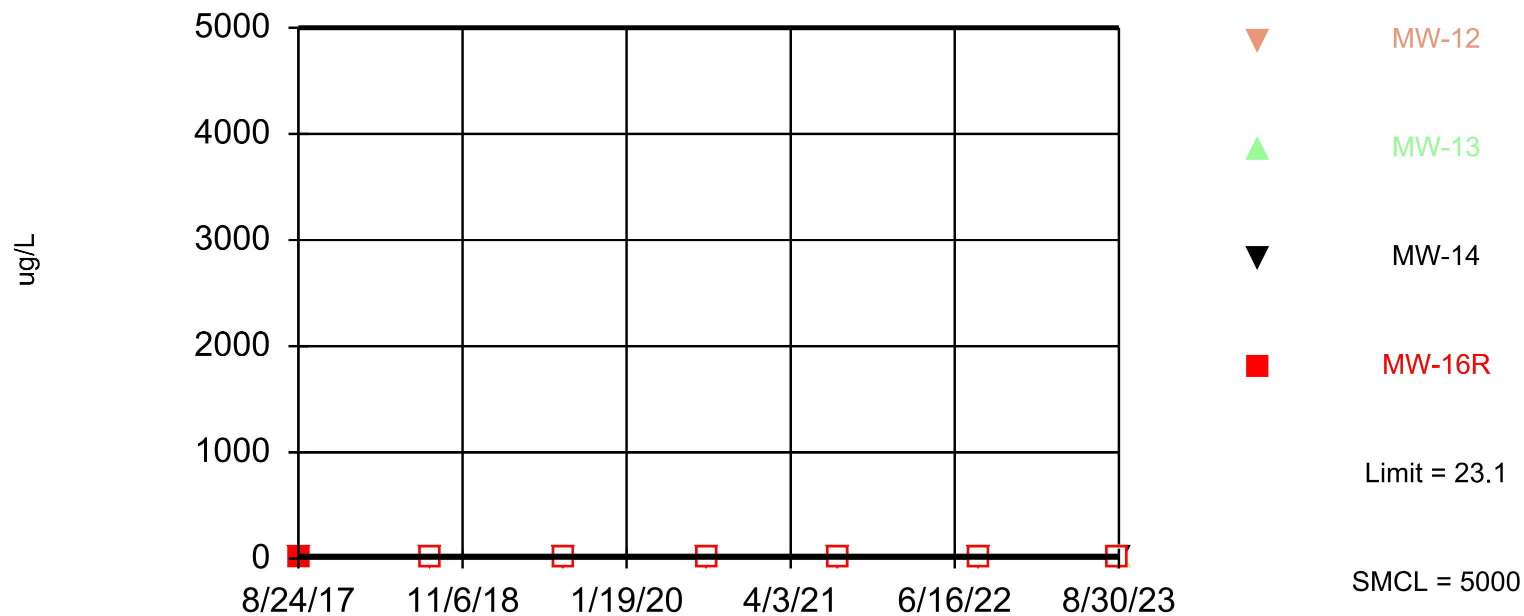
Hollow symbols indicate censored values.

Within Limit

Zinc

Interwell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=7.611, Std. Dev.=6.126, n=7, 42.86% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7873, critical = 0.73. Kappa = 2.53 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.008742. Individual comparison alpha = 0.002922. Comparing 4 points to limit.

Prediction Limit Analysis Run 10/10/2023 1:14 PM View: Pennsylvanian Unit

Ottumwa-Midland Landfill Client: SCS Engineers Data: 191022-input-OML

Prediction Limit

Constituent: Zinc (ug/L)   Analysis Run 10/10/2023 1:14 PM   View: Pennsylvanian Unit

Ottumwa-Midland Landfill   Client: SCS Engineers   Data: 191022-input-OML

	MW-102P (bg)	MW-16R	MW-12	MW-14	MW-13
8/24/2017	3.6 (J)	1 (J)	3.7 (J)	1.7 (J)	2 (J)
8/16/2018	4.3 (J)	<3.7	<3.7	<3.7	<3.7
8/7/2019	<10	<10	<10	<10	<10
8/24/2020	<40		<10	<10	<10
8/25/2020		<10			
8/10/2021			<10		
8/11/2021	<10	<10		<10	<10
8/24/2022	21	<10 (U)	<10 (U)	<10 (U)	<10 (U)
8/29/2023	6.9 (J)	<6.4 (U)	<6.4 (U)		
8/30/2023				<6.4 (U)	<6.4 (U)

ND substitution: RL or RL/2 if <15% NDs.

Appendix E

Additional Points Data History, 2020-Present

Appendix E
Additional Points Data History, 2020-Present*
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

CHEMICAL PARAMETER	GU-1 TEMP				GU-2				GU-EX			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
ARSENIC, UG/L	<0.88	<0.75							<0.88	1.9 J	2.2	
BARIUM, UG/L	45	41 B							30	25 B	64	
BERYLLIUM, UG/L	<0.27	<0.27							<0.27	<0.27	<0.27	
BORON, UG/L	520	370							1,000	1,000	870	
CALCIUM, MG/L(1)	--	--							--	--	--	
COBALT, UG/L	11	14							1.3	2.6	4.0	
COPPER	<1.5	<1.4							<1.5	<1.4	7.5	
FLUORIDE, MG/L	<0.23	0.47 J							0.30 J	0.76	<0.22	
IRON, UG/L	<50.0	41 J							720	810	6,900	
LEAD, UG/L	<0.11	<0.21							<0.11	<0.21	1.1	
LITHIUM, UG/L(1)	--	--							--	--	--	
MAGNESIUM, UG/L	70,000	67,000							29,000	38,000	53,000	
MANGANESE, UG/L	3,100	3,000	Too Little Water to Sample	DRY	DRY	DRY	DRY	DRY	240	530	400	DRY
MOLYBDENUM, UG/L(1)	--	--							--	--	--	
SELENIUM, UG/L	<1.0	<0.96							<1.0	0.97 J	2.0 J	
ZINC, UG/L	40	35							10.0 J	<10	36	
CHLORIDE, MG/L	16	17							5.5	8.2	15	
SULFATE, MG/L	500	460							390	440	700	
TOTAL DISSOLVED SOLIDS, MG/L	1,200	1,100							750	880	1,200	
TOTAL SUSPENDED SOLIDS, MG/L(1)	--	--							--	--	--	
pH, SU	7.03	6.44							7.16	7.25	6.76	
TEMPERATURE, DEGREES C	16	15.9							20.5	19.9	17.8	
SPECIFIC CONDUCTANCE, UMHOS/CM	1,758	1,615							1,114	1,298	1,489	
OXIDATION REDUCTION POTENTIAL, MV(1)	--	--							--	--	--	
DISSOLVED OXYGEN, MG/L(1)	--	--							--	--	--	

NOTES:
1. Parameter added to sampling list in 2023 as part of monitoring program modifications directed by IDNR.
2. Specific conductivity probe was likely not fully submerged in liquid at SW-3 in 2023.
* Historical data through 2019 are included in Appendix C
C:\Users\4880rmm\Desktop\[awqreport_OML - 2023.xlsx]Appendix F_Add. Points History

Appendix E
Additional Points Data History, 2020-Present*
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

CHEMICAL PARAMETER	LP-1				SW-1R				SW-2R			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
ARSENIC, UG/L						3.7				2.5		
BARIUM, UG/L						130 B				150 B		
BERYLLIUM, UG/L						<0.27				<0.27		
BORON, UG/L						71 J				150		
CALCIUM, MG/L[(1)]						--				--		
COBALT, UG/L						0.55				5.1		
COPPER						<1.4				6.9		
FLUORIDE, MG/L						0.52				0.6		
IRON, UG/L						210				5600		
LEAD, UG/L						<0.21				3.2		
LITHIUM, UG/L[(1)]						--				--		
MAGNESIUM, UG/L						25,000				24,000		
MANGANESE, UG/L	DRY	DRY	DRY	DRY	DRY	600	DRY	DRY	DRY	690	DRY	DRY
MOLYBDENUM, UG/L[(1)]						--				--		
SELENIUM, UG/L						<0.96				1.2 J		
ZINC, UG/L						<10				53		
CHLORIDE, MG/L						19				13		
SULFATE, MG/L						23				130		
TOTAL DISSOLVED SOLIDS, MG/L						340				390		
TOTAL SUSPENDED SOLIDS, MG/L[(1)]						--				--		
pH, SU						7.52				7.73		
TEMPERATURE, DEGREES C						23.4				23.3		
SPECIFIC CONDUCTANCE, UMHOS/CM						461				647		
OXIDATION REDUCTION POTENTIAL, MV[(1)]						--				--		
DISSOLVED OXYGEN, MG/L[(1)]						--				--		

Updated: RM, 10/10/2023
Checked: LH, 10/16/2023

Appendix E
Additional Points Data History, 2020-Present*
Ottumwa Midland Landfill
Permit No. 90-SDP-8-92P

CHEMICAL PARAMETER	SW-3				SW-4				SW-5			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
ARSENIC, UG/L	1.1 J	1.8 J	4.4	3.1	5.9				0.99 J	8.9		
BARIUM, UG/L	42	57 B	84.0	21	270.0				58	140 B		
BERYLLIUM, UG/L	<0.27	<0.27	<0.27	<0.33	<0.27				<0.27	<0.27		
BORON, UG/L	740	590	860	960	130				1,100	1,300		
CALCIUM, MG/L[1]	--	--	--	140	--				--	--		
COBALT, UG/L	0.096 J	0.36 J	0.67	0.41 J	1.8				0.25 J	3.8		
COPPER	<1.5	9.3	2.3 J	<1.8	<1.5				<1.5	1.7 J		
FLUORIDE, MG/L	0.24 J	0.43 J	<0.22	<0.38	<0.23				0.44 J	0.7		
IRON, UG/L	<50.0	260	590	130	950				61.0 J	3,200		
LEAD, UG/L	<0.11	0.35 J	0.44 J	0.28 J	0.42 J				<0.11	0.77		
LITHIUM, UG/L[1]	--	--	--	11	--				--	--		
MAGNESIUM, UG/L	25,000	26,000	36,000	54000	26,000				32,000	39,000		
MANGANESE, UG/L	<4.0	50	25	45	4700	DRY	DRY	DRY	300	7,500	DRY	Too Little Water to Sample
MOLYBDENUM, UG/L[1]	--	--	--	25	--				--	--		
SELENIUM, UG/L	<1.0	1.3 J	2.4 J	2.1 J	<1.0				<1.0	1.0 J		
ZINC, UG/L	<10.0	44	<10	9.8 J	<10.0				<10.0	<10		
CHLORIDE, MG/L	3.5 J	5.3	5.7	16	20				7.4	13		
SULFATE, MG/L	310	270	470	830	36				430	450		
TOTAL DISSOLVED SOLIDS, MG/L	490	470	730	1000	410				760	900		
TOTAL SUSPENDED SOLIDS, MG/L[1]	--	--	--	14	--				--	--		
pH, SU	8.93	7.41	8.68	9.01	7.55				7.45	7.14		
TEMPERATURE, DEGREES C	26.8	28.4	29.4	31.4	22.5				22.8	27.8		
SPECIFIC CONDUCTANCE, UMHOS/CM	786	741	963	--[2]	721				1,196	1,416		
OXIDATION REDUCTION POTENTIAL, MV[1]	--	--	--	45.80	--				--	--		
DISSOLVED OXYGEN, MG/L[1]	--	--	--	7.64	--				--	--		

CHEMICAL PARAMETER	LEACHATE BASIN				TCB-1/2			
	2020	2021	2022	2023	2020	2021	2022	2023
ARSENIC, UG/L	3.2	30	9.4	4.9	1.4 J	1.1 J	1.0 J	1.3 J
BARIUM, UG/L	70	42 B	55.0	61	140.0	150 B	110	63
BERYLLIUM, UG/L	<0.27	<0.27	<0.27	<0.33	<0.27	<0.27	<0.27	<0.33
BORON, UG/L	4300	2500	2,400	2200	870	440	450	480
CALCIUM, MG/L(1)	--	--	--	200	--	--	--	140
COBALT, UG/L	0.26 J	0.47 J	0.31 J	0.30 J	<0.091	<0.091	<0.19	<0.17
COPPER	1.5 J	4.9 J	2.0 J	2.4 J	<1.5	<1.4	<1.8	<1.8
FLUORIDE, MG/L	<0.23	<0.28	<0.22	<0.38	<0.23	0.35 J	<0.22	<0.38
IRON, UG/L	<50.0	90 J	45 J	<36	<50.0	<36	<36	52 J
LEAD, UG/L	<0.11	<0.21	<0.24	<0.24	<0.11	<0.21	<0.24	<0.24
LITHIUM, UG/L(1)	--	--	--	35	--	--	--	<2.5
MAGNESIUM, UG/L	85,000	21,000	31,000	34000	10,000	7,500	12,000	15000
MANGANESE, UG/L	62	33	15	16	4.7 J	6.4 J	<3.6	8.9 J
MOLYBDENUM, UG/L(1)	--	--	--	790	--	--	--	4.1
SELENIUM, UG/L	33	60	37	38	1.1 J	1.3 J	1.0 J	<1.4
ZINC, UG/L	<10.0	14 J	<10	6.9 J	<10.0	<10	<10	<6.4
CHLORIDE, MG/L	150	290	230	410	11	12	<2.3	18
SULFATE, MG/L	4,300	1,600	2,200	2500	370	270	370	560
TOTAL DISSOLVED SOLIDS, MG/L	7,500	2,900	3,500	3300	590	420	570	730
TOTAL SUSPENDED SOLIDS, MG/L(1)	--	--	--	8.7	--	--	--	1.3 J
pH, SU	8.59	8.45	8.86	8.86	8.46	7.44	8.79	7.79
TEMPERATURE, DEGREES C	26.8	27	29.1	30.3	27.7	29.1	27.3	26.6
SPECIFIC CONDUCTANCE, UMHOS/CM	4,097	4,306	4,567	5364	917	695	772	1003
OXIDATION REDUCTION POTENTIAL, MV(1)	--	--	--	63.3	--	--	--	67.0
DISSOLVED OXYGEN, MG/L(1)	--	--	--	10.4	--	--	--	7.47

Appendix F

2023 Annual Facility Inspection Summary and Leachate Control System Performance Evaluation

Annual Facility Inspection Summary – 2023
Interstate Power and Light Company
Ottumwa-Midland Commercial Landfill
Permit No. 90-SDP-8-92P

This annual facility inspection summary for the Interstate Power and Light Company (IPL) Ottumwa-Midland Landfill (OML) includes the following elements:

- Engineering inspection described in Section 8.0 of the August 2016 Operations Manual.
- Annual National Pollutant Discharge Elimination System Storm Water Pollution Prevention Plan (SWPPP) review.
- Annual Leachate Control System Performance Evaluation required by Special Provision 6.c. of the permit for OML (Sanitary Disposal Permit No. 90-SDP-8-92P).
- Groundwater monitoring well inspections.
- Iowa Department of Natural Resources (IDNR) inspections.

A summary of each annual inspection element is provided in the sections below.

No portion of the facility has received final cover, so no annual post-closure inspections have been completed per 567 IAC 103.1(5) f.

ENGINEERING INSPECTION

On August 22, 2023, Mr. Eric Nelson, PE with SCS Engineers, conducted a site inspection. The inspection included a review of operating records kept for compliance with U. S. Environmental Protection Agency (U.S. EPA) Rule 40 CFR 257, Subpart D - Standards for the Disposal of Coal Combustion Residuals (CCR) in Landfill and Surface Impoundments, and a visual review of the landfill facility for signs of distress or malfunction. This inspection summary addresses the report items described in Section 8.0 of the Operations Manual.

Changes in Geometry

No apparent changes in geometry were noted that would indicate distress or malfunction of the CCR units at the facility since the previous annual inspection. All changes in geometry observed during the inspection were the result of planned CCR filling or intermediate soil cover placement activities.

CCR Volumes

Approximately 1.281 million cubic yards (MCY) of CCR was in place at OML as of August 22, 2023. This estimate is based on:

- The in-place volume on June 8, 2023, as calculated using a topographic survey of the site and record surveys of liner construction.

- The volume of CCR material placed between June 8, 2023, and August 22, 2023, as estimated using disposal records provided by IPL.

Appearance of Structural Weakness

The inspection included a review of the appearance of an actual or potential structural weakness of the CCR unit as indicated by the following:

Signs of Surface Movement or Instability

No signs of surface movement or instability were noted during the inspection.

Inappropriate Vegetation Growth

Limited woody vegetation was noted during the inspection at the culverts draining to Temporary Contact Water Basin 1/2 on the northwest corner of Expansion Phase 1 that, if left to grow, could impede leachate flow within the sand leachate drainage layer. SCS recommends removing the vegetation and monitoring the area during the 7-day inspections.

Animal Burrows

No animal burrows were noted during the inspection.

Erosion Damage

No erosion damage was noted during the inspection.

Unusual Surface Damage Caused by Vehicle Traffic

No unusual surface damage was noted during the inspection.

Disruptive Conditions

Existing Disruptive Conditions

No existing disruptive conditions were noted during the inspection.

Potentially Disruptive Conditions

Location	Observation	Possible Resolution
Expansion Phase 1 – Rain cover ballast (various locations)	A number of stitched rain cover ballast material seams have started to separate, which may subject the rain cover material to uplift and potential damage.	• Repair stitching or add supplemental sandbag ballast in lieu of stitching on an as-needed basis. • Monitor during 7-day inspections.

Location	Observation	Possible Resolution
Expansion Phase 1	System status screen is not legible (apparently due to exposure to direct sunlight over time), making system monitoring difficult to impossible.	• Replace system readout (see construction submittals for leachate collection system, EPG Companies (supplier) Job #14 11496). • If possible, obtain readings when the readout is visible when not in direct sunlight.
Expansion Phase 1	Level sensor (transducer) is not legible and appears to read double-digits. Panel also shows a headwell sensor failure alarm during today's visit.	• Have IPL electrician evaluate sensor/control panel and discuss sensor and recurring fault condition with EPG Companies (panel and leachate level measurement system manufacturer). https://www.epgco.com/aboutus/contact-us/ • Monitor during 7-day inspections.

Other Changes Since Previous Annual Inspection

No changes to site conditions that appear to have the potential to affect the stability or operation of the facility were noted during the inspection.

Some potentially disruptive conditions pertaining to the Expansion Phase 1 leachate collection system vault control unit and level sensor mentioned in the last Facility Inspection Report were addressed in 2023 and are ongoing. The system status screen of the leachate collection system vault control panel was barely visible during the previous inspection, making system monitoring difficult. IPL electricians found a short in the control wiring, and new upgraded replacement control wiring was installed. This work was completed as of August 1, 2023. However, as noted above similar issues with the system status screen and level sensor readout were noted during the August 22, 2023 inspection. IPL is currently working with the system manufacturer, EPG, to identify and provide a more permanent repair to the level sensor and control panel display. As of the date of this report, IPL and EPG were in the process of scheduling a date for an in-field assessment by EPG and IPL staff.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM SWPPP

The SWPPP – Annual Site Compliance Evaluation/Report was completed in June 2023. A copy of the 2023 SWPPP – Annual Site Compliance Evaluation/Report is presented in **Attachment A.** Site personnel training records are included in **Attachment B.**

LEACHATE CONTROL SYSTEM PERFORMANCE

Leachate head levels are measured monthly by the landfill operator from LP-1 and LH-1. The records for leachate head levels are kept available at the site at all times. Monthly leachate elevation and head measurement records were viewed during the inspection and were complete.

Records of volume of leachate collected and the volume of leachate and contact water transported off site for treatment/disposal are kept available at the site at all times. Leachate and contact water removal and hauling records were viewed during the inspection. The Leachate Control System Performance Evaluation (LCSPE) is included as **Attachment C.**

Every 3 years leachate collection lines are to be cleaned and inspected. The collection lines were last cleaned in October 2023. The LCSPE includes information about the collection line cleaning.

GROUNDWATER WELLS

Tyler Stirling of SCS Engineers conducted an inspection of the site monitoring wells on August 29 to 30, 2023. All wells were found to be in good condition.

IDNR INSPECTIONS

The most recent IDNR inspection of the facility was performed on June 1, 2021. The inspection report is included as **Attachment D.**

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Attachment A

SWPPP – Annual Site Compliance Evaluation/Report and Signature Log

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

ANNUAL SITE COMPLIANCE EVALUATION / REPORT

for the

Ottumwa Midland Landfill

Inspection date: 06/08/2023

Prepared by

Rob Saunders

Guidance for Inspectors

During the inspection, use these guidelines:

- Employees should use common sense and maintain a neat, clean working environment which will help prevent spilling of significant materials. Any spills should be promptly cleaned up.
- All portable containers are required to be clearly labeled as to the contents.
- Is there evidence of pollutants entering the storm drainage system?
- Are the BMPs that are implemented effective in preventing storm water pollution?
- Is the Storm Water Pollution Prevention Plan up to date?
- Storm water pollution prevention equipment including dikes, curbs, gutter, drains, valves, concrete, containers, and drums should be given necessary preventative maintenance to prevent releases to storm water.
- All storm water pollution equipment will be maintained in a good operating order.
- Other equipment (such as tanks, containers, and drums) will be checked regularly for signs of deterioration.

For Section 313 Water Priority Chemicals, the periodic storm water inspections will include observations for the following:

- Leaks or conditions that would lead to discharges of section 313 Water Priority Chemicals.
- Conditions that could lead to direct contact of storm water with raw materials, intermediate materials, or products.
- Piping, pumps, storage tank and bins, pressure vessels, process and material handling equipment, and material bulk storage areas for leaks, wind blowing, corrosion, support or foundation failure, or other deterioration or non-containment.

Construction activities may involve the removal of large areas of vegetative cover exposing raw soil to erosion. During these construction periods, procedures should be implemented to reduce erosion. These procedures may include the following:

- Compliance with any applicable Storm Water Pollution Plan for Construction Activities.
- Seeding erodeable areas with a suitable grass.
- Spreading crushed rock on erodable areas.
- Minimizing the time period raw soil is exposed.
- Building temporary silt retention dams in ditches to allow settling of suspended soil before discharge.
- Applying biodegradable soil cover such as straw or burlap to highly erodable areas until a more permanent solution can be implemented.
- Use of silt fences.
- Use of velocity reduction structures (rip rap).

ANNUAL SITE COMPLIANCE EVALUATION / REPORT

In accordance with published EPA guidelines and requirements for Storm Water Discharges Associated with Industrial Activities, this ANNUAL SITE COMPLIANCE EVALUATION / REPORT is provided for record and authorization.

Facility Name: Ottumwa Midland Landfill

Facility Address: 15300 130th Street
Ottumwa, Iowa 52501

Date: 06/08/2023

Inspector(s) Rob Saunders

REQUIRED OBSERVATIONS and ACTIVITIES:

Do you see: (Y or N)

No	Pollutants entering stormwater drainage area, if "YES" then describe on an attached sheet?
Yes	BMP measures effectively reducing pollutant loading, if "NO" then describe on an attached sheet?
No	Areas needing new or additional BMP measures, if "YES" then describe on attached sheet?
Yes	BMP measures operating properly, if "NO" then describe on an attached sheet?
Yes	Effective and proper use of any equipment in use for this plan's implementation, if "NO" then describe on an attached sheet?
Yes	Any areas of noncompliance, if "YES" then describe on an attached sheet?

Note:

(✓) Prepare an ANNUAL SITE COMPLIANCE EVALUATION/REPORT, include the following:
- A) Inspection date,
- B) Inspection personnel,
- C) Incidents of noncompliance,
- D) Inspection results,
- E) Follow-up activities (schedule), and
- F) Certification

(✓) Was the current SWPPP reviewed and is it up to date?[1]
(✓) Sign the report in accordance with Section 2.6.2 and keep with plan. (EPA Guidance Manual)

[1] Update the SWPPP. Be sure to update the revision date on the title page and in the footer on each page. Be sure to update the revision sheet to reflect the review, even if no changes were made. Send an updated copy to the site See OGS Environmental Procedure 088: "How to Update SWPPP Plans."

ANNUAL SITE COMPLIANCE EVALUATION / REPORT

INCIDENTS of NON-COMPLIANCE:

- Seeding near Sedimentation Basin No. 2 has not yet grown in.

INSPECTION RESULTS:

- See the attached document, "Annual Facility Site Compliance Inspection (AFSCI) Finding Tracking Log."

FOLLOW-UP ACTIVITIES (SCHEDULE):

- Follow up on all incidents of non-compliance in one month (07/08/2023).

ADDITIONAL INFORMATION

- None

It is therefore the position of this team, that the **Ottumwa Midland Landfill** Storm Water Pollution Prevention Plan (SWPPP) is in compliance and will effectively reduce (or eliminate) storm water pollution at its source.

CERTIFICATION	
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware of the significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
A. Name & Official Title (type or print): John Watts Plant Manager Ottumwa Generating Station	B. Area Code and Telephone No: (641) 935-2903
C. Signature: John Watts	D. Date Signed: 13 June 2023

Attachment B

Site Personnel Training Records

Alliant Energy Ottumwa Generating Station	OGS Environmental Procedure 119: Environmental Training Sign In Sheet	Revision date: 05/16/2022 Author: Rob Saunders	Page 1 of 2

Procedure

Use this sign in sheet to document attendance at required environmental training sessions. Indicate the date, site, topic, and trainer.

Note to the Environmental Specialist: Submit a copy to The Point → Submit a Service Ticket → IPL Ops Support Coordinator → Category = IPL Training, Subcategory = Training Attendance Sheet
☐ Submitted to IPL Operations Support Services on NA.

1. Date:	03/16/2023
2. Site:	☐ OGS ☒ OML

3. Topic:[1]	☐ RCRA Waste Training (ENV0020) ☐ SWPPP (ENV0002) ☐ SPCC, Site Specific[2] ☐ Fugitive Dust (ENV0012) ☒ ERRAP[3] ☐ CCR Rule Training for Inspectors (ENV0404) ☐ DOT Haz Mat Training (ENV0061) ☐ LOTO Initial 6-hr (SAF0107) ☐ Other: ______
4. Trainer:	☒ Rob Saunders ☐ Other: ______

Line no.	Print your Name (Legibly)	Employee Number (NOT A0 number)
1.	Martin D Lamb	15512
2.	Wade Hart	16789
3.	Steve Keck	3370
4.	Kirk McAninch	16829
5.	DEREK ROBERTS	09346
6.	Rob Saunders	16073
7.		
8.		
9.		
10.		

Continued on back:

Employee ID	Employee Name	Job Title	Last Start/Hire Date	Job Entry Date	Apprentice?	Department Name	Location Name	Business Unit	Activity Code	Activity Name	Activity Type	Assigned as Re	Last Completed Date	Expiration Date	Manager Name	Hierarchy by Manager ID
16789	Hart, Wade	Ash Disposal Facility Operator	Oct 21, 2013	Oct 21, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	ENV0012	ENV0012 Fugitive Dust	ILT Course	Required	Jan 6, 2023	Dec 31, 2023	Lamb, Martin	07965-23071-04308-06846-15512
16789	Keck, Stephen B	Ash Disposal Facility Foreman	Nov 4, 1997	Sep 8, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	ENV0012	ENV0012 Fugitive Dust	ILT Course	Required	Aug 11, 2022	Dec 31, 2023	Lamb, Martin	07965-23071-04308-06846-15512
16789	McAninch, Kirk A	Ash Disposal Facility Operator	Nov 18, 2013	Nov 18, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	ENV0012	ENV0012 Fugitive Dust	ILT Course	Required	Jan 6, 2023	Dec 31, 2023	Lamb, Martin	07965-23071-04308-06846-15512
16789	Hart, Wade	Ash Disposal Facility Operator	Oct 21, 2013	Oct 21, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	ENV0020-GEN	ENV0020 Waste Awareness (Generation)	Curriculum	Required	Mar 25, 2021	Dec 31, 2022	Lamb, Martin	07965-23071-04308-06846-15512
16789	Keck, Stephen B	Ash Disposal Facility Foreman	Nov 4, 1997	Sep 8, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	ENV0020-GEN	ENV0020 Waste Awareness (Generation)	Curriculum	Required	Mar 25, 2021	Dec 31, 2022	Lamb, Martin	07965-23071-04308-06846-15512
16789	McAninch, Kirk A	Ash Disposal Facility Operator	Nov 18, 2013	Nov 18, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	ENV0020-GEN	ENV0020 Waste Awareness (Generation)	Curriculum	Required	Mar 24, 2021	Dec 31, 2022	Lamb, Martin	07965-23071-04308-06846-15512
03370	Hart, Wade	Ash Disposal Facility Operator	Oct 21, 2013	Oct 21, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0002	OGS0002 OGS and OML SWPPP Training	Course	Required	Jan 6, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512
03370	Keck, Stephen B	Ash Disposal Facility Foreman	Nov 4, 1997	Sep 8, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0002	OGS0002 OGS and OML SWPPP Training	Course	Required	Mar 6, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512
03370	McAninch, Kirk A	Ash Disposal Facility Operator	Nov 18, 2013	Nov 18, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0002	OGS0002 OGS and OML SWPPP Training	Course	Required	Jan 6, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512
03370	Hart, Wade	Ash Disposal Facility Operator	Oct 21, 2013	Oct 21, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0012	OGS0012 OGS Fugitive Dust Training	Course	Required	Jan 6, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512
03370	Keck, Stephen B	Ash Disposal Facility Foreman	Nov 4, 1997	Sep 8, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0012	OGS0012 OGS Fugitive Dust Training	Course	Required	Feb 21, 2022	Dec 31, 2023	Lamb, Martin	07965-23071-04308-06846-15512
03370	McAninch, Kirk A	Ash Disposal Facility Operator	Nov 18, 2013	Nov 18, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0012	OGS0012 OGS Fugitive Dust Training	Course	Required	Jan 6, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512
03370	Hart, Wade	Ash Disposal Facility Operator	Oct 21, 2013	Oct 21, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0020	OGS0020 OGS and OML RCRA Training	Course	Required	Mar 7, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512
03370	Keck, Stephen B	Ash Disposal Facility Foreman	Nov 4, 1997	Sep 8, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0020	OGS0020 OGS and OML RCRA Training	Course	Required	Mar 28, 2022	Dec 31, 2023	Lamb, Martin	07965-23071-04308-06846-15512
03370	McAninch, Kirk A	Ash Disposal Facility Operator	Nov 18, 2013	Nov 18, 2013	Non-Appr	Ottumwa Maintenance (Danny Lamb (15512))	Ottumwa Generating Station	B17G1	OGS0020	OGS0020 OGS and OML RCRA Training	Course	Required	Mar 6, 2023	Dec 31, 2024	Lamb, Martin	07965-23071-04308-06846-15512

Attachment C

Leachate Control System Performance Evaluation

November 30, 2023
File No. 25223073.00

Mr. Jeffrey Maxted
Alliant Energy
4902 N. Biltmore Lane
Madison, WI 53718

Subject: Leachate Control System Performance Evaluation
Interstate Power and Light Company
Ottumwa-Midland Commercial Landfill
Permit #90-SDP-08-92P

Dear Mr. Maxted:

This Leachate Control System Performance Evaluation (LCSPE) Report is provided by SCS Engineers (SCS) as per the requirements of the July 21, 2017 permit renewal for the Ottumwa-Midland Commercial Landfill (OML). This report is a supplement to the 2023 Annual Water Quality Report.

BACKGROUND

OML accepts coal combustion residuals (CCR). The current Phase 1 landfill is approximately 10 acres in size. The initial landfill permit was approved on September 23, 1994, by the Iowa Department of Natural Resources (IDNR). Landfill activities began in 1995. The last permit renewal was approved by the IDNR on July 21, 2017.

ORIGINAL LANDFILL LEACHATE CONTROL SYSTEM

The leachate control system in the original landfill area at OML consists of a leachate collection system, a leachate lift station, and a leachate storage lagoon. Construction of the leachate control system is described in the July 1995 Construction Certification Report that was prepared by Montgomery Watson. The leachate collection system layout is shown on **Figure 1**. A summary of the original landfill leachate control system is provided below.

The active leachate collection system in the original landfill consists of the following components:

- Twelve-inch protective general fill layer
- Geocomposite drainage layer
- Leachate collection pipes/trenches and cleanouts

Leachate collection pipe consists of 6-inch-diameter, perforated, heavy duty, smooth interior, corrugated polyethylene pipe (CPEP). Leachate collection system piping is installed in trenches excavated 18 inches into the 4-foot-thick compacted clay liner. One north-south-oriented trench and five east-west-oriented leachate collection trenches are installed at the base of the landfill. Leachate collection piping is bedded and covered with 1.5-inch clean stone, and the trenches are wrapped with geotextile. The geotextile-wrapped, stone-filled leachate collection trenches extend beneath the geocomposite drainage layer and 12-inch protective general fill layer. The east-west leachate collection pipes are sloped to the interior north-south-oriented leachate collection pipe. The north-south leachate collection pipe then drains south to a leachate transport pipe.

Each end of the east-west-oriented leachate collection pipes are connected to a 6-inch-diameter, non-perforated, heavy duty, smooth interior, CPEP leachate cleanout pipe. The north end of the north-south-oriented leachate collection pipe is also connected to a CPEP cleanout pipe. The cleanout pipes extend up the liner side slopes and are exposed above grade at the limits of the landfill liner to provide cleanout access at the ground surface.

The north-south-oriented leachate collection pipe is connected to a 6-inch-diameter, non-perforated, Standard Dimension Ratio (SDR) 17 high-density polyethylene (HDPE) leachate transport pipe where it exits the lined limits of the original landfill to the south. The leachate transport pipe drains leachate by gravity to the leachate wet well/lift station located south of the sediment pond. From the lift station, leachate is pumped under 130th Street to the leachate lagoon via a 2-inch-diameter, non-perforated, SDR 17 HDPE forcemain.

Leachate is pumped from the lagoon for on-site reuse for moisture conditioning during CCR placement in the landfill or dust control within the lined limits of OML. Leachate can also be transported off-site for treatment or disposal.

PHASE 1 EXPANSION LEACHATE CONTROL SYSTEM

The leachate control system in the Phase 1 Expansion area at OML consists of a leachate collection system, a leachate riser pipe and pump, and a leachate vault. Construction of the leachate control system is described in the November 5, 2015 Phase 1 Liner Construction Documentation Report, that was prepared by SCS. The leachate collection system layout is shown on Figure 2. A summary of the leachate control system in Phase 1 is provided below.

The active leachate collection system in Phase 1 consists of the following components:

- Twelve-inch leachate drainage layer
- Twelve-inch drainage filter and 12-inch coarse aggregate bedding over leachate collection pipes
- Leachate collection pipes/trenches and cleanouts

Leachate collection pipe consists of 6-inch-diameter, perforated, SDR 11, HDPE pipe. Leachate collection system piping is installed in a trench that is a minimum of 18 inches deep. The full 2-foot-thickness of the clay liner was maintained under the trench during construction. One east-west-oriented leachate collection trench is installed at the base of the landfill cell, and gravity drains to the west. A sweep bend is located at the west end of the leachate collection piping, and the pipe is oriented to the southwest toward the leachate sump.

The east end and southwest ends of the leachate collection pipe are connected to a 6-inch-diameter, non-perforated, HDPE cleanout pipe. The cleanout pipes extend up the liner side slopes and are exposed above grade to provide cleanout access at the ground surface.

An 18-inch-diameter SDR 17 HDPE leachate collection sump riser pipe is installed in the leachate collection sump. The riser pipe extends up the liner side slope in the southwest corner of Phase 1 to the leachate vault. A pump is installed in the riser pipe and pumps leachate from the leachate sump to the leachate vault. From the leachate vault, leachate is pumped through a 3-inch HDPE force main to the leachate lift station. From the leachate lift station, leachate is pumped across 130th Street to the leachate lagoon via a 2-inch-diameter, non-perforated, SDR 17 HDPE forcemain.

Leachate is pumped from the lagoon for on-site reuse for moisture conditioning during CCR placement in the landfill or dust control within the lined limits of OML. Leachate is also transported off-site for treatment or disposal.

LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION

The July 21, 2017, permit renewal requires an annual evaluation of the effectiveness of the leachate control system. The evaluation is based on a review of the following items provided by Interstate Power and Light (IPL):

- Volume of Leachate Collected
- Leachate Head Well Measurements
- Leachate Collection Line Cleaning/Jetting

The following subsections provide a summary of each of these items.

Volume of Leachate Collected

The leachate in the lagoon was primarily used for dust control within the landfill during 2023. The daily leachate volumes pumped from the landfill into the lagoon and transported off-site are shown in **Attachment A.** A total of 1,977,966 gallons of leachate was transported to the City of Ottumwa during November 2022 through October 2023, according to IPL records. Remaining leachate was used for waste conditioning and dust control within the active disposal areas. Historical data that summarizes quantities of leachate transported to the OGS are provided in Table A-2 of **Attachment A.**

Leachate Head Well Measurements

The location of leachate head wells LP-1 and LH-1 are shown on **Figures 1** and **2**. LP-1 was installed on June 7, 2011, and is constructed of 3-inch-diameter non-perforated HDPE riser pipe connected to a 3-foot-long schedule 80 PVC well screen at the bottom of the riser pipe. LP-1 was installed directly above the geocomposite.

LH-1 was constructed in 2015 during the Phase 1 construction project. LH-1 is constructed of a 3-inch-diameter, Schedule 80 PVC pipe with a 5-foot screened section at the end with 0.010-inch slots (10-slot). The headwell was installed at a constant elevation of approximately 753.55 feet directly on the geomembrane. The PVC pipe section is connected to a 3-inch-diameter solid SDR 17 HDPE riser pipe with an HDPE-to-PVC transition fitting prior to the 22 ½ degree HDPE elbow. A submersible level sensor was installed within the flat portion of the headwell just beyond the 22 ½ degree HDPE elbow.

A summary table of 2022 and 2023 leachate head level measurements for LP-1 and LH-1 is included in **Attachment B.** All leachate head levels at LP-1 during the period covered by this report were less than 1 foot. A sensor malfunction is hindering leachate head measurements at LH-1. Repair work, which included ordering and installing upgraded wiring to address a short in the control wiring, was completed on August 1, 2023, however similar issues with the system status screen and level sensor readout were noted during the August 22, 2023 inspection, and as of the date of this report readings cannot be obtained from LH-1. Readings from a level sensor installed in the leachate sump are included in **Attachment B**. The sump sensor is approximately 7 feet lower than the LH-1 sensor, and the sump is approximately 6 feet deep.

IPL is currently working with the system manufacturer, EPG, to identify and provide a more permanent repair to the LH-1 level sensor and control panel display. As of the date of this report, IPL and EPG were in the process of scheduling a date for an in-field assessment by EPG and IPL staff.

Leachate Collection Line Cleaning/Jetting

The last jetting of the leachate collection lines was performed on October 11, 2023. The jetting documentation is included in **Attachment C**. The next leachate line jetting is scheduled to be performed in 2026.

Summary of Leachate Control System Performance Evaluation

Based on a review of the leachate data included in this submittal, the leachate control system at OML appears to be functioning as designed. The leachate is pumped from the leachate collection system to the leachate storage lagoon. Leachate from the lagoon is primarily used for dust control within the landfill. A total of 1,977,966 gallons of leachate was transported off-site during November 2022 through October 2023. The leachate collection lines were cleaned on October 11, 2023. The leachate control measures appear to be adequate.

Three recommendations related to the leachate collection system were made after an August 2023 site inspection: replacement of the Expansion Phase 1 leachate headwell system readout screen; evaluation of the Expansion Phase 1 leachate monitoring system sensor and panel by an IPL electrician and the sensor manufacturer; and repair of the rain cover ballast material stitching. Work in response to these recommendations is ongoing.

If you have any questions about this report, please contact Tom Karwoski at 608-216-7369.

Sincerely,

Thomas J. Karwoski
Project Manager
SCS Engineers

Ryan Matzuk
Hydrogeologist
SCS Engineers

RM/AJR/MDB

Enclosures: Figure 1 – Leachate Control System
Figure 2 – Expansion Phase 1 Leachate Lines
Attachment A – Leachate Volumes
Attachment B – Leachate Head Measurements
Attachment C – Leachate Line Jetting Documentation

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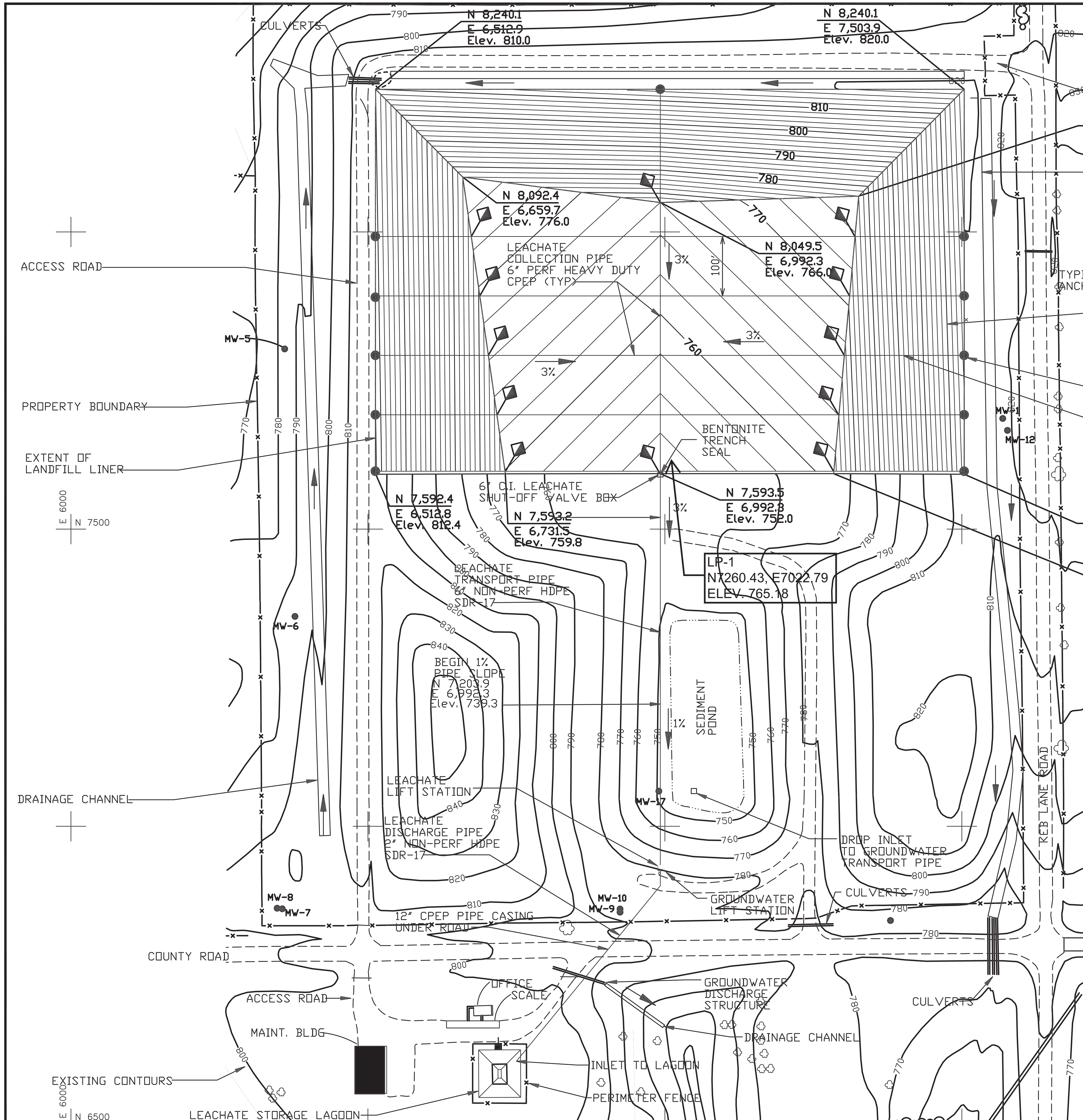
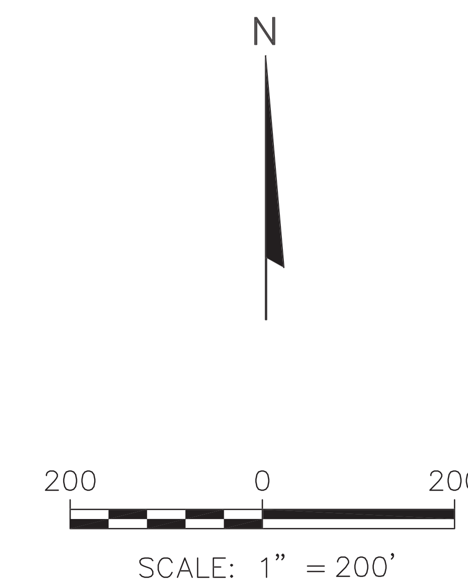
Figures



NOTES:

1. LEACHATE COLLECTION PIPING TO PARALLEL GROUNDWATER UNDERDRAIN PIPING BY +5.5 FEET.
2. LEACHATE CONTROL SYSTEM INFORMATION FROM NOVEMBER 1995 AS-BUILT PLAN SET PROVIDED BY ALLIANT ENERGY.
3. LEACHATE HEAD PIEZOMETER LP-1 LOCATION FROM JULY 22, 2011 PERMIT AMENDMENT REQUEST



PROJECT NO.	25213068.00	DRAWN BY:	KP
DRAWN:	11/19/13	CHECKED BY:	TK
REVISED:	11/28/2023	APPROVED BY:	MDB

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

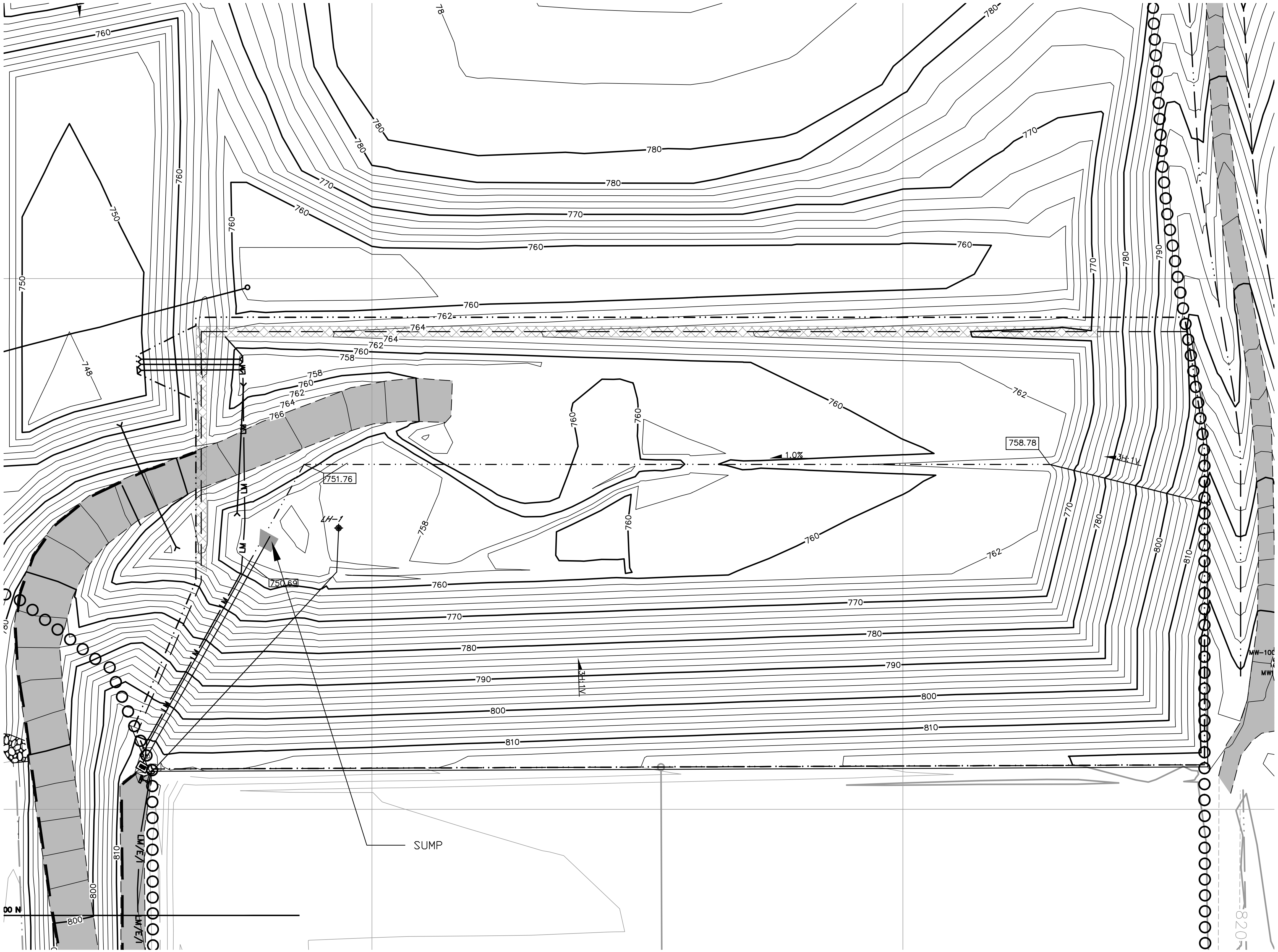
CLIENT: INTERSTATE POWER AND LIGHT CO.
15300 130th STREET
OTTUMWA, IA 52501

SITE: OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

LEACHATE CONTROL SYSTEM

FIGURE
1

I:\25213068\Drawings-General\Leachate system.DWG, 11/19/2013 9:51:21 AM



LEGEND

- APPROXIMATE PROPERTY LINE
- LIMITS OF WASTE
- PHASE LIMITS
- 770 EXISTING GROUND SURFACE (10' CONTOUR)
- EXISTING GROUND SURFACE (2' CONTOUR)
- 760 AS-BUILT GRADE (10' CONTOUR)
- 762 AS-BUILT GRADE (2' CONTOUR)
- LIMITS OF 2' CLAY LINER
- EXISTING DITCH
- EXISTING STREAM
- 1.0% SLOPE AND DIRECTION
- PERIMETER DITCH
- REALIGNED STREAM
- ACCESS ROAD
- CONCRETE BARRIER
- CULVERT
- PHASE DELINEATION BERM
- 6" DIA. PERFORATED LEACHATE COLLECTION PIPE
- 6" DIA. NON-PERFORATED LEACHATE RISER PIPE
- LM LM 6" DIA. LEACHATE FORCEMAIN
- LM/E/I LM/E/I 6" DIA. LEACHATE FORCEMAIN, ELECTRIC AND INSTRUMENT CONDUITS
- LEACHATE CLEANOUT RISER
- LH2 LEACHATE HEADWELL
- LEACHATE VAULT
- ELECTRIC VAULT
- E/I E/I ELECTRIC AND INSTRUMENT CONDUITS
- x x x x x 6' HIGH CHAIN LINK FENCE
- RIPRAP

NOTES

1. CONTOURS WITHIN CELL LIMITS REPRESENT TOP OF LEACHATE DRAINAGE LAYER GRADES
2. CONTOURS OUTSIDE CELL LIMITS REPRESENT TOP OF TOPSOIL GRADES

N

100 0 100

SCALE: 1" = 100'

PROJECT NO.	25216073.00	DRAWN BY:	BJM
DRAWN:	11/10/16	CHECKED BY:	MDB
REVISED:	11/10/16	APPROVED BY:	TK 11/23/2021

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

CLIENT: INTERSTATE POWER AND LIGHT CO.
15300 130th STREET
OTTUMWA, IA 52501

SITE: OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

EXPANSION PHASE 1 LEACHATE LINES

FIGURE 2

Attachment A

Leachate Volumes

Leachate Removal and Hauling Records
Ottumwa-Midland Commercial Landfill

enter blue data
spreadsheet calculates red data

Instructions for Use
1. Enter the dates for the month in the date column.
2. Enter the accumulated total generated leachate volume from the end of the previous month from the leachate totalizer in C12.
3. Enter the accumulated total generated leachate for each day from the leachate totalizer in Column C.
4. Enter the daily volume (in gallons) of leachate hauled off site and the offsite location in Column D. Note since we do not have a flow meter, convert from pounds to gallons: X lbs ÷ 8.34 = gallons.
5. The spreadsheet will calculate the daily leachate generated and the cumulative volume of leachate hauled for the month.

Revision Date: 08/29/16

Nov. 22	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	11,357,200	NA	27,909,397	NA	NA	NA		
11/1/2022	0	11,357,200	0	27,909,397				N	Leachate Flowmeter Malfunction
11/2/2022	0	11,357,200	5,741	27,915,138				N	Leachate Flowmeter Malfunction
11/3/2022	0	11,357,200	0	27,915,138	24,285		24285	N	Leachate Flowmeter Malfunction
11/4/2022									
11/5/2022									
11/6/2022									
11/7/2022	0	11,357,200	49,491	27,964,629	24,326		24326	N	Leachate Flowmeter Malfunction
11/8/2022	0	11,357,200	16,601	27,981,230	24,139		24139	N	Leachate Flowmeter Malfunction
11/9/2022	0	11,357,200	0	27,981,230	24,235		24235	N	Leachate Flowmeter Malfunction
11/10/2022	0	11,357,200	5,969	27,987,199	24,365		24365	N	Leachate Flowmeter Malfunction
11/11/2022									
11/12/2022									
11/13/2022									
11/14/2022	0	11,357,200	35,034	28,022,233				N	Leachate Flowmeter Malfunction
11/15/2022	0	11,357,200	4,492	28,026,725				N	Leachate Flowmeter Malfunction
11/16/2022	0	11,357,200	0	28,026,725				N	Leachate Flowmeter Malfunction
11/17/2022	0	11,357,200	0	28,026,725				N	Leachate Flowmeter Malfunction
11/18/2022									
11/19/2022									
11/20/2022									
11/21/2022	0	11,357,200	0	28,026,725				N	Leachate Flowmeter Malfunction
11/22/2022	0	11,357,200	8,401	28,035,126	24,173		24173	N	Leachate Flowmeter Malfunction
11/23/2022	0	11,357,200	30,757	28,065,883	24,254		24254	N	Leachate Flowmeter Malfunction
11/24/2022									
11/25/2022									
11/26/2022									
11/27/2022									
11/28/2022	0	11,357,200	14,943	28,080,826	24,276		24276	N	Leachate Flowmeter Malfunction
11/29/2022	0	11,357,200	25,391	28,106,217	24,266		24266	N	Leachate Flowmeter Malfunction
11/30/2022	0	11,357,200	0	28,106,217	24,180		24180	N	Leachate Flowmeter Malfunction
Totals	0	NA	**196,820**	NA	**242,499**	NA	NA		NA

[1] "Ground Water" refers to combination of old cell under-drain water plus storm water discharged form the old storm water pond. Both are discharged to the same wetwell. So, when storm water is discharged, there is no way to estimate the volume of under-drain water discharged, as the two streams are commingled in the wetwell. Storm water is not often discharged. This means that most of the time, but not all of the time, we are able to estimate the volume of under-drain water discharged. Ground water withdrawls that exceed 25,000 gpd would require a DNR water use permit.

Leachate Removal and Hauling Records
Ottumwa-Midland Commercial Landfill

enter blue data
spreadsheet calculates red data

Instructions for Use

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5. The spreadsheet will calculate the daily leachate generated and the cumulative volume of leachate hauled for the month.

Revision Date: 08/29/16

Dec-22	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	0	11,357,200	0	28,106,217	NA	NA	NA		
12/1/2022	0	11,357,200	5,980	28,112,197	24,079		24079	N	Leachate Flowmeter Malfunction
12/2/2022									
12/3/2022									
12/4/2022									
12/5/2022	0	11,357,200	17,675	28,129,872				N	Leachate Flowmeter Malfunction
12/6/2022	0	11,357,200	0	28,129,872				N	Leachate Flowmeter Malfunction
12/7/2022	0	11,357,200	5,828	28,135,700				N	Leachate Flowmeter Malfunction
12/8/2022	0	11,357,200	0	28,135,700				N	Leachate Flowmeter Malfunction
12/9/2022									
12/10/2022									
12/11/2022									
12/12/2022	0	11,357,200	26,977	28,162,677	24,285		24285	N	Leachate Flowmeter Malfunction
12/13/2022	0	11,357,200	12,177	28,174,854	24,297		24297	N	Leachate Flowmeter Malfunction
12/14/2022	0	11,357,200	28,855	28,203,709	24,077		24077	N	Leachate Flowmeter Malfunction
12/15/2022		11,357,200	6,067	28,209,776	24,019		24019	N	Leachate Flowmeter Malfunction
12/16/2022									
12/17/2022									
12/18/2022									
12/19/2022	0	11,357,200	0	28,209,776	23,734		23734	N	Leachate Flowmeter Malfunction
12/20/2022	0	11,357,200	1	28,209,777	11,765		11765	N	Leachate Flowmeter Malfunction
12/21/2022	0	11,357,200	0	28,209,777				N	Leachate Flowmeter Malfunction
12/22/2022	0	11,357,200	0	28,209,777				N	Leachate Flowmeter Malfunction
12/23/2022									
12/24/2022									
12/25/2022									
12/26/2022									
12/27/2022	0	11,357,200	0	28,209,777				N	Leachate Flowmeter Malfunction
12/28/2022	0	11,357,200	0	28,209,777				N	Leachate Flowmeter Malfunction
12/29/2022	0	11,357,200	0	28,209,777				N	Leachate Flowmeter Malfunction
12/30/2022	0	11,357,200	2,392	28,212,169				N	Leachate Flowmeter Malfunction
12/31/2022									
Totals	0	NA	105,952	NA	156,256	NA	NA		NA

[1] "Ground Water" refers to combination of old cell under-drain water plus storm water discharged form the old storm water pond. Both are discharged to the same wetwell. So, when storm water is discharged, there is no way to estimate the volume of under-drain water discharged, as the two streams are commingled in the wetwell. Storm water is not often discharged. This means that most of the time, but not all of the time, we are able to estimate the volume of under-drain water discharged. Ground water withdrawls that exceed 25,000 gpd would require a DNR water use permit.

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Ottumwa-Midland Commercial Landfill

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spreadsheet calculates red data

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Revision Date: 08/29/16

Jan-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month		11,357,200		28,212,169					
1/1/2023									
1/2/2023									
1/3/2023	0	11,357,200	3,698	28,215,867				N	Leachate Meter Malfunction
1/4/2023	0	11,357,200	14,181	28,230,048				N	Leachate Meter Malfunction
1/5/2023	0	11,357,200	0	28,230,048				N	Leachate Meter Malfunction
1/6/2023	0	11,357,200	9,524	28,239,572				N	Leachate Meter Malfunction
1/7/2023									
1/8/2023									
1/9/2023	0	11,357,200	0	28,239,572	23,993		23993	N	Leachate Meter Malfunction
1/10/2023	0	11,357,200	3,331	28,242,903	24,149		24149	N	Leachate Meter Malfunction
1/11/2023	0	11,357,200	21,165	28,264,068	24,144		24144	N	Leachate Meter Malfunction
1/12/2023	0	11,357,200	9,678	28,273,746				N	Leachate Meter Malfunction
1/13/2023									
1/14/2023									
1/15/2023									
1/16/2023	0	11,357,200	8,498	28,282,244	24,228		24228	N	Leachate Meter Malfunction
1/17/2023	0	11,357,200	17,929	28,300,173	24,012		24012	N	Leachate Meter Malfunction
1/18/2023	0	11,357,200	15,710	28,315,883	24,223		24223	N	Leachate Meter Malfunction
1/19/2023	0	11,357,200	7,282	28,323,165	24,264		24264	N	Leachate Meter Malfunction
1/20/2023									
1/21/2023									
1/22/2023									
1/23/2023	0	11,357,200	11,077	28,334,242				N	Leachate Meter Malfunction
1/24/2023	0	11,357,200	6,690	28,340,932				N	Leachate Meter Malfunction
1/25/2023	0	11,357,200	13,727	28,354,659				N	Leachate Meter Malfunction
1/26/2023	0	11,357,200	5,775	28,360,434				N	Leachate Meter Malfunction
1/27/2023									
1/28/2023									
1/29/2023									
1/30/2023	0	11,357,200	224	28,360,658				N	Leachate Meter Malfunction
1/31/2023	0	11,357,200	0	28,360,658				N	Leachate Meter Malfunction
Totals	0	NA	148,489	NA	169,013	NA	NA		NA

[1] "Ground Water" refers to combination of old cell under-drain water plus storm water discharged form the old storm water pond. Both are discharged to the same wetwell. So, when storm water is discharged, there is no way to estimate the volume of under-drain water discharged, as the two streams are commingled in the wetwell. Storm water is not often discharged. This means that most of the time, but not all of the time, we are able to estimate the volume of under-drain water discharged. Ground water withdrawls that exceed 25,000 gpd would require a DNR water use permit.

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Ottumwa-Midland Commercial Landfill

enter blue data
spreadsheet calculates red data

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Revision Date: 08/29/16

Febuary 2023	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	11,357,200	NA	28,360,658	NA	NA	NA		
2/1/2023	0	11,357,200	0	28,360,658				N	Leachate Meter Malfunction
2/2/2023	0	11,357,200	0	28,360,658				N	Leachate Meter Malfunction
2/3/2023									
2/4/2023									
2/5/2023									
2/6/2023	0	11,357,200	2,637	28,363,295				N	Leachate Meter Malfunction
2/7/2023	0	11,357,200	0	28,363,295				N	Leachate Meter Malfunction
2/8/2023	0	11,357,200	0	28,363,295				N	Leachate Meter Malfunction
2/9/2023	0	11,357,200	0	28,363,295				N	Leachate Meter Malfunction
2/10/2023									
2/11/2023									
2/12/2023									
2/13/2023	0	11,357,200	0	28,363,295				N	Leachate Meter Malfunction
2/14/2023	0	11,357,200	15,078	28,378,373				N	Leachate Meter Malfunction
2/15/2023	0	11,357,200	10,680	28,389,053				N	Leachate Meter Malfunction
2/16/2023	0	11,357,200	0	28,389,053				N	Leachate Meter Malfunction
2/17/2023									
2/18/2023									
2/19/2023									
2/20/2023	0	11,357,200		28,389,053				N	Leachate Meter Malfunction
2/21/2023	0	11,357,200	0	28,389,053		23,981	City	N	Leachate Meter Malfunction
2/22/2023	0	11,357,200	0	28,389,053		24,319	City	N	Leachate Meter Malfunction
2/23/2023	0	11,357,200	12,311	28,401,364		24,086	City	N	Leachate Meter Malfunction
2/24/2023									
2/25/2023									
2/26/2023									
2/27/2023	0	11,357,200	9,271	28,410,635		24,331	City	N	Leachate Meter Malfunction
2/28/2023	0	11,357,200	16,988	28,427,623		24,103	City	N	Leachate Meter Malfunction
Totals	0	NA	**66,965**	NA	**0**	120,820	NA		NA

[1] "Ground Water" refers to combination of old cell under-drain water plus storm water discharged form the old storm water pond. Both are discharged to the same wetwell. So, when storm water is discharged, there is no way to estimate the volume of under-drain water discharged, as the two streams are commingled in the wetwell. Storm water is not often discharged. This means that most of the time, but not all of the time, we are able to estimate the volume of under-drain water discharged. Ground water withdrawls that exceed 25,000 gpd would require a DNR water use permit.

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Revision Date: 08/29/16

Mar-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	11,357,200	NA	28,427,623	NA	NA	NA		
3/1/2023	0	11,357,200	19,758	28,447,381				N	Leachate meter malfunction
3/2/2023	0	11,357,200	0	28,447,381				N	Leachate meter malfunction
3/3/2023									
3/4/2023									
3/5/2023									
3/6/2023	0	11,357,200	12,093	28,459,474		24,017	City	N	Leachate meter malfunction
3/7/2023	0	11,357,200	6,527	28,466,001		24,000	City	N	Leachate meter malfunction
3/8/2023	0	11,357,200	23,434	28,489,435		24,142	City	N	Leachate meter malfunction
3/9/2023	0	11,357,200	21,827	28,511,262		18,094	City	N	Leachate meter malfunction
3/10/2023									
3/11/2023									
3/12/2023									
3/13/2023	0	11,357,200	7,409	28,518,671		24,228	City	N	Leachate meter malfunction
3/14/2023	0	11,357,200	21,112	28,539,783		23,969	City	N	Leachate meter malfunction
3/15/2023	0	11,357,200	21,590	28,561,373		24,029	City	N	Leachate meter malfunction
3/16/2023	0	11,357,200	21,760	28,583,133		24,326	City	N	Leachate meter malfunction
3/17/2023									
3/18/2023									
3/19/2023									
3/20/2023	0	11,357,200	3,414	28,586,547		23,496	City	N	Leachate meter malfunction
3/21/2023	0	11,357,200	11,713	28,598,260		24,235	City	N	Leachate meter malfunction
3/22/2023	0	11,357,200	20,380	28,618,640		24,331	City	N	Leachate meter malfunction
3/23/2023	0	11,357,200	17,142	28,635,782				N	Leachate meter malfunction
3/24/2023									
3/25/2023									
3/26/2023									
3/27/2023	502,500	11,859,700	9,100	28,644,882		24,151	City	N	Leachate meter malfunction
3/28/2023	29,300	11,889,000	23,690	28,668,572		24,094	City`	N	Leachate meter malfunction
3/29/2023	29,400	11,918,400	23,938	28,692,510		24,154	City	N	Leachate meter malfunction
3/30/2023	25,200	11,943,600	20,475	28,712,985		24,302	City	N	Leachate meter malfunction
3/31/2023									
Totals	586,400	NA	**285,362**	NA	**0**	355,568	NA		NA

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Ottumwa-Midland Commercial Landfill

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Revision Date: 08/29/16

Apr-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	11,943,600	NA	28,712,985	NA	NA	NA		
4/1/2023									
4/2/2023									
4/3/2023	0	11,943,600	4,350	28,717,335		24,329	City	N	Leachate Meter Failure
4/4/2023	0	11,943,600	0	28,717,335		24,026	City	N	Leachate Meter Failure
4/5/2023	0	11,943,600	23,392	28,740,727		24,048	City	N	Leachate Meter Failure
4/6/2023	0	11,943,600	36,492	28,777,219		24,180	City	N	Leachate Meter Failure
4/7/2023									
4/8/2023									
4/9/2023									
4/10/2023	0	11,943,600	0	28,777,219		24,139	City	N	Leachate Meter Failure
4/11/2023	0	11,943,600	0	28,777,219		24,129	City	N	Leachate Meter Failure
4/12/2023	0	0	13,068	28,790,287		0	City	N	Leachate Meter Replaced
4/13/2023	20,270	20,270	19,592	28,809,879		24,163	City	N	
4/14/2023									
4/15/2023									
4/16/2023									
4/17/2023	21,244	41,514	16,218	28,826,097		24,062	City	N	
4/18/2023	19,881	61,395	16,729	28,842,826		24,197	City	N	
4/19/2023	21,100	82,495	18,020	28,860,846				N	
4/20/2023	20,515	103,010	18,661	28,879,507				N	
4/21/2023									
4/22/2023									
4/23/2023									
4/24/2023	1,778	104,788	3,589	28,883,096		24,249	City	N	
4/25/2023	18,379	123,167	11,329	28,894,425		23,760	City	N	
4/26/2023	14,043	137,210	14,028	28,908,453				N	
4/27/2023	0	137,210	0	28,908,453				N	
4/28/2023									
4/29/2023									
4/30/2023									
Totals	137,210	NA	**195,468**	NA	**0**	265,282	NA		NA

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Revision Date: 08/29/16

May-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	137,210	NA	28,908,453	NA	NA	NA		
5/1/2023	17,147	154,357	13,106	28,921,559		24,206	City	N	
5/2/2023	23,911	178,268	20,750	28,942,309		23,919	City	N	
5/3/2023	22,936	201,204	23,300	28,965,609		24,178	City	N	
5/4/2023	4,076	205,280	3,951	28,969,560		24,120	City	N	
5/5/2023									
5/6/2023									
5/7/2023									
5/8/2023	12,043	217,323	9,052	28,978,612		24,122	City	N	
5/9/2023	20,695	238,018	19,026	28,997,638		24,254	City	N	
5/10/2023	24,914	262,932	24,600	29,022,238				N	
5/11/2023	3,798	266,730	2,162	29,024,400				N	
5/12/2023									
5/13/2023									
5/14/2023									
5/15/2023	15,836	282,566	13,491	29,037,891				N	
5/16/2023	21,322	303,888	19,648	29,057,539		24,170	City	N	
5/17/2023	2,940	306,828	1,840	29,059,379		24,130	City	N	
5/18/2023	6,307	313,135	5,617	29,064,996				N	
5/19/2023									
5/20/2023									
5/21/2023									
5/22/2023	15,599	328,734	12,896	29,077,892				N	
5/23/2023	4,066	332,800	1,980	29,079,872				N	
5/24/2023	0	332,800	0	29,079,872				N	
5/25/2023	0	332,800	0	29,079,872				N	
5/26/2023									
5/27/2023									
5/28/2023									
5/29/2023									
5/30/2023	21,025	353,825	17,597	29,097,469				N	
5/31/2023	4,521	358,346	2,062	29,099,531					
Totals	221,136	NA	**191,078**	NA	**0**	193,099	NA		NA

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Revision Date: 08/29/16

Jun-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	358,346	NA	29,099,531	NA	NA	NA		
6/1/2023	0	358,346	0	29,099,531				N	
6/2/2023	1,044	359,390	0	29,099,531				N	
6/3/2023									
6/4/2023									
6/5/2023	2,304	361,694	0	29,099,531				N	
6/6/2023	0	361,694	145	29,099,676				N	
6/7/2023	14,506	376,200	12,188	29,111,864				N	
6/8/2023	7,453	383,653	6,028	29,117,892				N	
6/9/2023									
6/10/2023									
6/11/2023									
6/12/2023	11,062	394,715	5,887	29,123,779				N	
6/13/2023	1,583	396,298	0	29,123,779				N	
6/14/2023	2,943	399,241	1,444	29,125,223				N	
6/15/2023	0	399,241	0	29,125,223				N	
6/16/2023									
6/17/2023									
6/18/2023									
6/19/2023	14,235	413,476	11,892	29,137,115				N	
6/20/2023	20,969	434,445	20,052	29,157,167		22,719	City	N	
6/21/2023	1,200	435,645	144	29,157,311		22,614	City	N	
6/22/2023	842	436,487	137	29,157,448					
6/23/2023									
6/24/2023									
6/25/2023									
6/26/2023	16,378	452,865	14,371	29,171,819				N	
6/27/2023	919	453,784	415	29,172,234		22,619	City	N	
6/28/2023	1,490	455,274	36	29,172,270		22,576	City	N	
6/29/2023	6,096	461,370	3,932	29,176,202				N	
6/30/2023									
Totals	103,024	NA	**76,671**	NA	**0**	90,528	NA		NA

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Revision Date: 08/29/16

Jul-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	6,096	461,370	3,932	29,176,202				N	
7/1/2023									
7/2/2023									
7/3/2023	18,345	479,715	14,566	29,190,768				N	
7/4/2023	17,467	497,182	15,897	29,206,665		22,607	City	N	
7/5/2023	26,808	523,990	23,207	29,229,672		22,638	City	N	
7/6/2023	3,850	527,840	330	29,230,002				N	
7/7/2023									
7/8/2023									
7/9/2023									
7/10/2023	28,324	556,164	29,393	29,259,395		22,652	City	N	
7/11/2023	0	556,164	0	29,259,395		22,578	City	N	
7/12/2023	7,816	563,980	5,684	29,265,079				N	
7/13/2023	6,684	570,664	4,108	29,269,187				N	
7/14/2023									
7/15/2023									
7/16/2023									
7/17/2023	15,769	586,433	14,240	29,283,427				N	
7/18/2023	12,949	599,382	13,104	29,296,531		5,652	City	N	
7/19/2023	0	599,382	0	29,296,531		22,648	City	N	
7/20/2023	0	599,382	0	29,296,531				N	
7/21/2023									
7/22/2023									
7/23/2023									
7/24/2023	14,694	614,076	12,456	29,308,987				N	
7/25/2023	1,546	615,622	0	29,308,987				N	
7/26/2023	0	615,622	0	29,308,987				N	
7/27/2023	0	615,622	0	29,308,987				N	
7/28/2023									
7/29/2023									
7/30/2023									
7/31/2023	20,470	636,092	18,919	29,327,906				N	
Totals	174,722	NA	**151,904**	NA	**0**	118,775	NA		NA

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Revision Date: 08/29/16

Aug-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	636,092	NA	29,327,906	NA	NA	NA		
8/1/2023	2,700	638,792	1,098	29,329,004				NA	
8/2/2023	4,223	643,015	4,010	29,333,014				NA	
8/3/2023	11,967	654,982	10,537	29,343,551				NA	
8/4/2023									
8/5/2023									
8/6/2023									
8/7/2023	32,986	687,968	28,630	29,372,181				NA	
8/8/2023	0	687,968	0	29,372,181				NA	
8/9/2023	0	687,968	0	29,372,181				NA	
8/10/2023	10,301	698,269	8,579	29,380,760		22,698	City	NA	
8/11/2023									
8/12/2023									
8/13/2023									
8/14/2023	22,975	721,244	20,128	29,400,888		22,638	City	NA	
8/15/2023	1,535	722,779	0	29,400,888		22,580	City	NA	
8/16/2023	6,774	729,553	4,755	29,405,643				NA	
8/17/2023	774	730,327	926	29,406,569		22,724	City	NA	
8/18/2023									
8/19/2023									
8/20/2023									
8/21/2023	10,078	740,405	5,710	29,412,279				NA	
8/22/2023	1,136	741,541	0	29,412,279				NA	
8/23/2023	6,931	748,472	5,618	29,417,897				NA	
8/24/2023	1,148	749,620	0	29,417,897				NA	
8/25/2023									
8/26/2023									
8/27/2023									
8/28/2023	10,038	759,658	5,715	29,423,612				NA	
8/29/2023	1,142	760,800	0	29,423,612				NA	
8/30/2023	1,150	761,950	0	29,423,612				NA	
8/31/2023	6,753	768,703	5,702	29,429,314				NA	
Totals	132,611	NA	**101,408**	NA	**0**	NA	NA		NA

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Revision Date: 08/29/16

Sep-23	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	768,703	NA	29,429,314	NA	NA	NA		
9/1/2023									
9/2/2023									
9/3/2023									
9/4/2023									
9/5/2023	10,932	779,635	5,716	29,435,030				N	
9/6/2023	1,540	781,175	0	29,435,030				N	
9/7/2023	775	781,951	0	29,435,030				N	
9/8/2023	1,157	783,108	0	29,435,030				N	
9/9/2023									
9/10/2023									
9/11/2023	24,226	807,338	20,020	29,455,050				N	
9/12/2023	2,528	809,866	2,789	29,457,839				N	
9/13/2023	6,736	816,602	5,758	29,463,597		22,765	City	N	
9/14/2023	1,151	817,753	0	29,463,597		22,698	City	N	
9/15/2023									
9/16/2023									
9/17/2023									
9/18/2023	10,302	828,055	6,138	29,469,735		22,607	City	N	
9/19/2023	1,155	829,210	0	29,469,735		22,710	City	N	
9/20/2023	7,782	836,992	6,617	29,476,352				N	
9/21/2023	761	837,753	0	29,476,352				N	
9/22/2023									
9/23/2023									
9/24/2023									
9/25/2023	10,439	848,192	6,150	29,482,502				N	
9/26/2023	1,154	849,346	0	29,482,502				N	
9/27/2023	1,145	850,491	0	29,482,502				N	
9/28/2023	783	851,274	0	29,482,502				N	
9/29/2023									
9/30/2023									
Totals	82,566	NA	**53,188**	NA	**0**	90,780	NA		NA

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5. The spreadsheet will calculate the daily leachate generated and the cumulative volume of leachate hauled for the month.

Revision Date: 08/29/16

1-Oct	Daily Total Generated [Wetwell Flow Meter] (Gallons)	Cumulative Total Generated [Wetwell Flow Meter] (Gallons)	Daily Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Cumulative Total Generated [Phase 1 (LV-1) Flow Meter] (Gallons)	Batch Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Cumulative Total to Offsite Treatment [Loading Facility Flow Meter] (Gallons)	Offsite Treatment Location ("OGS" or other)	Ground Water Discharged >25,000 gpd? (Y or N)[1]	Comments
Last month	NA	851,274	NA	29,482,502	NA	NA	NA		
10/1/2023									
10/2/2023	10,047	861,321	5,953	29,488,455				N	
10/3/2023	1,155	862,476	0	29,488,455				N	
10/4/2023	1,170	863,637	0	29,488,455				N	
10/5/2023	6,800	874,437	5,946	29,494,401				N	
10/6/2023									
10/7/2023									
10/8/2023									
10/9/2023	582	875,019	0	29,494,401				N	
10/10/2023	1,161	876,180	0	29,494,401				N	Jetting Leachate lines used 2000 gallons of water
10/11/2023	9,046	885,226	5,698	29,500,099				N	Jetting Leachate lines used 1500 gallons of water
10/12/2023	1,557	886,783	0	29,500,099				N	
10/13/2023									
10/14/2023									
10/15/2023									
10/16/2023	18,081	904,864	14,226	29,514,325				N	
10/17/2023	790	905,654	0	29,514,325				N	
10/18/2023	1,573	907,227	0	29,514,325		16,933	City	N	
10/19/2023	787	908,014	0	29,514,325		16,892	City	N	
10/20/2023									
10/21/2023									
10/22/2023									
10/23/2023	10,894	918,908	6,572	29,520,897				N	
10/24/2023	775	919,683	0	29,520,897		17,029	City	N	
10/25/2023	1,166	920,849	0	29,520,897		16,962	City	N	
10/26/2023	14,035	934,884	11,650	29,532,547		16,890	City	N	
10/27/2023									
10/28/2023									
10/29/2023									
10/30/2023	24,771	959,655	22,394	29,554,941				N	
10/31/2023	1,086	960,741	0	29,554,941				N	
Totals	105,476	NA	**72,439**	NA	**0**	84,706	NA		NA

[1] "Ground Water" refers to combination of old cell under-drain water plus storm water discharged form the old storm water pond. Both are discharged to the same wetwell. So, when storm water is discharged, there is no way to estimate the volume of under-drain water discharged, as the two streams are commingled in the wetwell. Storm water is not often discharged. This means that most of the time, but not all of the time, we are able to estimate the volume of under-drain water discharged. Ground water withdrawls that exceed 25,000 gpd would require a DNR water use permit.

Table A-2. Summary of Leachate and Contact Water Quantities Transported to Ottumwa Generating Station or Other Offsite Disposal Location, 2013-2023
Ottumwa-Midland Commercial Landfill
Wapello County, Iowa

	Volume (gallons)										
Month	**2013***	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
January	--	--	46,500	528,115	--	--	--	--	255,594	--	169,013
February	--	--	71,300	310,180	--	--	--	--	301,065	91,834	120,820
March	41,242	--	--	675,520	--	--	--	59,806	473,255	383,001	355,568
April	159,710	--	37,200	531,440	129,817	366,173	--	376,426	342,758	259,322	265,282
May	210,988	98,419	182,900	439,047	735,442	486,212	127,770	416,619	367,950	271,152	193,099
June	--	23,800	1,036,300	628,126	492,458	--	363,490	401,999	247,168	187,212	90,528
July	--	--	770,550	522,497	--	--	--	144,309	598,589	72,802	118,775
August	--	--	1,106,800	622,201	--	--	144,477	41,348	103,526	--	90,640
September	--	17,000	779,300	563,082	--	916,824	206,826	246,230	90,923	169,815	90,780
October	--	--	--	47,187	--	--	579,793	91,055	181,751	87,169	84,706
November	--	--	430,190	--	--	--	73,311	101,914	211,827	242,499	N/A
December	--	--	2,501,725	--	--	--	133,176	157,652	217,013	156,256	N/A
Total	411,940	139,219	6,962,765	4,867,395	1,357,717	1,769,209	1,628,843	2,037,358	3,391,419	1,921,062	1,579,211

-- = No hauling N/A = Data not yet available

*: Quantities for years prior to 2013 were included in previous AWQRs.

Created by: MDB Date: 11/1/2019
Last revision by: RM Date: 11/7/2023
Checked by: AJR Date: 11/8/2023

I:\25223073.00\Deliverables\2023 AWQR\App F - Inspection\Attachments\C_LCSPE_complete\Attachments\[A2_Leachate Hauling Table.xlsx]Hauled Volume

Attachment B

Leachate Head Measurements

Monthly Leachate Elevation and Head Measurement Records
LP-1
Ottumwa Midland Landfill

Year: 2022

enter blue data
spreadsheet calculates red data

Operator: Keck, Hart, McAninch
Equipment Used: Model 101, Serial number 223320

Revised 10/11/2017

Month	Leachate Piezometer	Location (Phase)	TOC Elev. (NGVD) a	BOC Elev. (NGVD) b	Top of Clay Liner Elev. (NGVD) c	Depth to Leachate (ft) d	Leachate Elev. (NGVD) a-d	Leachate Head at Top of Clay Liner (ft) a-c-d	Date Read/Comments
NA	LP-1	Original Cell	765.18	753.56	753.11	NA	NA	NA	NA
January	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	1/3/2022
February	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	2/1/2022
March	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	3/3/2022
April	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	4/1/2022
May	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	5/2/2022
June	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	6/1/2022
July	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	7/5/2022
August	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	8/2/2022
September	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	9/1/2022
October	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	10/3/2022
November	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	11/1/2022
December	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	12/1/2022

Notes:
1) TOC = Top of Casing. Based on June 15, 2011 survey and boring log/well construction form = 765.18
2) BOC = Bottom of Casing. Based on June 15, 2011 survey and boring log/well construction form = 753.56
3) Top of Clay Liner Elevation based on June 15, 2011 survey and boring log/well construction form = 753.11
4) NGVD = National Geodetic Vertical Datum
5) TBD = To Be Determined, well has not been installed

Monthly Leachate Elevation and Head Measurement Records
LP-1
Ottumwa Midland Landfill

Year: 2023

enter blue data
spreadsheet calculates red data

Operator: Keck, Hart, McAninch
Equipment Used: Model 101, Serial number 223320

Revised 10/11/2017

Month	Leachate Piezometer	Location (Phase)	TOC Elev. (NGVD) a	BOC Elev. (NGVD) b	Top of Clay Liner Elev. (NGVD) c	Depth to Leachate (ft) d	Leachate Elev. (NGVD) a-d	Leachate Head at Top of Clay Liner (ft) a-c-d	Date Read/Comments
NA	LP-1	Original Cell	765.18	753.56	753.11	NA	NA	NA	NA
January	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
February	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
March	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
April	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
May	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
June	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
July	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
August	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
September	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
October	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
November	LP-1	Original Cell	765.18	753.56	753.11	11.55	753.63	0.52	
December	LP-1	Original Cell	765.18	753.56	753.11	?	#VALUE!	#VALUE!	

Notes:
1) TOC = Top of Casing. Based on June 15, 2011 survey and boring log/well construction form = 765.18
2) BOC = Bottom of Casing. Based on June 15, 2011 survey and boring log/well construction form = 753.56
3) Top of Clay Liner Elevation based on June 15, 2011 survey and boring log/well construction form = 753.11
4) NGVD = National Geodetic Vertical Datum
5) TBD = To Be Determined, well has not been installed

Monthly Leachate Elevation and Head Measurement Records
LH-1
Ottumwa Midland Landfill

Year: 2022

Operator: Wade

Equipment Used: Read out at vault

Revised 10/24/2013

Month	Leachate Piezometer	Location (Phase)	TOC Elev. (NGVD) a	BOC Elev. (NGVD) b	Top of Clay Liner Elev. (NGVD) c	Depth to Leachate (ft) d	Leachate Elev. (NGVD) a-d	Leachate Head at Top of Clay Liner (ft) a-c-d	Comments
	LH-1	Phase 1	TBD	TDB	TBD				See Notes
January	LH-1	0						753.59	
February	LH-1	0						753.59	
March	LH-1	0						753.59	
April	LH-1	0						753.59	
May	LH-1	0						753.59	
June	LH-1	0						753.59	
July	LH-1	0						753.59	
August	LH-1	0						753.59	
September	LH-1	0						753.59	
October	LH-1	0						753.59	
November	LH-1	0						753.59	
December	LH-1	0						753.59	

Notes:
1) TOC = Top of Casing. Based on _________ survey and boring log/well construction form.
2) BOC = Bottom of Casing. Based on _________ survey and boring log/well construction form.
3) Top of Clay Liner Elevation based on _________ survey and boring log/well construction form.
4) NGVD = National Geodetic Vertical Datum
5) TBD = To Be Determined, well has not been installed

Note: The liner elevation at transducer location in LH-1 is 753.59 feet per the November 2015 Phase 1 Liner Construction Documentation Report prepared by SCS. (Source: Email from Eric Nelson, 10/18/2017, 1:18 PM.)

How to use this spreadsheet: (RJS 10/19/2017):
1. Enter the leachate head level from the transducer panel located near Leachate Vault-1 (LV-1) in column J in decimal feet.
2. Add the observed leachate level to the liner elevation at transducer location LH-1. Enter this value into column I. This will represent the leachate head elevation above the liner.

For example: The observed leachate level in 0.375 ft on the digital readout for LH-1. Enter this into column J. Add 0.375 to the liner elevation at LH-1 to get the elevation of the leachate: 753.59 + 0.375 = 753.965. Enter this value into column I.

From Eric Nelson (10/18/2017, 1:18 PM):
The text referenced for leachate headwell measurements and the monitoring forms were originally prepared for and fit best to LP-1, which is located on the south facing slope of the existing landfill. We've made this easier with the direct read-out of leachate head in the expansion, so no physical measurement has to be made for LH-1. For LH-1 in Expansion Phase 1 the leachate head can be directly read from the panel adjacent to the vault. I've attached a mockup of how I would fill out this monitoring form with data I simply made up. It looks like we missed updating this in the recent permit renewal version of the Ops Manual to reflect the installation of the transducer/remote readout system in Phase 1.

Monthly Leachate Elevation and Head Measurement Records
LH-1
Ottumwa Midland Landfill

Year: 2023

Operator: Keck

Equipment Used: Vault reading

Revised 10/24/2013

Month	Leachate Piezometer	Location (Phase)	TOC Elev. (NGVD) a	BOC Elev. (NGVD) b	Top of Clay Liner Elev. (NGVD) c	Depth to Leachate (ft) d	Leachate Elev. (NGVD) a-d	Leachate Head at Top of Clay Liner (ft) a-c-d	Comments
	LH-1	Phase 1	TBD	TDB	TBD				See Notes
January	LH-1	Phase 1			753.59			0	Sensor malfunction
February	LH-1	Phase 1			753.59			0	Sensor malfunction
March	LH-1	Phase 1			753.59			0	Sensor malfunction
April	LH-1	Phase 1			753.59			0	Sensor malfunction
May	LH-1	Phase 1			753.59			0	Sensor malfunction
June	LH-1	Phase 1			753.59			0	Sensor malfunction
July	LH-1	Phase 1			753.59				LH-1 sensor malfunction. Sump liquid level recorded as 4.25'
August	LH-1	Phase 1			753.59				LH-1 sensor malfunction. Sump liquid level recorded as 2.2'
September	LH-1	Phase 1			753.59				LH-1 sensor malfunction. Sump liquid level recorded as 1.67'
October	LH-1	Phase 1			753.59				LH-1 sensor malfunction. Sump liquid level recorded as 2.75'
November	LH-1	Phase 1							
December	LH-1	Phase 1							

Notes:
1) TOC = Top of Casing. Based on _________ survey and boring log/well construction form.
2) BOC = Bottom of Casing. Based on _________ survey and boring log/well construction form.
3) Top of Clay Liner Elevation based on _________ survey and boring log/well construction form.
4) NGVD = National Geodetic Vertical Datum
5) TBD = To Be Determined, well has not been installed

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How to use this spreadsheet: (RJS 10/19/2017):
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For example: The observed leachate level in 0.375 ft on the digital readout for LH-1. Enter this into column J. Add 0.375 to the liner elevation at LH-1 to get the elevation of the leachate: 753.59 + 0.375 = 753.965. Enter this value into column I.

From Eric Nelson (10/18/2017, 1:18 PM):
The text referenced for leachate headwell measurements and the monitoring forms were originally prepared for and fit best to LP-1, which is located on the south facing slope of the existing landfill. We've made this easier with the direct read-out of leachate head in the expansion, so no physical measurement has to be made for LH-1. For LH-1 in Expansion Phase 1 the leachate head can be directly read from the panel adjacent to the vault. I've attached a mockup of how I would fill out this monitoring form with data I simply made up. It looks like we missed updating this in the recent permit renewal version of the Ops Manual to reflect the installation of the transducer/remote readout system in Phase 1.

Attachment C

Leachate Line Jetting Documentation

GEORGE & JEFF
SINCE 1966
BOITNOTT
ENTERPRISES

Interstate Power & Light Company
1031 Iowa St. Suite # 5007
Dubuque IA 52001-5007

October 11, 2023

Attn: Steve Keck
Fly Ash Disposal Foreman
Ottumwa Midland Landfull

Services renderred at Ottumwa Midland Landfill, 15300 130th Street, Ottumwa IA 52501

We, George Boitnott Enterprises, Inc. were on site on 10/10/23 & 10/11/23 to jet the lateral lines at the Ottumwa Midland Landfill using 3,500 gallons of water. All lines were clean with no blockages found while jetting of any lines.

Sincerely,

Kevin McIntosh

Kevin McIntosh
George Boitnott Enterprise Service Supervisor.

George & Jeff Boitnott Enterprises, Inc.
735 Gateway Drive • P.O. Box 157 • Ottumwa, IA 52501
☎ 641-682-5157 or 1-800-373-9433 • Fax 641-682-6872

Attachment D

IDNR Landfill Compliance Visit Report

IOWA DEPARTMENT OF NATURAL RESOURCES

GOVERNOR KIM REYNOLDS
LT. GOVERNOR ADAM GREGG
DIRECTOR KAYLA LYON

June 22, 2021

Alliant Energy Corporate Services, Inc.
Attn: Tasha Campbell, Environmental Specialist II
4902 North Bitmore Lane
Madison, WI 53718

Subject: Ottumwa-Midland CCR Landfill Compliance Visit
Facility No: 90-SDP-08-92P

Dear Ms. Campbell:

On June 1, 2021 I met with Rob Saunders, Blake McClaflin and Steve Keck to conduct a compliance visit at the Ottumwa-Midland CCR Landfill. Please review the enclosed report which outlines various items discussed and observed during the course of our visit.

If you have any questions or would like further explanation of any part of this report, please contact me at this office at 319-653-2135 or at ryan.stouder@dnr.iowa.gov.

Sincerely,

FIELD SERVICES & COMPLIANCE BUREAU

Ryan Stouder

Ryan Stouder
Environmental Specialist Senior

Encl. SDP Visit Report

N:\SHARED\SW 2021\Midland CCR visit cover 060121

xc: Becky Jolly, IDNR Solid Waste Section, via email
Alliant Energy, Attn:Rob Saunders, 20775 Powerplant Rd, Ottumwa, IA 52501 (w/encl)
Ottumwa Midland CCR SW File

IOWA DEPARTMENT OF NATURAL RESOURCES
Field Office 6
1023 West Madison, Washington, IA 52353
319-653-2135
Sanitary Landfill Visit

Permit #: 90-SDP-08-92P **Date this Visit:** 06/01/2021 **Previous Visit Date:** 9/11/12

Weather Conditions at Time of Visit: 73 deg. F, Sunny, Wind: South 5 mph

Person(s) Contacted: Rob Saunders, Blake McClaflin, Steve Keck

Were deficiencies noted or significant observations made during this inspection?
Yes – See Comments Sec., No – No deficiencies noted, Blank – Not applicable or observed, PND – Previously Noted Deficiency

Observations

Yes	No	PND	Item	Yes	No	PND	Item
☐	☒	☐	1. Fill Cover: daily; intermediate; final	☐	☐	☐	10. Special Waste Handling
☐	☒	☐	2. Control of Face: slope; width; location	☐	☒	☐	11. ERRAP/GP1
☐	☒	☐	3. Compaction	☐	☒	☐	12. Operator Certification
☐	☒	☐	4. Cover erosion; minor rills	☐	☒	☐	13. Staffing
☐	☒	☐	5. Drainage into fill	☐	☒	☐	14. Equipment Backup/Maintenance
☐	☒	☐	6. Leachate Mgmt. & Control	☐	☒	☐	15. Interior Roads
☐	☒	☒	7. Fugitive Dust	☐	☒	☐	16. Perimeter fence, gate, signs, mon. wells
☐	☒	☐	8. Wet Weather Area	☐	☒		17. Photos taken
☐	☐	☐	9. Construction & Demolition Area	☐	☒		18. Follow-up needed

Comments: Expansion phase 1 is being utilized, this area has been used for the past 3 or 4 years. Most of the bottom ash comes from the Ottumwa Generating Station and some loads come from the Prairie Creek Cedar Rapids plant. The ash material was being spread at the time of my visit. No fugitive dust issues were observed. A water truck usually follows the drier material, the weather conditions have been moderately wet so not as much water has been utilized. The main working face is covered with soil. The soil cover is from the stockpile north or the sides of the main working face. There was minor erosion in the area near the working face.

The haul roads are well maintained with ditches designed convey stormwater runoff offsite. The older portions of the landfill have a well-established grassed cover. This area is mowed and maintained as needed to prevent tree growth.

The leachate pond observed in the discharge area on the northwest corner. The area around the leachate pond was absent of trees and maintained with gravel to reduce woody plants. A leachate pond loadout is located near the main gate and office. I was able to review records of ash deliver loads and CCR well monitoring data, landfill operation and policy guidance.

No issues were observed with the monitoring wells located around the landfill property.

AUTHENTICATION

INSPECTOR: Ryan Stouder Ryan Stouder

REVIEWER: Kurt Levetzow Kurt Levetzow 6/24/21