



2023 ANNUAL WATER QUALITY REPORT  
AMSTED RAIL FOUNDRY WASTE LANDFILL  
KEOKUK, IOWA  
PERMIT #56-SDP-89P

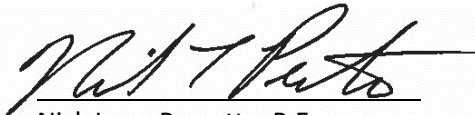
by Haley & Aldrich, Inc.  
Dayton, Ohio

for Amsted Rail Company, Inc.  
Keokuk, Iowa

File No. 129848-030  
November 2023

## CERTIFICATION PAGE

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.



Nick Leon Perrotta, P.E.

28 November 2023

Date

**License Number:** 22717

**My license renewal date is:** 31 December 2024

**Pages or sheets covered by this seal:** Entire Document





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28 November 2023  
File No. 129848-030

Iowa Department of Natural Resources  
502 East 9th Street  
Des Moines, Iowa 50319-0034

Attention: Michael B. Leat  
Land Quality Bureau

Subject: 2023 Annual Water Quality Report  
Amsted Rail Foundry Waste Landfill  
Keokuk, Iowa  
Iowa Permit #56-SDP-15-89-91C

Dear Mr. Leat:

Haley & Aldrich, Inc. is submitting this 2023 Annual Water Quality Report on behalf of Amsted Rail Company, Inc. for their Griffin Wheel Foundry Waste Landfill located in Keokuk, Iowa. Please contact me at 937.530.1412 if you have any questions or require additional information regarding this report.

Sincerely yours,  
**HALEY & ALDRICH, INC.**

A handwritten signature in black ink that reads "Tom Vanage".

Thomas M. Vanage  
Project Manager

Enclosure

c: Amsted Rail Company, Inc.; Attn: Paul Sheppard

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## Executive Summary

This Annual Water Quality Report (AWQR) summarizes and evaluates groundwater and surface water quality data from the Amsted Rail Company, Inc. (Amsted) Griffin Wheel Foundry Waste Landfill (Landfill), located in Keokuk, Iowa (Site). Groundwater sampling activities were conducted on 18 to 20 April and 22 through 24 August 2023.

The results of the statistical analyses for the groundwater samples were similar to those observed in previous years. The results indicate the following parameters exceeded the upper control limits in April and/or August 2023:

- ammonia nitrogen (MW-7, MW-26, and MW-27);
- boron (MW-7, MW-25, MW-26, and MW-27);
- field-measured conductivity (MW-7, MW-26, MW-27, and SW-2);
- fluoride (MW-25);
- chloride (SW-2);
- iron (MW-7, MW-26, and MW-27);
- manganese (MW-6, MW-7, and MW-26);
- field-measured pH (SW-2);
- sodium (MW-26 and SW-2);
- strontium (MW-7, MW-26, and MW-27);
- sulfate (MW-7, MW-25, MW-26, and MW-27); and
- field-measured temperature (MW-6, MW-7, MW-25, MW-26, and SW-2).

Groundwater analytical sampling results from 2023 are generally consistent with previous sampling events. The parameters that were detected at concentrations greater than the Iowa Department of Natural Resources (IDNR) Action Levels were iron, lithium, manganese, sodium, and sulfate. Groundwater and surface water samples that were detected with concentrations greater than the appropriate action levels in April and/or August 2023 are as follows:

- Iron was detected at concentrations greater than the final Secondary Drinking Water Regulation (SDWR; 0.3 milligrams per liter [mg/L]) in groundwater samples collected from monitoring wells MW-7, MW-16, MW-26, and MW-27.
- Sulfate was detected at concentrations greater than the final Secondary Drinking Water Regulation (SDWR; 250 mg/L) in groundwater samples collected from monitoring wells MW-7, MW-26, and MW-27.
- Manganese was detected at concentrations greater than the final Health Advisory Level (HAL; 0.3 mg/L) in groundwater samples collected from monitoring wells MW-6, MW-7, and MW-26, and from surface water samples from SW-1 and SW-2.
- Sodium was detected at concentrations greater than the final HAL for sodium (20 mg/L) in groundwater samples collected from monitoring wells MW-5, MW-6, MW-7, MW-12, MW-16, MW-20, MW-21, MW-25, MW-26, and MW-27, and surface water samples collected from SW-1, and SW-2.

- Lithium was detected at concentrations greater than the IDNR Action Level (0.014 mg/L) in groundwater samples from monitoring wells MW-5, MW-7, MW-16, MW-20, MW-21, MW-25, and MW-27.
- Surface water samples collected in April 2023 from surface water locations SW-1 and SW-2 had concentrations of iron greater than the SDWR (0.3 mg/L) during the fall sampling event; however, the samples were not field-filtered, and the result was reported as total iron instead of as dissolved iron.

A review of the groundwater concentration vs. time graphs indicates that the detected concentrations of parameters are generally similar to historical sampling results. Elevated concentrations of ammonia (SW-1), boron (SW-1), manganese (MW-6), total organic halogens (MW-6), and chloride (MW-5) will continue to be monitored in future years of groundwater sampling to assess whether or not this was an isolated situation.

No actions or permit amendments are needed based on this year's sampling results.

The landfill is in post-closure monitoring. The Closure Permit (#56-SDP-15-89-91C) was provided by IDNR on 27 September 2022. Therefore, post-closure activities at the landfill will be performed in conformance with Iowa Code Chapter 455B.

As part of the closure permit, an Environmental Covenant was agreed upon and implemented that prohibits on-site groundwater to be used as a source of drinking water.

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## List of Acronyms/Abbreviations

|                 |                                               |
|-----------------|-----------------------------------------------|
| Amsted          | Amsted Rail Company, Inc.                     |
| AWQR            | Annual Water Quality Report                   |
| cm/s            | centimeters per second                        |
| COD             | chemical oxygen demand                        |
| DUSR            | Data Usability Summary Report                 |
| EPA             | U.S. Environmental Protection Agency          |
| GWQS            | Groundwater Quality Standards                 |
| HAL             | Health Advisory Level                         |
| Haley & Aldrich | Haley & Aldrich, Inc.                         |
| HMSP            | Hydrologic Monitoring System Plan             |
| IAC             | Iowa Administrative Code                      |
| IDNR            | Iowa Department of Natural Resources          |
| Landfill        | Griffin Wheel Foundry Waste Landfill          |
| LCS             | laboratory control sample                     |
| LCSD            | laboratory control sample duplicate           |
| MCL             | maximum contaminant level                     |
| MCLG            | Maximum Contaminant Level Goal                |
| mg/L            | milligrams per liter                          |
| MS              | matrix spike                                  |
| MSD             | matrix spike duplicate                        |
| ND              | non-detect                                    |
| NRL             | Negligible Risk Level                         |
| QA/QC           | quality assurance/quality control             |
| Site            | Amsted Foundry Waste Landfill in Keokuk, Iowa |
| SDWR            | Secondary Drinking Water Regulation           |
| TOX             | total organic halogens                        |
| UCL             | upper control limit                           |

# 1. Introduction

Haley & Aldrich, Inc., (Haley & Aldrich) has prepared this 2023 Annual Water Quality Report (AWQR) on behalf of Amsted Rail Company, Inc., (Amsted) to summarize and evaluate groundwater and surface water quality data from the Griffin Wheel Foundry Waste Landfill (Landfill), located in Keokuk, Iowa (Site).

Clean closure activities for the disposal areas of the Landfill were completed from 2019 through early 2022. On 27 September 2022, Iowa Department of Natural Resources (IDNR) provided the Amsted Sanitary Disposal Project Closure Permit (#56-SDP-15-89-91C) for the Landfill. Post-Closure activities at the Landfill will be conducted in conformance with Iowa Code Chapter 455B. As special provision #7 of the Permit, hydraulic monitoring at the Site shall be performed in accordance with the Revised *Hydrologic Monitoring System Plan* (HMSP; Haley & Aldrich, 2016) for a minimum duration of five years beginning on the issuance date of the permit (i.e., until 27 April 2027).

The groundwater monitoring activities presented in this report were performed in accordance with the amended HMSP.

## 1.1 SITE HISTORY

The Site has been used as a waste landfill for materials generated at the Amsted Foundry since the mid-1970s. Prior to that time, the Site was undeveloped. The Site receives various materials generated at the Amsted facility that are then reused either on or off Site. These materials generally fall into two categories: 1) spent foundry sand; and 2) slag that is comingled with refractory material. The slag is further processed into four sizes of aggregates (small, medium, large, and oversized).

The general geology of the Site is clayey silt or alluvium up to 10 feet below ground surface, underlain by a brown and gray sandy, silty clay unit up to 30 feet in thickness. The monitoring wells installed at the Site are either screened in the brown or gray, sandy, silty clay layer.

Surface water on the Landfill flows toward the east side of the Site into the upper reach of Soap Creek, which empties into the Mississippi River nearly 2 miles southeast of the Site. Shallow groundwater moves toward Soap Creek under a horizontal hydraulic gradient of approximately 0.03 foot per foot. The portions of the water table to the west, north, and east are located hydraulically upgradient of the Site. The portions of the water table near Soap Creek and southeast of the Site are generally hydraulically downgradient of the Site.

## **2. Groundwater Monitoring System**

The monitoring system network comprises monitoring wells within the water table, the uppermost aquifer, and the surface water. The groundwater monitoring program is summarized below and in Table 1, Monitoring Program Summary and the groundwater monitoring schedule is summarized in Table 2.

### **2.1 WATER TABLE MONITORING SYSTEM**

The water table monitoring system comprises upgradient monitoring wells MW-12 and MW-20 and downgradient monitoring wells MW-5, MW-6, and MW-25. Although not part of the monitoring system network, monitoring wells MW-14 and MW-17 are retained to gather additional information pertaining to water table elevations. Figures 1 and 2 show the water table monitoring well locations.

### **2.2 UPPERMOST AQUIFER MONITORING SYSTEM**

The uppermost aquifer monitoring system comprises upgradient monitoring wells MW-16 and MW-21 and downgradient monitoring wells MW-7, MW-26, and MW-27. Although not part of the monitoring system network, monitoring wells MW-2, MW-3, MW-11, MW-13, MW-15, MW-19, MW-23, and MW-24 are retained to gather additional information pertaining to water elevations within the uppermost aquifer monitoring system. Figures 3 and 4 show the uppermost aquifer monitoring well locations.

### **2.3 SURFACE WATER MONITORING SYSTEM**

The surface water monitoring system comprises upgradient surface water monitoring location SW-1 and downgradient surface water monitoring location SW-2. Surface water locations SW-3 and SW-4 are no longer monitored, as approved by the IDNR in a letter dated 25 January 2017. Figure 1 shows the surface water and monitoring well locations.

### **2.4 MONITORING WELL CONDITION ASSESSMENT**

A well assessment was conducted during the October 2022 sampling event, and it was observed that the hinge was broken on monitoring well MW-27. The hinge was repaired by Amsted prior to the August 2023 event. During the August 2023 sampling event, the hinges to the lids of monitoring wells MW-11 and MW-13 were broken. The repairs to these hinges will be completed prior to the next sampling event, scheduled for spring 2024.

Table 3, the Monitoring Well Maintenance and Performance Revaluation Schedule, lists the completed and scheduled tasks performed in accordance with Iowa Administrative Code (IAC) 114.21(2)d. The monitoring well maintenance and performance schedule is summarized in Table 4. Monitoring well depths were measured during the April 2023 sampling event and will be measured once every five years due to the dedicated pumps that are installed in each sampling monitoring well. In-situ permeability tests were completed in April 2023. The results of the in-situ permeability tests are summarized in Table 4.

### **2.5 ANALYTICAL PARAMETERS**

Groundwater and surface water samples collected during the 2023 sampling events were analyzed for the parameters shown in Table 2, consistent with IAC Section 567, Chapter 115.26(4)e and (4)f and according to the special provisions of Permit No. 56-SDP-15-89-91C. The parameters sampled for and analyzed in April and August 2023 have been agreed upon by IDNR and will be monitored in future sampling events. Samples for

dissolved metals were field-filtered using an in-line, 0.45-micron filter. Completed Sampling Forms are included in Appendix A.

## 2.6 LABORATORY ANALYSIS

Appropriately prepared sample containers for each sampling event were provided by Eurofins Laboratories. Eurofins's laboratory located in North Canton, Ohio performed the analyses for the April and August sampling events. However, for the August sampling event, the analysis of total organic halides (TOX), and carbon trap preparation were completed at Eurofins's Savannah, Georgia laboratory. Copies of the analytical laboratory reports and associated Data Usability Summary Reports (DUSRs) for the 2023 sampling events are provided in Appendix B.

The laboratory analyses were completed in accordance with the procedures and methods described in the U.S. Environmental Protection Agency's (EPA's) *Test Methods for Evaluating Solid Waste, SW-846, Physical/Chemical Methods* (February 2007 with updates). The quality assurance and quality control (QA/QC) procedures used to ensure the precision and accuracy of the sample analyses are provided in the Eurofins *Laboratories Quality Assurance Manual*, which is available upon request.

The information provided in the laboratory reports includes the completed chain of custody forms, investigative sample results, and the results for the associated QA/QC samples, method blanks, laboratory control spikes, laboratory duplicates, and matrix spike (MS) and matrix spike duplicates (MSDs) analyzed concurrently with the investigative samples. The reported results for the semiannual sampling events were validated with guidance from the *National Functional Guidelines for Inorganic Data Review* (EPA, February 2004). The laboratory analytical reports were evaluated for completeness, overall quality and usability, compliance with method-specific sample holding times, precision and accuracy, and potential sample cross-contamination.

As presented in the DUSRs, the laboratory reports were found to be complete and the reported results usable for Amsted's monitoring program. The April 2023 sample results for chemical oxygen demand (COD) had a "J/UJ" qualifier for all samples because the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recovery and the relative percent difference between the LCS and LCSD results were not within the specified limits, as the relative percent difference was low. Sample MW-7-041823-1656 had a "J+" applied due to a method blank detection. The August 2023 sample results for phenolics had a "UJ" qualifier for sample 20760-082323-0001 because the MSD recovery and the relative percent difference between the MS and MSD results were not within the specified limits, as the relative percent difference was low.

## 2.7 NOTABLE ISSUES

Wasp nests were encountered inside the well housing in monitoring wells MW-3, MW-12, and MW-23. These wasp nests were removed during the August sampling event.

The Eurofins laboratory report for the April 2023 sampling event states that water samples collected from SW-1 and SW-2 were not filtered by the laboratory for the dissolved iron analysis. Therefore, the iron analysis for surface water samples SW-1 and SW-2 are reported as total instead of dissolved for the April event. Eurofins filtered the surface water samples using a 0.45-micron filter for the August event.

### 3. Groundwater Flow Conditions

#### 3.1 HORIZONTAL GROUNDWATER FLOW

Static water levels were measured during each sampling event in the monitoring wells included in the network as well as monitoring wells MW-2, MW-3, MW-11, MW-13, MW-14, MW-15, MW-17, MW-19, MW-23, and MW-24. Table 4 contains groundwater elevations for measured groundwater monitoring wells during the 2023 sampling events. Water table and upper aquifer water elevation maps (Figures 1 through 4) were prepared using the water level measurements from the 2023 sampling events. Horizontal groundwater flow was observed during these sampling events to flow to the east, northeast, and southeast toward Soap Creek, located on the east side of the Site.

#### 3.2 VERTICAL HYDRAULIC GRADIENTS

Water levels measured in monitoring well clusters MW-5/MW-27, MW-6/MW-7, MW-17/MW-16, and MW-20/MW-19 during the 2023 sampling events were used to calculate vertical hydraulic gradients for the Site. The vertical hydraulic gradients were calculated by the following equation:

$$\frac{\Delta H}{\Delta L} = \frac{H_d - H_s}{L_s - L_d}$$

Where:  $H_d$  = the water elevation in the deep well  
 $H_s$  = the water elevation in shallow well  
 $L_s$  = the elevation of the middle of saturated zone of the shallow well screen  
 $L_d$  = the elevation of the middle of saturated zone of the deep well screen

The average vertical hydraulic gradients were 0.08 foot per foot in well cluster MW-5/MW-27 and 0.17 foot per foot in well cluster MW-6/MW-7 (upward-directed flow in both well clusters). The average vertical hydraulic gradients were -0.35 foot per foot in well cluster MW-17/MW-16, and -0.34 foot per foot in well cluster MW-20/MW-19 (downward-directed flow in both well clusters) during 2023. The calculated vertical hydraulic gradients were consistent with previous results and are discussed below.

#### 3.3 WATER LEVEL AND LOCATION EVALUATION

An evaluation was completed for the high and low water level elevations at each well, and the vertical and horizontal acceptability of each well location, as required by 567 IAC 115.21(2)a. The table below shows the elevations of the historical high and low water levels and the elevations of the top and bottom of the well screen in each well.

Table 3.3-1: Recorded High and Low Water Level Elevations 2018-2023

| Monitoring Well | High Water Level | Low Water Level | Bottom and Top of Well Screen |
|-----------------|------------------|-----------------|-------------------------------|
| MW-02           | 630.25           | 621.24          | 580.02 – 590.02               |
| MW-03           | 650.25           | 632.90          | 599.27 – 609.27               |
| MW-05           | 623.43           | 622.34          | 605.07 – 615.07               |
| MW-06           | 621.68           | 618.58          | 604.30 – 614.30               |
| MW-07           | 625.41           | 623.91          | 566.06 – 576.06               |
| MW-11           | 628.55           | 623.83          | 583.42 – 593.42               |

| Monitoring Well | High Water Level | Low Water Level | Bottom and Top of Well Screen |
|-----------------|------------------|-----------------|-------------------------------|
| MW-12           | 629.03           | 624.03          | 613.27 – 623.27               |
| MW-13           | 631.98           | 628.58          | 589.79 – 599.79               |
| MW-14           | 644.23           | 640.68          | 623.37 – 633.37               |
| MW-15           | 640.20           | 637.61          | 589.96 – 599.96               |
| MW-16           | 626.68           | 624.99          | 594.13 – 604.13               |
| MW-17           | 638.38           | 633.65          | 620.60 – 630.60               |
| MW-19           | 626.24           | 623.62          | 580.93 – 590.93               |
| MW-20           | 640.89           | 638.71          | 620.29 – 630.29               |
| MW-21           | 644.31           | 641.09          | 594.07 – 604.07               |
| MW-23           | 642.92           | 637.26          | 609.40 – 619.40               |
| MW-24           | 631.79           | 628.60          | 598.24 – 608.24               |
| MW-25           | 626.40           | 622.58          | 613.56 – 623.56               |
| MW-26           | 624.31           | 622.92          | 583.29 – 588.29               |
| MW-27           | 624.57           | 623.87          | 582.20 – 587.20               |

*Note: All groundwater elevations in feet National Geodetic Vertical Datum.*

Water level elevations in the monitoring wells for the 2023 sampling events were located above the top of the well screen. The monitoring wells are located within water-bearing units either upgradient or downgradient of the Landfill.

The groundwater flow underneath the Landfill during the 2023 sampling events has generally been from the southwest to the northeast. The groundwater flow for the entire Site is divided by Soap Creek. From a review of the vertical hydraulic gradients, the groundwater recharges at Soap Creek. The horizontal placement of monitoring wells is such that the spacing between downgradient monitoring wells has been maintained at less than the 600-foot maximum throughout the sampling events.

### 3.3.1 SLUG TESTING

Haley & Aldrich personnel performed one or more sets of slug tests (rising and falling head) on on-site wells from 18 April 2023 through 23 April 2023. Prior to the falling head test, a static water level measurement was obtained from the top of casing. Then a pressure transducer was placed in the monitoring well and the water level was allowed to stabilize prior to beginning the test. The falling head test began by submerging the slug in the well and continued until the water level recovered. The rising head test began by removing the slug from the water column and continued until the water level recovered. Recovery times ranged from 20 minutes to several hours.

The recorded data from the transducers were transferred to AQTESOLV® software to produce displacement versus time plots. The collected data were analyzed using the Bouwer and Rice (1976)<sup>1</sup> analytical model. Unconfined aquifer conditions were present at monitoring well MW-14, while confined aquifer conditions were present at the other tested wells. Monitoring well MW-27 could not be tested because the well was artesian at the time of testing. Based on in-situ slug tests, hydraulic conductivities in the screened formations range from approximately less than 1.65E-05 to 1.07E-03 (0.0000165 to 0.00107) centimeters per second (cm/s). The hydraulic conductivity values for the monitoring wells are generally consistent with the range of

<sup>1</sup> <http://www.aqtesolv.com/bouwer-rice.htm>.

hydraulic conductivity cited in literature for glacial tills, which is similar to what is encountered at the Site. The values of the averaged calculated hydraulic conductivity (K) values are summarized in Table 4 as the “baseline permeability value” and AQTESOLV® plots are provided in Appendix C.

As per 567 IAC 115.21(2)“d”, in-situ permeability test are scheduled once every five years as shown on Table 3; however, future permeability results will be calculated by drawdown rates during sampling activities due to the dedicated pumps in each sampling well. These future drawdown rates will be reported in future AWQRs.

### **3.4 POTENTIAL GROUNDWATER MOUNDING**

A potential for groundwater mounding exists if the surface elevations of the landfill increase to a significant height. The present surface elevation of the material staging areas has not increased to more than 20 feet above the ground surface where the upgradient wells are installed. The vertical component of the groundwater flow at the Site has consistently indicated downward flow at the upgradient well locations and upward flow at the downgradient well locations. It is believed that no groundwater mounding is occurring at the Site.

Construction activities of the sand and slag area, including removal of material and regrading to the base layer along with exposure to rainfall, may have impacted the groundwater results. Now that a base layer is established and the Landfill is closed, native ground surface disturbance will decrease and future impacts to groundwater are not anticipated.

## 4. Analysis of Annual Monitoring Results

### 4.1 STATISTICAL ANALYSIS

Laboratory results were imported directly from the laboratory Excel file into the existing database with groundwater data from 2018 (field measurements were entered manually). The mean and standard deviation of each parameter for upgradient monitoring points in each monitoring network were calculated as required in 567 IAC 115.26(6). Analytical data from each sampling event was included in an Appendix D table and used in the mean and standard deviation calculations. The following formula was used to calculate the standard deviation:

$$s = \sqrt{\frac{\sum(X-M)^2}{n-1}}$$

Where: s = Sample Standard Deviation  
X = Individual Data  
M = Sample Mean  
n = Number of Data Points in Set

Using the calculated mean and standard deviation for each analytical parameter, the upgradient control limit (the upgradient mean plus two standard deviations) for each parameter was calculated for each of the upgradient monitoring networks. The two standard deviations of the upgradient data were subtracted from the mean upgradient data to determine the lower control limit for pH. A summary of the calculated upper control limits (UCLs) (or background levels) is included in Table 5.

### 4.2 CALCULATED CONTROL LIMITS AND ACTION LEVELS

A comparison was made to the calculated control limits for the upgradient sampling data to evaluate the status of the Site's water quality. A comparison was also made to the IDNR Action Levels established by Chapter 133, IAC. IDNR Action Levels were established for specific chemical and exposure numbers, lifetime exposure, cancer risks, and drinking water exposure over a 70-year period. The following defines some of the various terms used in 567 IAC 133.2 (455B, 455E):

- IDNR Action Level – The IDNR Action Level for any contaminant is as follows: The EPA Health Advisory Level (HAL), if one exists; if there is no HAL, then the EPA Negligible Risk Level (NRL); if there is no HAL or NRL, then the EPA Maximum Contaminant Level (MCL), Secondary Drinking Water Regulation (SDWR), or Maximum Contaminant Level Goal (MCLG) is used. If there is no HAL, NRL, MCL, SDWR, or MCLG, an action level may be established by the IDNR based on current technical literature and recommended guidelines of the EPA and recognized experts on a case-by-case basis.
- HAL – A lifetime HAL for a contaminant is established by the EPA. Health advisories represent the concentration of a single contaminant, based on current toxicological information in drinking water, which is not expected to cause adverse health effects over a lifetime of exposure.
- NRL – The NRL for carcinogens is established by EPA. The NRL estimates the concentration of a contaminant that would cause an additional cancer case per million people exposed over a lifetime to the contaminant.
- MCL – The enforceable MCL was established by EPA pursuant to the Safe Drinking Water Act.

- **SDWR** – An SDWR exists for some contaminants that do not have HALs, NRLs, or MCLs. This number is usually based on the aesthetic qualities of the parameter and is generally not an enforceable limit. These were also established by EPA pursuant to the Safe Drinking Water Act.
- **MCLG** – An MCLG is a non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

When referring to the HAL, NRL, MCL, SDWR, and MCLG in the following analysis, the status of that standard is given in terms of final, draft, listed for regulation, proposed, or tentative form. The UCLs, the action levels, and the source of the action levels for each constituent are presented in Table 5 for each monitored aquifer.

### 4.3 WATER QUALITY ANALYTICAL RESULTS

Time versus concentration graphs for each analytical parameter are provided in Appendix D. Analytical data are also presented in tables where the mean and upgradient control limit is developed from the upgradient monitoring well concentrations. The upgradient control limits and the IDNR Action Levels (when within the scale of the graph) are shown on these graphs.

### 4.4 STATISTICAL TREND ANALYSIS

Statistical methods were used to evaluate groundwater trends. The analysis was completed for monitoring wells in the sampling program. Trend analysis was performed for data collected from 2018 through 2023. After the descriptive statistics had been summarized, the data was evaluated to check the viability of trends, including outlier presence, data censorship (percent of non-detects [NDs]), and determination of an adequate amount of data. A simple substitution method was utilized for ND datasets by substituting each ND value with the laboratory reporting limit. A formal two-tailed statistical trend evaluation (Mann-Kendall) with minimum 95 percent confidence level test (2.5 percent significance level at each tail) was performed for the monitoring wells. The following stepwise approach was utilized for the trend analysis:

1. **For dataset with less than 70 percent non-detects:** Constituents of concern maximum concentration values at each monitoring well were compared to the Groundwater Quality Standards (GWQS). If the maximum concentration of a constituent exceeded the GWQS, then trend analysis was completed using the Mann-Kendall test.
2. **For dataset with greater than 70 percent NDs:** Constituent concentrations were evaluated to determine if the constituent were detected during the sampling events conducted recently. If the detected most recent concentration of a constituent in a sample from the monitoring well exceeded the GWQS, then trend analysis using the Mann-Kendall test was performed.

The statistical evaluation was performed using ChemStat software (version 6.3.0.0). Statistical analyses were performed on constituents that have at least six data points and either had detections or exceedances of state action levels.

Increasing trends were observed in one upgradient monitoring well (MW-16) for iron. Increasing trends were also observed in downgradient wells for iron (MW-26 and MW-27) and sulfate (MW-7 and MW-26). The remaining constituents with concentrations above the groundwater protection standard were either stable or decreasing. The statistical analysis results are summarized in Table 10 and the statistical analysis is contained in Appendix E.

## 5. Groundwater and Surface Water Quality Results

### 5.1 STATISTICAL RESULTS

As shown in Appendix D, similar to past sampling events, exceedances of the UCL exist in downgradient water table monitoring wells, downgradient uppermost aquifer monitoring wells, and in the downstream surface water sampling location. Constituents with no immediately preceding control limit exceedances are summarized in Table 6. A review of Appendix D indicates the following parameters exceeded upper control limits in April and/or August 2023:

- ammonia nitrogen (MW-7, MW-26, and MW-27);
- boron (MW-7, MW-25, MW-26, and MW-27);
- field-measured conductivity (MW-7, MW-26, MW-27, and SW-2);
- fluoride (MW-25);
- chloride (SW-2);
- iron (MW-7, MW-26, and MW-27);
- manganese (MW-6, MW-7, and MW-26);
- field-measured pH (SW-2);
- sodium (MW-26 and SW-2);
- strontium (MW-7, MW-26, and MW-27);
- sulfate (MW-7, MW-25, MW-26, and MW-27); and
- temperature (MW-6, MW-7, MW-25, MW-26, and SW-2).

Table 7 depicts a summary of the ongoing and newly identified control limit exceedances by showing the most recent result of each exceeding constituent compared to the UCL and action level.

Surface water is not used as a source of drinking water. All businesses and residents in the area are supplied with drinking water from the City of Keokuk public water supply. The source for the City of Keokuk public water is the Mississippi River.

Table 9 includes a summary of historical IDNR Action Level exceedances and calculated control limit exceedances from 2018 through 2023.

### 5.2 ANALYTICAL RESULTS

A summary of IDNR Action Level exceedances in 2023 for groundwater and surface water samples is shown in Table 8, Analytical Data Summary. Groundwater sampling results from 2023 are generally consistent with previous sampling events. Table 9 presents a summary of historical IDNR Action Level exceedances and calculated control limit exceedances from 2018 through 2023. The parameters that were detected at concentrations greater than the IDNR Action Levels were iron, lithium, manganese, sodium, and sulfate.

Groundwater and surface water samples that were detected with concentrations greater than the appropriate action level are as follows:

- Iron was detected at concentrations greater than the final SDWR (0.3 milligrams per liter [mg/L]) in groundwater samples collected from monitoring wells MW-7, MW-16, MW-26, MW-27.
- Sulfate was detected at concentrations greater than the final SDWR (250 mg/L) in groundwater samples collected from monitoring wells MW-7, MW-26, MW-27.
- Manganese was detected at concentrations greater than the final HAL (0.3 mg/L) in groundwater samples collected from monitoring wells MW-6, MW-7, and MW-26, and from surface water samples from SW-1 and SW-2.
- Sodium was detected at concentrations greater than the final HAL for sodium (20 mg/L) in groundwater samples collected from monitoring wells MW-5, MW-6, MW-7, MW-12, MW-16, MW-20, MW-21, MW-25, MW-26, and MW-27, and surface water samples collected from SW-1, and SW-2.
- Lithium was detected at concentrations greater than the IDNR Action Level (0.014 mg/L) in groundwater samples from monitoring wells MW-5, MW-7, MW-16, MW-20, MW-21, MW-25, and MW-27.
- Surface water samples collected in April 2023 from surface water locations SW-1 and SW-2 had concentrations of iron greater than the SDWR (0.3 mg/L) during the fall sampling event; however, the samples were not field-filtered, and the result was reported as total iron instead of as dissolved iron.

A review of the groundwater concentration vs. time graphs included in Appendix D indicates that the detected concentrations of parameters are generally similar to historical sampling results. Elevated concentrations of ammonia (SW-1), boron (SW-1), manganese (MW-6), TOX (MW-6), and chloride (MW-5) will continue to be monitored in future years of groundwater sampling to assess whether or not this was an isolated situation.

## **6. Leachate and Gas Monitoring**

The landfill has operated and was closed under IDNR permit #56-SDP-15-89P; Special Provision 4 states in part, that based on a completed and certified site risk assessment meeting the requirements outlined in Chapter 455B.305, Section 6 of the Iowa Code, the permit holder was conditionally exempted under the IDNR letter dated 5 September 1995 from providing and implementing a leachate control plan for the Phase I disposal area; therefore, leachate monitoring is not conducted at the Site. This facility will continue to store and process the same materials. Refer to Table 11.

The permit holder is not required to monitor or report Site gas concentrations, as the defined waste stream consists of inorganic foundry waste; therefore, no gas monitoring is required for this Site. Refer to Table 12.

## **7. Recommendations**

Haley & Aldrich's review of hydrogeological conditions has indicated that the number of monitoring wells and their locations are adequate. We therefore recommend no changes to this component of the Groundwater Monitoring Plan. Per IDNR guidance, the "water table" and the "uppermost aquifer" are each monitored using two background wells and three downgradient wells in each unit. Water levels recorded at 20 of the Site's monitoring wells also provide valuable data used to document groundwater flow direction; there is no benefit to abandoning any of these wells at this time.

Moving forward, IDNR has issued a closure permit (56-SDP-15-89-91C); as such the monitoring wells will be monitored for five years. If IDNR determines that all monitored parameters are exhibiting stable or declining concentrations, the permit will expire, and all groundwater monitoring wells shall be abandoned with appropriate documentation submitted to IDNR.

## References

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## TABLES

TABLE 1  
MONITORING PROGRAM SUMMARY  
2023 ANNUAL WATER QUALITY REPORT  
AMSTED - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Monitoring Well | Formation                        | Current Monitoring Program* | Change for next sampling event | Control Limit Exceedances                                                         |                                                                                                        | Total # of Samples in each monitoring program since January 1, 2018 |              |                 |
|-----------------|----------------------------------|-----------------------------|--------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------|-----------------|
|                 |                                  |                             |                                | April 2023                                                                        | August 2023                                                                                            | Routine                                                             | Supplemental | Remedial Action |
| MW-5            | Water Table (Downgradient)       | Routine                     | NC                             | No Exceedance                                                                     | No Exceedance                                                                                          | 12                                                                  | 0            | 0               |
| MW-6            | Water Table (Downgradient)       | Routine                     | NC                             | No Exceedance                                                                     | Manganese, Temperature (field)                                                                         | 12                                                                  | 0            | 0               |
| MW-7            | Uppermost Aquifer (Downgradient) | Routine                     | NC                             | Boron, Conductivity (field), Iron, Strontium, Sulfate                             | Ammonia, Boron, Conductivity (field), Iron, Manganese, Strontium, Sulfate, Temperature (field)         | 12                                                                  | 0            | 0               |
| MW-12           | Water Table (Upgradient)         | Routine                     | NC                             | No Exceedance                                                                     | No Exceedance                                                                                          | 12                                                                  | 0            | 0               |
| MW-16           | Uppermost Aquifer (Upgradient)   | Routine                     | NC                             | No Exceedance                                                                     | No Exceedance                                                                                          | 12                                                                  | 0            | 0               |
| MW-20           | Water Table (Upgradient)         | Routine                     | NC                             | No Exceedance                                                                     | No Exceedance                                                                                          | 12                                                                  | 0            | 0               |
| MW-21           | Uppermost Aquifer (Upgradient)   | Routine                     | NC                             | No Exceedance                                                                     | No Exceedance                                                                                          | 12                                                                  | 0            | 0               |
| MW-25           | Water Table (Downgradient)       | Routine                     | NC                             | Boron, Fluoride, Sulfate                                                          | Boron, Fluoride, Temperature (field)                                                                   | 12                                                                  | 0            | 0               |
| MW-26           | Uppermost Aquifer (Downgradient) | Routine                     | NC                             | Ammonia, Boron, Conductivity (field), Iron, Manganese, Sodium, Strontium, Sulfate | Ammonia, Boron, Conductivity (field), Iron, Manganese, Sodium, Strontium, Sulfate, Temperature (field) | 12                                                                  | 0            | 0               |
| MW-27           | Uppermost Aquifer (Downgradient) | Routine                     | NC                             | Ammonia, Boron, Iron, Sulfate, Strontium                                          | Ammonia, Boron, Conductivity (field), Iron, Sulfate, Strontium                                         | 12                                                                  | 0            | 0               |
| SW-1            | Surface Water (Upgradient)       | Routine                     | NC                             | No Exceedance                                                                     | No Exceedance                                                                                          | 12                                                                  | 0            | 0               |
| SW-2            | Surface Water (Downgradient)     | Routine                     | NC                             | Chloride, Sodium                                                                  | Chloride, Conductivity (field), pH, Sodium, Temperature (field)                                        | 12                                                                  | 0            | 0               |

Notes:  
\* In accordance with permit #56-SDP-15-89-91C.  
NC: No Change

TABLE 2  
MONITORING PROGRAM IMPLEMENTATION SCHEDULE  
2023 ANNUAL WATER QUALITY REPORT  
AMSTED - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Monitoring Well | Recent Sampling Dates and Constituents |                          |                          |                          |                          |                           |                          |                            |                        |                          |                         |                         | Upcoming Sampling Dates and Constituents |              |
|-----------------|----------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|----------------------------|------------------------|--------------------------|-------------------------|-------------------------|------------------------------------------|--------------|
|                 | 4/16/2018 -<br>4/18/2018               | 10/08/18 -<br>10/10/2018 | 4/13/2019 -<br>4/14/2019 | 10/01/19 -<br>10/02/2019 | 4/07/2020 -<br>4/09/2020 | 9/30/2020 -<br>10/02/2020 | 4/13/2021 -<br>4/15/2021 | 10/12/2021 -<br>10/14/2021 | 4/19/2022 -<br>4/20/22 | 9/27/2022 -<br>9/29/2022 | 4/18/2023-<br>4/19/2023 | 8/22/2023-<br>8/24/2023 | April 2024                               | October 2024 |
| MW-5            | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-6            | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-7            | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-12           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-16           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-20           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-21           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-25           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-26           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| MW-27           | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| SW-1            | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |
| SW-2            | 1, 3                                   | 1, 2, 3                  | 1, 3                     | 1, 2, 3                  | 1, 3                     | 1, 2, 3                   | 1, 3                     | 1, 2, 3                    | 1, 3                   | 1, 2, 3                  | 1, 3                    | 1, 2, 3                 | 1, 3                                     | 1, 2, 3      |

Notes:  
1. Semiannual Parameters: pH, Conductivity, Temperature, Dissolved Iron, Total Manganese, Ammonia Nitrogen, and Chemical Oxygen Demand (COD)  
2. Annual Parameters: Total Organic Halogen, and Phenols  
3. Supplemental Parameters: Boron, Lithium, Sodium, Strontium, Fluoride, and Sulfate

**TABLE 3**  
**MONITORING WELL MAINTENANCE AND PERFORMANCE REVALUATION SCHEDULE**  
 2023 ANNUAL WATER QUALITY REPORT  
 AMSTED - KEOKUK, IOWA  
 PERMIT NO. 56-SDP-15-89-91C

| Compliance with:                                                        | Monitoring Calendar Years |           |           |           |           |                        |           |
|-------------------------------------------------------------------------|---------------------------|-----------|-----------|-----------|-----------|------------------------|-----------|
|                                                                         | 2018                      | 2019      | 2020      | 2021      | 2022      | 2023                   | 2024      |
| 567 IAC 115.21(2)"a" high and low water levels (annual)                 | Completed                 | Completed | Completed | Completed | Completed | Completed              | Scheduled |
| 567 IAC 115.21(2)"b" changes in the hydrologic setting and flow paths   | Completed                 | Completed | Completed | Completed | Completed | Completed              | Scheduled |
| 567 IAC 115.21(2)"c" well depths                                        | N/A                       | N/A       | N/A       | N/A       | Completed | Completed <sup>1</sup> | N/A       |
| 567 IAC 115.21(2)"d" in-situ permeability tests (once every five years) | N/A                       | N/A       | N/A       | N/A       | N/A       | Completed <sup>2</sup> | N/A       |

**Notes:**

1. Well depths were measured during the April 2023 event. Well depths will be measured every 5 years instead of once per year because dedicated pumps are installed in each sampling monitoring well.
2. In-situ permeability tests were completed by Haley & Aldrich in April 2023.

TABLE 4  
MONITORING WELL MAINTENANCE AND PERFORMANCE SUMMARY  
2023 ANNUAL WATER QUALITY REPORT  
AMSTED - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Well  | Monitored Aquifer  | Top of casing | Top of Screen | Screen Length | Total Depth |                                | Date of Measurements |           | Maximum Depth<br>Discrepancy (ft) | Baseline Permeability <sup>1</sup><br>(cm/s/date) | Current Permeability <sup>2</sup> |          |
|-------|--------------------|---------------|---------------|---------------|-------------|--------------------------------|----------------------|-----------|-----------------------------------|---------------------------------------------------|-----------------------------------|----------|
|       |                    |               |               |               |             |                                | 4/18/2023            | 8/22/2023 |                                   |                                                   | 4/18/23-4/23/23                   | % Change |
| MW-2  | Upper Most Aquifer | 636.62        | 590.02        | 10            | 56.6        | Groundwater Level (ft)         | 11.92                | 15.33     | -0.11                             | <1.65E-05<br>4/21/2023                            | <1.65E-05                         | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 624.7                | 621.29    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 56.71                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-3  | Upper Most Aquifer | 660.62        | 609.27        | 10            | 61.35       | Groundwater Level (ft)         | 23.65                | 25.96     | 0.17                              | <1.65E-05<br>4/21/2023                            | <1.65E-05                         | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 636.97               | 634.66    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 61.18                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-5  | Water Table        | 625.07        | 615.07        | 10            | 20          | Groundwater Level (ft)         | 2.67                 | 2.73      | -0.09                             | 2.73E-05<br>4/20/2023                             | 2.73E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 622.40               | 622.34    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 20.09                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-6  | Water Table        | 627.76        | 614.30        | 10            | 23.46       | Groundwater Level (ft)         | 9.23                 | 9.18      | 1.51                              | 2.93E-05<br>4/20/2023                             | 2.93E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 618.53               | 618.58    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 21.95                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-7  | Upper Most Aquifer | 626.06        | 576.06        | 10            | 60          | Groundwater Level (ft)         | 0.65                 | 1.50      | 0                                 | 6.02E-04<br>4/21/2023                             | 6.02E-04                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 625.41               | 624.56    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 60.00                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-11 | Upper Most Aquifer | 636.22        | 593.42        | 10            | 52.8        | Groundwater Level (ft)         | 7.67                 | 12.39     | 1.1                               | 2.80E-05<br>4/19/2023                             | 2.80E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 628.55               | 623.83    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 51.70                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-12 | Water Table        | 633.27        | 623.27        | 10            | 20          | Groundwater Level (ft)         | 8.88                 | 8.46      | -0.12                             | 1.65E-05<br>4/20/2023                             | 1.65E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 624.39               | 624.81    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 20.12                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-13 | Upper Most Aquifer | 641.2         | 599.79        | 10            | 51.41       | Groundwater Level (ft)         | 10.57                | 12.62     | 0                                 | 5.54E-05<br>4/19/2023                             | 5.54E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 630.63               | 628.58    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 51.41                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-14 | Water Table        | 648.67        | 633.37        | 10            | 25.3        | Groundwater Level (ft)         | 5.82                 | 7.99      | -0.06                             | 9.58E-05<br>4/19/2023                             | 9.58E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 642.85               | 640.68    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 25.36                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-15 | Upper Most Aquifer | 649.96        | 599.96        | 10            | 60          | Groundwater Level (ft)         | 10.69                | 11.41     | -1.24                             | <1.65E-05<br>4/19/2023                            | <1.65E-05                         | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 639.27               | 638.55    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 61.24                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-16 | Upper Most Aquifer | 640.5         | 604.13        | 10            | 46.37       | Groundwater Level (ft)         | 13.94                | 14.92     | -0.51                             | <1.65E-05<br>4/21/2023-4/22/2023                  | <1.65E-05                         | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 626.56               | 625.58    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 46.88                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-17 | Water Table        | 640.7         | 630.60        | 10            | 20.1        | Groundwater Level (ft)         | 5.52                 | 5.08      | -0.07                             | 5.73E-05<br>4/22/2023                             | 5.73E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 635.18               | 635.62    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 20.17                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-19 | Upper Most Aquifer | 650.43        | 590.93        | 10            | 69.5        | Groundwater Level (ft)         | 24.19                | 25.54     | 1.31                              | 4.57E-04<br>4/18/2023                             | 4.57E-04                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 626.24               | 624.89    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 68.19                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-20 | Water Table        | 650.39        | 630.29        | 10            | 30.1        | Groundwater Level (ft)         | 11.21                | 11.33     | -0.06                             | 1.45E-04<br>4/20/2023                             | 1.45E-04                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 639.18               | 639.06    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 30.16                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-21 | Upper Most Aquifer | 660.72        | 604.07        | 10            | 66.65       | Groundwater Level (ft)         | 17.83                | 19.26     | 0.05                              | 5.03E-05<br>4/21/2023                             | 5.03E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 642.89               | 641.46    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 66.60                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-23 | Upper Most Aquifer | 659.75        | 609.40        | 10            | 50.35       | Groundwater Level (ft)         | 18.37                | 21.71     | -0.1                              | 7.33E-04<br>4/22/2023                             | 7.33E-04                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 641.38               | 638.04    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 50.45                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-24 | Upper Most Aquifer | 639.99        | 608.24        | 10            | 41.75       | Groundwater Level (ft)         | 9.65                 | 11.36     | -0.06                             | 2.22E-04<br>4/20/2023                             | 2.22E-04                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 630.34               | 628.63    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 41.81                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-25 | Water Table        | 631.77        | 623.56        | 10            | 18.21       | Groundwater Level (ft)         | 8.88                 | 9.19      | -0.55                             | 1.07E-03<br>4/21/2023                             | 1.07E-03                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 622.89               | 622.58    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 18.76                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-26 | Upper Most Aquifer | 631.03        | 588.29        | 5             | 47.74       | Groundwater Level (ft)         | 6.72                 | 7.46      | -0.86                             | 8.60E-05<br>4/21/2023                             | 8.60E-05                          | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | 624.31               | 623.57    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 48.60                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| MW-27 | Upper Most Aquifer | 624.57        | 587.20        | 5             | 42.37       | Groundwater Level (ft)         | Artesian             | 0.20      | 0                                 | Artesian well, could not slug test                | NA                                | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | -                    | 624.37    |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | 42.37                | NM        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Submerged screen               | Y                    | Y         |                                   |                                                   |                                   |          |
| SW-1  | Surface Water      | NA            | NA            | NA            | NA          | Groundwater Level (ft)         | Dry                  | Dry       | NA                                | NA                                                | NA                                | NA       |
|       |                    |               |               |               |             | Groundwater Elevation (Ft MSL) | NA                   | NA        |                                   |                                                   |                                   |          |
|       |                    |               |               |               |             | Measured Well Depth (ft)       | NA                   | NA        |                                   |                                                   |                                   |          |

TABLE 5  
BACKGROUND SUMMARY  
2023 ANNUAL WATER QUALITY REPORT  
AMSTED - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Water Table Background/Control Limit (MW-12 and MW-20) |          |         |            |                  |                  |              |         |
|--------------------------------------------------------|----------|---------|------------|------------------|------------------|--------------|---------|
| Constituent                                            | Units    | Samples | Detections | Background level | Statistical Test | Action Level | Source  |
| Semiannual                                             |          |         |            |                  |                  |              |         |
| pH                                                     | pH Units | 24      | 24         | 8.137 and 5.522* | M+/-2SD          | 6.5/8.5      | SDWR    |
| Conductivity                                           | mS/cm    | 24      | 24         | 1.3              | M+/-2SD          | NA           | NA      |
| Temperature                                            | mg/L     | 24      | 24         | 22.03            | M+/-2SD          | NA           | NA      |
| Dissolved Iron                                         | mg/L     | 24      | 4          | 0.15             | M+/-2SD          | 0.3          | SDWR    |
| Total Managenese                                       | mg/L     | 24      | 15         | 0.055            | M+/-2SD          | 0.3          | HAL     |
| Ammonia Nitrogen                                       | mg/L     | 24      | 4          | 0.56             | M+/-2SD          | 30           | IDNR AL |
| Chemical Oxygen Demand (COD)                           | mg/L     | 24      | 13         | 34.11            | M+/-2SD          | NA           | NA      |
| Annual Parameters                                      |          |         |            |                  |                  |              |         |
| Total Organic Halogen                                  | mg/L     | 12      | 12         | 0.09             | M+/-2SD          | NA           | NA      |
| Phenols                                                | mg/L     | 12      | 0          | 0.0258           | M+/-2SD          | NA           | IDNR AL |
| Supplemental Parameters                                |          |         |            |                  |                  |              |         |
| Boron                                                  | mg/L     | 24      | 3          | 0.138            | M+/-2SD          | 6            | HAL     |
| Lithium                                                | mg/L     | 24      | 16         | 0.06             | M+/-2SD          | 0.014        | IDNR AL |
| Sodium                                                 | mg/L     | 24      | 24         | 100.84           | M+/-2SD          | 20           | HAL     |
| Strontium                                              | mg/L     | 24      | 24         | 0.62             | M+/-2SD          | 4            | HAL     |
| Fluoride                                               | mg/L     | 24      | 24         | 0.61             | M+/-2SD          | 4            | MCL     |
| Chloride                                               | mg/L     | 24      | 24         | 58.43            | M+/-2SD          | 250          | SDWR    |
| Sulfate                                                | mg/L     | 24      | 24         | 60.86            | M+/-2SD          | 250          | HAL     |

| Uppermost Aquifer Background/Control Limit (MW-16 and MW-21) |       |         |            |                  |                  |              |         |
|--------------------------------------------------------------|-------|---------|------------|------------------|------------------|--------------|---------|
| Constituent                                                  | Units | Samples | Detections | Background level | Statistical Test | Action Level | Source  |
| Semiannual                                                   |       |         |            |                  |                  |              |         |
| pH                                                           | mg/L  | 24      | 24         | 8.34 and 4.96*   | M+/-2SD          | 6.5/8.5      | SDWR    |
| Conductivity                                                 | mg/L  | 24      | 24         | 1.33             | M+/-2SD          | NA           | NA      |
| Temperature                                                  | mg/L  | 24      | 24         | 21.75            | M+/-2SD          | NA           | NA      |
| Dissolved Iron                                               | mg/L  | 24      | 14         | 0.48             | M+/-2SD          | 0.3          | SDWR    |
| Total Managenese                                             | mg/L  | 24      | 24         | 0.37             | M+/-2SD          | 0.3          | HAL     |
| Ammonia Nitrogen                                             | mg/L  | 24      | 5          | 0.56             | M+/-2SD          | 30           | IDNR AL |
| Chemical Oxygen Demand (COD)                                 | mg/L  | 24      | 11         | 38.4             | M+/-2SD          | NA           | NA      |
| Annual Parameters                                            |       |         |            |                  |                  |              |         |
| Total Organic Halogen                                        | mg/L  | 12      | 5          | 0.06             | M+/-2SD          | NA           | NA      |
| Phenols                                                      | mg/L  | 12      | 0          | 0.026            | M+/-2SD          | NA           | IDNR AL |
| Supplemental Parameters                                      |       |         |            |                  |                  |              |         |
| Boron                                                        | mg/L  | 24      | 22         | 0.11             | M+/-2SD          | 6            | HAL     |
| Lithium                                                      | mg/L  | 24      | 23         | 0.0809           | M+/-2SD          | 0.014        | IDNR AL |
| Sodium                                                       | mg/L  | 24      | 24         | 64.79            | M+/-2SD          | 20           | HAL     |
| Strontium                                                    | mg/L  | 24      | 24         | 0.61             | M+/-2SD          | 4            | HAL     |
| Fluoride                                                     | mg/L  | 24      | 24         | 0.51             | M+/-2SD          | 4            | MCL     |
| Chloride                                                     | mg/L  | 24      | 24         | 5.22             | M+/-2SD          | 250          | SDWR    |
| Sulfate                                                      | mg/L  | 24      | 24         | 91.95            | M+/-2SD          | 250          | HAL     |

| Surface Water Background/Control Limit (SW-1) |       |         |            |                  |                  |              |         |
|-----------------------------------------------|-------|---------|------------|------------------|------------------|--------------|---------|
| Constituent                                   | Units | Samples | Detections | Background level | Statistical Test | Action Level | Source  |
| Semiannual                                    |       |         |            |                  |                  |              |         |
| pH                                            | mg/L  | 12      | 10         | 7.95 and 6.55*   | M+/-2SD          | 6.5/8.5      | SDWR    |
| Conductivity                                  | mg/L  | 12      | 12         | 0.69             | M+/-2SD          | NA           | NA      |
| Temperature                                   | mg/L  | 12      | 12         | 26.16            | M+/-2SD          | NA           | NA      |
| Dissolved Iron                                | mg/L  | 12      | 9          | 3.24             | M+/-2SD          | 0.3          | SDWR    |
| Total Managenese                              | mg/L  | 12      | 12         | 0.84             | M+/-2SD          | 0.3          | HAL     |
| Ammonia Nitrogen                              | mg/L  | 12      | 10         | 5.5              | M+/-2SD          | 30           | IDNR AL |
| Chemical Oxygen Demand (COD)                  | mg/L  | 12      | 11         | 42.03            | M+/-2SD          | NA           | NA      |
| Annual Parameters                             |       |         |            |                  |                  |              |         |
| Total Organic Halogen                         | mg/L  | 6       | 5          | 0.04             | M+/-2SD          | NA           | NA      |
| Phenols                                       | mg/L  | 6       | 0          | 0.0267           | M+/-2SD          | NA           | IDNR AL |
| Supplemental Parameters                       |       |         |            |                  |                  |              |         |
| Boron                                         | mg/L  | 12      | 12         | 0.44             | M+/-2SD          | 6            | HAL     |
| Lithium                                       | mg/L  | 12      | 0          | 0.05             | M+/-2SD          | 0.014        | IDNR AL |
| Sodium                                        | mg/L  | 12      | 12         | 25.42            | M+/-2SD          | 20           | HAL     |
| Strontium                                     | mg/L  | 12      | 12         | 0.27             | M+/-2SD          | 4            | HAL     |
| Fluoride                                      | mg/L  | 12      | 12         | 1.21             | M+/-2SD          | 4            | MCL     |
| Chloride                                      | mg/L  | 12      | 12         | 25.96            | M+/-2SD          | 250          | SDWR    |
| Sulfate                                       | mg/L  | 12      | 12         | 64.21            | M+/-2SD          | 250          | HAL     |

Notes:

\*Two control limits were established for pH, an upper and lower gradient control limit

1. AL: Action Level
2. HAL: EPA Health Advisory Level
3. IDNR AL: Iowa Department of Natural Resources Action Level
4. MCL: Maximum Contaminant Level
5. MCLG: EPA Maximum Contaminant Level Goal
6. mg/L: milligrams per liter
7. mS/cm: milliSiemens per centimeter
8. NRL: EPA Negligible Risk Level
9. SDWR: Secondary Drinking Water Regulation

TABLE 6  
SUMMARY OF WELL/DETECTED CONSTITUENTS WITH NO IMMEDIATELY PRECEDING CONTROL LIMIT EXCEEDANCES  
2023 ANNUAL WATER QUALITY REPORT  
AMSTED - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Well              | Constituent*           | Units | Most recent result |             | Control Limit |
|-------------------|------------------------|-------|--------------------|-------------|---------------|
|                   |                        |       | April 2023         | August 2023 |               |
| Water Table       |                        |       |                    |             |               |
| MW-5              | Ammonia                | mg/L  | ND                 | ND          | 0.56          |
|                   | Boron                  | mg/L  | ND                 | ND          | 0.138         |
|                   | Chemical Oxygen Demand | mg/L  | ND                 | ND          | 34.11         |
|                   | Chloride               | mg/L  | 3.62               | 3.69        | 58.43         |
|                   | Fluoride               | mg/L  | 0.446              | 0.471       | 0.61          |
|                   | Iron                   | mg/L  | ND                 | 0.104       | 0.15          |
|                   | Lithium                | mg/L  | 0.0255             | 0.0221      | 0.06          |
|                   | Manganese              | mg/L  | ND                 | 0.0196      | 0.055         |
|                   | Sodium                 | mg/L  | 42.9               | 43.4        | 100.84        |
|                   | Strontium              | mg/L  | 0.3                | 0.296       | 0.62          |
|                   | Sulfate                | mg/L  | 36.1               | 33.9        | 60.86         |
|                   | Total Organic Halogens | mg/L  | NA                 | ND          | 0.09          |
|                   | Total Phenols          | mg/L  | NA                 | ND          | 0.0258        |
| MW-6              | Ammonia                | mg/L  | ND                 | ND          | 0.56          |
|                   | Boron                  | mg/L  | ND                 | ND          | 0.138         |
|                   | Chemical Oxygen Demand | mg/L  | ND                 | 4.65        | 34.11         |
|                   | Chloride               | mg/L  | 13.9               | 13.4        | 58.43         |
|                   | Fluoride               | mg/L  | 0.344              | 0.318       | 0.61          |
|                   | Iron                   | mg/L  | ND                 | ND          | 0.15          |
|                   | Lithium                | mg/L  | ND                 | ND          | 0.06          |
|                   | Manganese              | mg/L  | 0.0149             | -           | 0.055         |
|                   | Sodium                 | mg/L  | 42.5               | 44.7        | 100.84        |
|                   | Strontium              | mg/L  | 0.377              | 0.386       | 0.62          |
|                   | Sulfate                | mg/L  | 15.7               | 9.62        | 60.86         |
|                   | Total Organic Halogens | mg/L  | NA                 | 0.0643      | 0.09          |
|                   | Total Phenols          | mg/L  | NA                 | ND          | 0.0258        |
| MW-25             | Ammonia                | mg/L  | ND                 | ND          | 0.56          |
|                   | Chemical Oxygen Demand | mg/L  | 5.42               | ND          | 34.11         |
|                   | Chloride               | mg/L  | 22.1               | 34.4        | 58.43         |
|                   | Iron                   | mg/L  | 0.0711             | ND          | 0.15          |
|                   | Lithium                | mg/L  | 0.037              | 0.044       | 0.06          |
|                   | Manganese              | mg/L  | 0.00376            | 0.00912     | 0.055         |
|                   | Sodium                 | mg/L  | 49.8               | 61.1        | 100.84        |
|                   | Strontium              | mg/L  | 0.476              | 0.571       | 0.62          |
|                   | Sulfate                | mg/L  | -                  | 55.8        | 60.86         |
|                   | Total Organic Halogens | mg/L  | NA                 | 0.0341      | 0.09          |
|                   | Total Phenols          | mg/L  | NA                 | ND          | 0.0258        |
| Uppermost Aquifer |                        |       |                    |             |               |
| MW-7              | Chemical Oxygen Demand | mg/L  | ND                 | 5.62        | 38.4          |
|                   | Chloride               | mg/L  | 1.51               | 1.34        | 5.22          |
|                   | Fluoride               | mg/L  | 0.309              | 0.331       | 0.51          |
|                   | Lithium                | mg/L  | 0.0573             | 0.0711      | 0.0809        |
|                   | Manganese              | mg/L  | 0.0543             | -           | 0.37          |
|                   | Sodium                 | mg/L  | 59.1               | 59.4        | 64.79         |
|                   | Total Organic Halogens | mg/L  | NA                 | ND          | 0.06          |
|                   | Total Phenols          | mg/L  | NA                 | ND          | 0.026         |
| MW-26             | Chemical Oxygen Demand | mg/L  | 3.53               | ND          | 38.4          |
|                   | Chloride               | mg/L  | 2.84               | 2.85        | 5.22          |
|                   | Fluoride               | mg/L  | 0.228              | 0.200       | 0.51          |
|                   | Lithium                | mg/L  | ND                 | ND          | 0.0809        |
|                   | Total Organic Halogens | mg/L  | NA                 | ND          | 0.06          |
|                   | Total Phenols          | mg/L  | NA                 | ND          | 0.026         |
| MW-27             | Total Phenols          | mg/L  | NA                 | ND          | 0.026         |
|                   | Chloride               | mg/L  | 1.8                | 1.66        | 5.22          |
|                   | Fluoride               | mg/L  | 0.356              | 0.303       | 0.51          |
|                   | Lithium                | mg/L  | 0.0553             | 0.0447      | 0.0809        |
|                   | Manganese              | mg/L  | 0.153              | 0.162       | 0.37          |
|                   | Sodium                 | mg/L  | 43.9               | 43.6        | 64.79         |
|                   | Total Organic Halogens | mg/L  | NA                 | 0.0222      | 0.06          |
| Surface Water     |                        |       |                    |             |               |
| SW-2              | Total Phenols          | mg/L  | NA                 | ND          | 0.0267        |
|                   | Ammonia                | mg/L  | 0.191              | 0.134       | 5.5           |
|                   | Boron                  | mg/L  | 0.116              | 0.267       | 0.44          |
|                   | Chemical Oxygen Demand | mg/L  | 6.69               | ND          | 42.03         |
|                   | Fluoride               | mg/L  | 0.494              | 0.561       | 1.21          |
|                   | Iron                   | mg/L  | 0.682              | ND          | 3.24          |
|                   | Lithium                | mg/L  | ND                 | ND          | 0.05          |
|                   | Manganese              | mg/L  | 0.741              | 0.229       | 0.84          |
|                   | Strontium              | mg/L  | 0.251              | 0.223       | 0.27          |
|                   | Sulfate                | mg/L  | 40                 | 30.6        | 64.21         |
|                   | Total Organic Halogens | mg/L  | NA                 | 0.0257      | 0.04          |

Notes:

1. "-": Exceeds background limit
2. NA: Not Analyzed in Spring
3. ND: Non-detect
4. \*Field parameters (temperature, conductivity, and pH) are not included in this table due to variations from weather or equipment.

TABLE 7  
SUMMARY OF ONGOING AND NEWLY IDENTIFIED CONTROL LIMIT EXCEEDANCES  
2023 ANNUAL WATER QUALITY REPORT  
GRIFFIN WHEEL - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Well                           | Constituent | Units | Most recent result |             | Background Standard<br>(Upper Control Limit) | Action Level/<br>Statewide Standard |
|--------------------------------|-------------|-------|--------------------|-------------|----------------------------------------------|-------------------------------------|
|                                |             |       | April 2023         | August 2023 |                                              |                                     |
| Downgradient Water Table       |             |       |                    |             |                                              |                                     |
| MW-6                           | Manganese   | mg/L  | NE                 | 0.575       | 0.055                                        | 0.3                                 |
| MW-25                          | Boron       | mg/L  | 0.207              | 0.222       | 0.138                                        | 6                                   |
|                                | Fluoride    | mg/L  | 2.38               | 1.83        | 0.61                                         | 4                                   |
|                                | Sulfate     | mg/L  | 61.5               | NE          | 60.86                                        | 250                                 |
| Downgradient Uppermost Aquifer |             |       |                    |             |                                              |                                     |
| MW-7                           | Ammonia     | mg/L  | NE                 | 0.703       | 0.56                                         | 30                                  |
|                                | Boron       | mg/L  | 0.317              | 0.248       | 0.11                                         | 6                                   |
|                                | Iron        | mg/L  | 2.42               | 2.51        | 0.48                                         | 0.3                                 |
|                                | Manganese   | mg/L  | NE                 | 1.41        | 0.37                                         | 0.3                                 |
|                                | Strontium   | mg/L  | 1.81               | 1.8         | 0.61                                         | 4                                   |
|                                | Sulfate     | mg/L  | 1330               | 1350        | 91.95                                        | 250                                 |
| MW-26                          | Ammonia     | mg/L  | 1.26               | 1.19        | 0.56                                         | 30                                  |
|                                | Boron       | mg/L  | 0.358              | 0.275       | 0.11                                         | 6                                   |
|                                | Iron        | mg/L  | 1.85               | 1.94        | 0.48                                         | 0.3                                 |
|                                | Manganese   | mg/L  | 3.35               | 2.83        | 0.37                                         | 0.3                                 |
|                                | Sodium      | mg/L  | 86.7               | 83.1        | 64.79                                        | 20                                  |
|                                | Strontium   | mg/L  | 2.08               | 1.97        | 0.61                                         | 4                                   |
|                                | Sulfate     | mg/L  | 1500               | 1500        | 91.95                                        | 250                                 |
| MW-27                          | Ammonia     | mg/L  | 1.37               | 1.37        | 0.56                                         | 30                                  |
|                                | Boron       | mg/L  | 0.183              | 0.165       | 0.11                                         | 6                                   |
|                                | Iron        | mg/L  | 3.11               | 2.34        | 0.48                                         | 0.3                                 |
|                                | Strontium   | mg/L  | 0.797              | 0.764       | 0.61                                         | 4                                   |
|                                | Sulfate     | mg/L  | 257                | 254         | 91.95                                        | 250                                 |
| SW-2                           | Chloride    | mg/L  | 48.4               | 49.7        | 25.96                                        | 250                                 |
|                                | Sodium      | mg/L  | 39.3               | 35.2        | 25.42                                        | 20                                  |

- Notes:
- 1. NE: No Exceedance
  - 2. NA: Not Applicable, only analyzed in Fall
  - 3. Red text indicates exceedance of action level/statewide standard.
  - 4. \*Field parameters (temperature, conductivity and pH) are not included in this table due to variations from weather or equipment.

TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br><br>Unit | IDNR<br>Action<br>Level<br>Source | MW-05<br>04/18/2018<br>N<br><br>WATER TABLE | MW-05<br>10/10/2018<br>N<br><br>WATER TABLE | MW-05<br>04/13/2019<br>N<br><br>WATER TABLE | MW-05<br>10/01/2019<br>N<br><br>WATER TABLE | MW-05<br>04/09/2020<br>N<br><br>WATER TABLE | MW-05<br>10/01/2020<br>N<br><br>WATER TABLE | MW-05<br>04/14/2021<br>N<br><br>WATER TABLE | MW-05<br>10/13/2021<br>N<br><br>WATER TABLE | MW-05<br>04/20/2022<br>N<br><br>WATER TABLE | MW-05<br>09/28/2022<br>N<br><br>WATER TABLE | MW-05<br>11/01/2022<br>N<br><br>WATER TABLE | MW-05<br>04/19/2023<br>N<br><br>WATER TABLE | MW-05<br>08/24/2023<br>N<br><br>WATER TABLE |           |
|----------------------------------------------------|-----------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-----------|
| Field Parameters                                   |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |           |
| Temperature (Deg C)                                | -                                 | -                                           | 8.47                                        | 15.76                                       | 10.37                                       | 18.81                                       | 10.79                                       | 15.83                                       | 13.56                                       | 17.12                                       | 9.12                                        | 15.57                                       | 12.50                                       | 13.41                                       | 20.68     |
| Conductivity, Field (mS/cm)                        | -                                 | -                                           | 0.673                                       | 0.778                                       | 0.735                                       | 0.741                                       | 0.757                                       | 1.15                                        | 0.707                                       | 0.579                                       | 0.781                                       | 0.886                                       | 0.711                                       | 0.693                                       | 0.772     |
| pH, Field (pH units)                               | 6.5-8.5                           | SDWR                                        | 6.48                                        | 6.36                                        | 6.66                                        | 6.90                                        | 6.79                                        | 6.36                                        | 5.19                                        | 6.81                                        | 3.68                                        | 6.47                                        | 7.26                                        | 6.98                                        | 6.66      |
| Inorganic Compounds (mg/L)                         |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |           |
| Boron, Total                                       | 6                                 | HAL                                         | ND (0.05)                                   | ND (0.05)                                   | ND (0.05)                                   | 0.0247 J                                    | ND (0.1)                                    | 0.0238 J                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | -                                           | ND (0.1)                                    | ND (0.1)  |
| Iron, Dissolved                                    | 0.3                               | SDWR                                        | ND (0.025)                                  | ND (0.025)                                  | 0.0463 R                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | 0.052 J                                     | ND (0.1)                                    | -                                           | ND (0.1)                                    | 0.104     |
| Iron, Total <sup>5</sup>                           | 0.3                               | SDWR                                        | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -         |
| Lithium, Total                                     | 0.014                             | IDNR AL                                     | 0.0301 J                                    | 0.0662                                      | 0.0255 J                                    | 0.0251 J                                    | 0.0182 J                                    | 0.0249 J                                    | 0.0175 J                                    | 0.0217 J                                    | ND (0.05)                                   | 0.0216 J                                    | -                                           | 0.0255 J                                    | 0.0221 J  |
| Manganese, Total                                   | 0.3                               | HAL                                         | 0.0145                                      | ND (0.08)                                   | 0.00777 J+                                  | 0.00788                                     | 0.0901                                      | 0.0648                                      | 0.0337                                      | 0.0449                                      | 0.0245                                      | 0.171                                       | -                                           | ND (0.005)                                  | 0.0196    |
| Sodium, Total                                      | 20                                | HAL                                         | 42.9                                        | 57.1                                        | 26.9 J+                                     | 41.2                                        | 42.7                                        | 41.9                                        | 40.8                                        | 42.2                                        | 44.3                                        | 42.6                                        | -                                           | 42.9                                        | 43.4      |
| Strontium, Stable, Total                           | 4                                 | HAL                                         | 0.291 J-                                    | 0.282                                       | 0.292                                       | 0.288                                       | 0.31                                        | 0.265                                       | 0.267                                       | 0.251                                       | 0.295                                       | 0.276                                       | -                                           | 0.3                                         | 0.296     |
| Other (mg/L)                                       |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |           |
| Ammonia (as N)                                     | 30                                | IDNR AL                                     | 0.0851 J                                    | ND (0.1) J                                  | ND (0.127)                                  | ND (0.2)                                    | ND (0.2)                                    | ND (0.5)                                    | ND (0.2)                                    | ND (0.5)                                    | ND (0.2) J                                  | ND (0.5)                                    | -                                           | ND (0.2)                                    | ND (0.2)  |
| Chemical Oxygen Demand (COD)                       | -                                 | -                                           | ND (20)                                     | ND (20)                                     | 6.97 J                                      | ND (10)                                     | 7.2 J                                       | ND (25)                                     | ND (10)                                     | ND (25)                                     | ND (10)                                     | ND (25)                                     | -                                           | ND (10) J                                   | ND (10)   |
| Chloride                                           | 250                               | SDWR                                        | 3.98                                        | 4.26                                        | 3.96                                        | 4.11                                        | 3.79                                        | 3.93                                        | 3.85                                        | 4.03                                        | 3.76                                        | 3.71                                        | -                                           | 3.62                                        | 3.69      |
| Fluoride                                           | 4                                 | MCL                                         | 0.409                                       | 0.443                                       | 0.435                                       | 0.508                                       | 0.462                                       | 0.502                                       | 0.463                                       | 0.517                                       | 0.456                                       | 0.461                                       | -                                           | 0.446                                       | 0.471     |
| Sulfate                                            | 250                               | SDWR                                        | 36.4                                        | 38.7                                        | 40.4                                        | 41                                          | 38.5                                        | 39                                          | 35.7                                        | 38.5                                        | 30.3                                        | 33.2                                        | -                                           | 36.1                                        | 33.9      |
| Total Organic Halides (TOX)                        | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0533                                      | -                                           | 0.0445                                      | -                                           | 0.0325 J                                    | -                                           | -                                           | ND (0.04) |
| Total Organic Halides (2)                          | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0523                                      | -                                           | 0.0457                                      | -                                           | -                                           | -                                           | -                                           | ND (0.04) |
| Total Organic Halides (3)                          | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | ND (0.04) |
| Total Organic Halogens                             | -                                 | -                                           | -                                           | 0.0161 J                                    | -                                           | 0.042                                       | -                                           | 0.0533                                      | -                                           | 0.0445                                      | -                                           | -                                           | -                                           | -                                           | ND (0.04) |
| Total Phenols                                      | 2                                 | IDNR AL                                     | -                                           | ND (0.01)                                   | -                                           | ND (0.0196)                                 | -                                           | ND (0.0188)                                 | -                                           | ND (0.0184)                                 | -                                           | -                                           | ND (0.02)                                   | -                                           | ND (0.01) |

- Notes:
- 1. Results in **bold** were detected.
  - 2. ND: Not detected above reporting limit  
J: Estimated result  
R: Rejected during validation
  - 3. Results exceeding IDNR Action Levels are highlighted gray.
  - 4. HAL: Health Advisory Level (EPA 822-S-12-001; March 2018)  
MCL: Maximum Contaminant Level (EPA, May 2009)  
SDWR: Secondary Drinking Water Regulation (EPA 822-S-12-001; March 2018)  
IDNR AL: Statewide Standards for a Protected Groundwater Source (February 2017)
  - 5. Surface water samples collected in September 2022 were not lab filtered for iron analysis, results are reported as total.

TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br><br>Unit | IDNR<br>Action<br>Level<br>Source | MW-06<br>04/18/2018<br>N<br><br>WATER TABLE | MW-06<br>10/10/2018<br>N<br><br>WATER TABLE | MW-06<br>04/14/2019<br>N<br><br>WATER TABLE | MW-06<br>10/02/2019<br>N<br><br>WATER TABLE | MW-06<br>04/08/2020<br>N<br><br>WATER TABLE | MW-06<br>09/30/2020<br>N<br><br>WATER TABLE | MW-06<br>04/13/2021<br>N<br><br>WATER TABLE | MW-06<br>10/14/2021<br>N<br><br>WATER TABLE | MW-06<br>04/20/2022<br>N<br><br>WATER TABLE | MW-06<br>09/27/2022<br>N<br><br>WATER TABLE | MW-06<br>04/18/2023<br>N<br><br>WATER TABLE | MW-06<br>08/23/2023<br>N<br><br>WATER TABLE | MW-07<br>04/18/2018<br>N<br><br>UPPER<br>AQUIFER |           |            |
|----------------------------------------------------|-----------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|--------------------------------------------------|-----------|------------|
| Field Parameters                                   | Temperature (Deg C)               | -                                           | -                                           | 6.96                                        | 15.97                                       | 8.84                                        | 17.78                                       | 13.59                                       | 17.46                                       | 12.22                                       | 18.03                                       | 8.47                                        | 20.16                                       | 13.13                                            | 28.77     | 8.40       |
|                                                    | Conductivity, Field (mS/cm)       | -                                           | -                                           | 0.704                                       | 0.836                                       | 0.776                                       | 0.803                                       | 0.75                                        | 1.28                                        | 0.732                                       | 0.759                                       | 0.739                                       | 0.682                                       | 0.725                                            | 0.774     | 2.337      |
|                                                    | pH, Field (pH units)              | 6.5-8.5                                     | SDWR                                        | 5.56                                        | 6.93                                        | 6.96                                        | 7.00                                        | 7.15                                        | 7.17                                        | 6.13                                        | 6.20                                        | 7.92                                        | 5.28                                        | 7.39                                             | 7.25      | 6.52       |
| Inorganic Compounds (mg/L)                         |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                                  |           |            |
| Boron, Total                                       | 6                                 | HAL                                         | ND (0.05)                                   | ND (0.05)                                   | ND (0.05)                                   | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                         | ND (0.1)  | 0.18       |
| Iron, Dissolved                                    | 0.3                               | SDWR                                        | 0.0186 J                                    | ND (0.025)                                  | 0.221 R                                     | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                         | ND (0.1)  | ND (0.025) |
| Iron, Total <sup>5</sup>                           | 0.3                               | SDWR                                        | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                                | -         | -          |
| Lithium, Total                                     | 0.014                             | IDNR AL                                     | 0.0192 J                                    | ND (0.05)                                   | 0.0196 J                                    | 0.0143 J                                    | 0.0104 J                                    | 0.013 J                                     | 0.00696 J                                   | 0.00978 J                                   | ND (0.05)                                   | 0.0122 J                                    | ND (0.05)                                   | ND (0.05)                                        | ND (0.05) | 0.0872     |
| Manganese, Total                                   | 0.3                               | HAL                                         | 0.124                                       | 0.549                                       | 0.0786                                      | 0.2                                         | 0.0909                                      | 0.436                                       | 0.0557                                      | 0.703                                       | 0.0729                                      | 0.253                                       | 0.0149                                      | 0.575                                            | 0.0844    | 0.0844     |
| Sodium, Total                                      | 20                                | HAL                                         | 38.5                                        | 61.5                                        | 43.5 J+                                     | 41.5                                        | 42.2                                        | 44.8                                        | 41.4                                        | 45.9                                        | 39.9                                        | 43.2                                        | 42.5                                        | 44.7                                             | 64.4      | 64.4       |
| Strontium, Stable, Total                           | 4                                 | HAL                                         | 0.349 J-                                    | 0.365                                       | 0.362                                       | 0.393                                       | 0.394                                       | 0.355                                       | 0.328                                       | 0.355                                       | 0.33                                        | 0.357                                       | 0.377                                       | 0.386                                            | 1.85 J-   | 1.85 J-    |
| Other (mg/L)                                       |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                                  |           |            |
| Ammonia (as N)                                     | 30                                | IDNR AL                                     | ND (0.1)                                    | ND (0.1) J                                  | ND (0.1)                                    | ND (0.2)                                    | ND (0.2)                                    | ND (0.5)                                    | ND (0.2)                                    | ND (0.5)                                    | ND (0.2) J                                  | ND (0.5)                                    | ND (0.2)                                    | ND (0.2)                                         | ND (0.1)  | ND (0.1)   |
| Chemical Oxygen Demand (COD)                       | -                                 | -                                           | 5.09 J+                                     | ND (20)                                     | 8.65 J                                      | ND (10)                                     | 7.71 J                                      | 52.3 J+                                     | ND (10)                                     | 42.8                                        | ND (10)                                     | ND (25)                                     | ND (10) J                                   | 4.65 J                                           | ND (20)   | ND (20)    |
| Chloride                                           | 250                               | SDWR                                        | 13.6                                        | 14.1                                        | 14                                          | 14.4                                        | 13.1                                        | 14.5                                        | 13.9                                        | 11.1                                        | 13.1                                        | 12.2                                        | 13.9                                        | 13.4                                             | 1.37      | 1.37       |
| Fluoride                                           | 4                                 | MCL                                         | 0.327                                       | 0.312                                       | 0.343                                       | 0.354                                       | 0.267                                       | 0.351                                       | 0.346                                       | 0.422                                       | 0.379                                       | 0.349                                       | 0.344                                       | 0.318                                            | 0.312     | 0.312      |
| Sulfate                                            | 250                               | SDWR                                        | 12.7                                        | 10.5                                        | 13                                          | 14.8                                        | 12.2                                        | 13.7                                        | 13.2                                        | 8.35                                        | 12.3                                        | 11                                          | 15.7                                        | 9.62                                             | 1250      | 1250       |
| Total Organic Halides (TOX)                        | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0528                                      | -                                           | 0.0339 J                                    | -                                           | 0.0502 J                                    | -                                           | 0.0643                                           | -         | -          |
| Total Organic Halides (2)                          | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0574                                      | -                                           | 0.0254 J                                    | -                                           | -                                           | -                                           | 0.067                                            | -         | -          |
| Total Organic Halides (3)                          | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0615                                           | -         | -          |
| Total Organic Halogens                             | -                                 | -                                           | -                                           | 0.036                                       | -                                           | 0.0524 J                                    | -                                           | 0.0528                                      | -                                           | 0.0339 J                                    | -                                           | -                                           | -                                           | 0.0643                                           | -         | -          |
| Total Phenols                                      | 2                                 | IDNR AL                                     | -                                           | ND (0.01)                                   | -                                           | ND (0.02)                                   | -                                           | ND (0.0204)                                 | -                                           | ND (0.0184)                                 | -                                           | ND (0.02)                                   | -                                           | ND (0.01)                                        | -         | -          |

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SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | MW-07<br>10/10/2018<br>N<br>UPPER<br>AQUIFER | MW-07<br>04/14/2019<br>N<br>UPPER<br>AQUIFER | MW-07<br>10/02/2019<br>N<br>UPPER<br>AQUIFER | MW-07<br>04/08/2020<br>N<br>UPPER<br>AQUIFER | MW-07<br>09/30/2020<br>N<br>UPPER<br>AQUIFER | MW-07<br>09/30/2020<br>FD<br>UPPER<br>AQUIFER | MW-07<br>04/13/2021<br>N<br>UPPER<br>AQUIFER | MW-07<br>04/13/2021<br>FD<br>UPPER<br>AQUIFER | MW-07<br>10/14/2021<br>N<br>UPPER<br>AQUIFER | MW-07<br>04/20/2022<br>N<br>UPPER<br>AQUIFER | MW-07<br>09/27/2022<br>N<br>UPPER<br>AQUIFER | MW-07<br>04/18/2023<br>N<br>UPPER AQUIFER | MW-07<br>08/23/2023<br>N<br>UPPER<br>AQUIFER |           |
|------------------------------------------------|-----------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------|----------------------------------------------|-----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-------------------------------------------|----------------------------------------------|-----------|
| Field Parameters                               | -                                 | -                                            | 15.40                                        | 10.06                                        | 18.12                                        | 12.52                                        | 15.55                                         | -                                            | 12.66                                         | -                                            | 15.14                                        | 10.46                                        | 15.19                                     | 15.4                                         | 28.99     |
|                                                | -                                 | -                                            | 2.613                                        | 2.559                                        | 2.542                                        | 2.51                                         | 4.21                                          | -                                            | 2.4                                           | -                                            | 2.328                                        | 2.59                                         | 1.97                                      | 2.42                                         | 2.48      |
|                                                | 6.5-8.5                           | SDWR                                         | 5.06                                         | 6.74                                         | 6.80                                         | 6.81                                         | 7.17                                          | -                                            | 6.24                                          | -                                            | 6.53                                         | 7.33                                         | 5.08                                      | 7.23                                         | 7.15      |
| Inorganic Compounds (mg/L)                     |                                   |                                              |                                              |                                              |                                              |                                              |                                               |                                              |                                               |                                              |                                              |                                              |                                           |                                              |           |
| Boron, Total                                   | 6                                 | HAL                                          | 0.108                                        | 0.181                                        | 0.244                                        | 0.243                                        | 0.228                                         | 0.234                                        | 0.204                                         | 0.21                                         | 0.192                                        | 0.277                                        | 0.244                                     | 0.317                                        | 0.248     |
| Iron, Dissolved                                | 0.3                               | SDWR                                         | 0.297                                        | 0.213 R                                      | 0.204                                        | 7.93                                         | 0.801 J                                       | 0.223 J                                      | 8.8                                           | 8.84                                         | 9.64                                         | 8.68                                         | 9.63                                      | 2.42                                         | 2.51      |
| Iron, Total <sup>5</sup>                       | 0.3                               | SDWR                                         | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | -                                             | -                                            | -                                            | -                                            | -                                         | -                                            | -         |
| Lithium, Total                                 | 0.014                             | IDNR AL                                      | 0.116                                        | 0.0916                                       | 0.0776                                       | 0.0696                                       | 0.0784                                        | 0.0773                                       | 0.0671                                        | 0.0676                                       | 0.073                                        | 0.0829                                       | 0.077                                     | 0.0573                                       | 0.0711    |
| Manganese, Total                               | 0.3                               | HAL                                          | 2.33                                         | 0.0783                                       | 1.76                                         | 1.28                                         | 1.49                                          | 1.46                                         | 1.3                                           | 1.27                                         | 1.49                                         | 1.46                                         | 1.58                                      | 0.0543                                       | 1.41      |
| Sodium, Total                                  | 20                                | HAL                                          | 79.1                                         | 69.4 J+                                      | 57.7                                         | 63.4                                         | 58.3                                          | 59.3                                         | 60.9                                          | 62.3                                         | 60.2                                         | 65.8                                         | 62.1                                      | 59.1                                         | 59.4      |
| Strontium, Stable, Total                       | 4                                 | HAL                                          | 1.82                                         | 1.83                                         | 1.83                                         | 1.93                                         | 1.67                                          | 1.68                                         | 1.57                                          | 1.64                                         | 1.74                                         | 1.79                                         | 1.78                                      | 1.81                                         | 1.8       |
| Other (mg/L)                                   |                                   |                                              |                                              |                                              |                                              |                                              |                                               |                                              |                                               |                                              |                                              |                                              |                                           |                                              |           |
| Ammonia (as N)                                 | 30                                | IDNR AL                                      | 0.809 J                                      | 0.165 J+                                     | 1.07 J+                                      | 0.492                                        | 0.992                                         | 0.958                                        | 0.994                                         | 0.904                                        | 0.934                                        | 0.979 J                                      | 0.918                                     | ND (0.2)                                     | 0.703     |
| Chemical Oxygen Demand (COD)                   | -                                 | -                                            | ND (20)                                      | 7.19 J                                       | ND (10)                                      | 48.3                                         | 43.9 J+                                       | 27.2 J+                                      | 8.65 J                                        | ND (10)                                      | 37.4                                         | ND (10)                                      | ND (25)                                   | ND (10) J                                    | 5.62 J    |
| Chloride                                       | 250                               | SDWR                                         | 1.49                                         | 1.48                                         | 1.38                                         | 1.38                                         | 1.46                                          | 1.41                                         | 1.44                                          | 1.41                                         | 1.47                                         | 1.41                                         | 1.37                                      | 1.51 J+                                      | 1.34      |
| Fluoride                                       | 4                                 | MCL                                          | 0.302                                        | 0.3                                          | 0.345                                        | 0.322                                        | 0.338                                         | 0.338                                        | 0.347                                         | 0.344                                        | 0.329                                        | 0.324                                        | 0.288                                     | 0.309                                        | 0.331     |
| Sulfate                                        | 250                               | SDWR                                         | 1220                                         | 1250                                         | 1240                                         | 1320                                         | 1240                                          | 1270                                         | 1370                                          | 1390                                         | 1440                                         | 1340                                         | 1320                                      | 1330                                         | 1350      |
| Total Organic Halides (TOX)                    | -                                 | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0779                                        | 0.0333 J                                     | -                                             | -                                            | ND (0.04)                                    | -                                            | 0.0183 J                                  | -                                            | ND (0.04) |
| Total Organic Halides (2)                      | -                                 | -                                            | -                                            | -                                            | -                                            | -                                            | 0.08                                          | 0.0261 J                                     | -                                             | -                                            | ND (0.04)                                    | -                                            | -                                         | -                                            | ND (0.04) |
| Total Organic Halides (3)                      | -                                 | -                                            | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | -                                             | -                                            | -                                            | -                                            | -                                         | -                                            | ND (0.04) |
| Total Organic Halogens                         | -                                 | -                                            | ND (0.03)                                    | -                                            | ND (0.01)                                    | -                                            | 0.0779 J                                      | 0.0333 J                                     | -                                             | -                                            | ND (0.04)                                    | -                                            | -                                         | -                                            | ND (0.04) |
| Total Phenols                                  | 2                                 | IDNR AL                                      | ND (0.01)                                    | -                                            | ND (0.0204)                                  | -                                            | ND (0.02)                                     | ND (0.0204)                                  | -                                             | -                                            | ND (0.0184)                                  | -                                            | ND (0.02)                                 | -                                            | ND (0.01) |

- Notes:
- 1. Results in **bold** were detected.
  - 2. ND: Not detected above reporting limit
  - J: Estimated result
  - R: Rejected during validation
  - 3. Results exceeding IDNR Action Levels are highlighted gray.
  - 4. HAL: Health Advisory Level (EPA 822-S-12-001; March 2018)  
MCL: Maximum Contaminant Level (EPA, May 2009)  
SDWR: Secondary Drinking Water Regulation (EPA 822-S-12-001; March 2018)  
IDNR AL: Statewide Standards for a Protected Groundwater Source (February 2017)
  - 5. Surface water samples collected in September 2022 were not lab filtered for iron analysis, results are reported as total.

TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

|                              | Location<br>Sample Date<br>Sample Type<br><br>Unit | IDNR<br>Action<br>Level<br>Source | MW-12<br>04/17/2018<br>N<br><br>WATER TABLE | MW-12<br>10/09/2018<br>N<br><br>WATER TABLE | MW-12<br>04/14/2019<br>N<br><br>WATER TABLE | MW-12<br>10/02/2019<br>N<br><br>WATER TABLE | MW-12<br>04/08/2020<br>N<br><br>WATER TABLE | MW-12<br>10/01/2020<br>N<br><br>WATER TABLE | MW-12<br>04/15/2021<br>N<br><br>WATER TABLE | MW-12<br>10/14/2021<br>N<br><br>WATER TABLE | MW-12<br>04/19/2022<br>N<br><br>WATER TABLE | MW-12<br>09/28/2022<br>N<br><br>WATER TABLE | MW-12<br>04/18/2023<br>N<br><br>WATER TABLE | MW-12<br>08/24/2023<br>N<br><br>WATER TABLE | MW-16<br>04/17/2018<br>N<br>UPPER<br>AQUIFER |
|------------------------------|----------------------------------------------------|-----------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|----------------------------------------------|
| Field Parameters             |                                                    |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                              |
| Temperature (Deg C)          | -                                                  | -                                 | 10.60                                       | 15.86                                       | 7.72                                        | 17.42                                       | 12.10                                       | 15.15                                       | 10.52                                       | -                                           | 10.78                                       | 15.68                                       | 14.33                                       | 20.95                                       | 7.99                                         |
| Conductivity, Field (mS/cm)  | -                                                  | -                                 | 0.903                                       | 0.943                                       | 0.945                                       | 0.964                                       | 0.948                                       | 1.51                                        | 0.931                                       | -                                           | 0.958                                       | 0.975                                       | 0.744                                       | 0.867                                       | 0.923                                        |
| pH, Field (pH units)         | 6.5-8.5                                            | SDWR                              | 6.46                                        | 6.84                                        | 6.55                                        | 6.75                                        | 6.76                                        | 6.07                                        | 6.54                                        | -                                           | 5.56                                        | 6.32                                        | 7.22                                        | 6.71                                        | 6.42                                         |
| Inorganic Compounds (mg/L)   |                                                    |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                              |
| Boron, Total                 | 6                                                  | HAL                               | ND (0.05)                                   | ND (0.05)                                   | ND (0.05)                                   | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | 0.0706                                       |
| Iron, Dissolved              | 0.3                                                | SDWR                              | 0.0121 J                                    | ND (0.025)                                  | 0.0629 R                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | 0.051 J                                     | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.025)                                   |
| Iron, Total <sup>5</sup>     | 0.3                                                | SDWR                              | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                            |
| Lithium, Total               | 0.014                                              | IDNR AL                           | 0.0193 J                                    | ND (0.05)                                   | 0.0175 J                                    | ND (0.05)                                   | ND (0.05)                                   | 0.0128 J                                    | 0.00796 J                                   | 0.0102 J                                    | ND (0.05)                                   | ND (0.05)                                   | ND (0.05)                                   | ND (0.05)                                   | 0.0703                                       |
| Manganese, Total             | 0.3                                                | HAL                               | 0.00344 J                                   | ND (0.08)                                   | ND (0.004)                                  | ND (0.005)                                  | 0.00282 J                                   | 0.00643                                     | ND (0.005)                                  | ND (0.01)                                   | ND (0.01)                                   | ND (0.01)                                   | ND (0.005)                                  | ND (0.005)                                  | 0.477                                        |
| Sodium, Total                | 20                                                 | HAL                               | 34.2                                        | 34.6                                        | 34.9 J+                                     | 24.9                                        | 34.4                                        | 28.4                                        | 31.1                                        | 27.4                                        | 32                                          | 24.3                                        | 30.8                                        | 23.9                                        | 47.2                                         |
| Strontium, Stable, Total     | 4                                                  | HAL                               | 0.513 J-                                    | 0.535                                       | 0.494                                       | 0.594                                       | 0.562                                       | 0.542                                       | 0.443                                       | 0.557                                       | 0.474                                       | 0.492                                       | 0.49                                        | 0.513                                       | 0.523 J-                                     |
| Other (mg/L)                 |                                                    |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                             |                                              |
| Ammonia (as N)               | 30                                                 | IDNR AL                           | ND (0.1)                                    | ND (0.1) J                                  | ND (0.139)                                  | ND (0.2)                                    | ND (0.2)                                    | ND (0.5)                                    | 0.147 J                                     | ND (0.5)                                    | ND (0.2) J                                  | ND (0.5)                                    | ND (0.2)                                    | ND (0.2)                                    | ND (0.1)                                     |
| Chemical Oxygen Demand (COD) | -                                                  | -                                 | ND (20)                                     | 5.25 J                                      | 7.52 J                                      | 8.59 J                                      | 11.3                                        | 25.5 J+                                     | ND (10)                                     | ND (25)                                     | 9 J                                         | ND (25)                                     | ND (10) J                                   | ND (10)                                     | 4.03 J+                                      |
| Chloride                     | 250                                                | SDWR                              | 5.26                                        | 6.92                                        | 5.77                                        | 5.58                                        | 6.08                                        | 6.31                                        | 6.73                                        | 7.4                                         | 6.65                                        | 7.94                                        | 8.24                                        | 9.04                                        | 2.98                                         |
| Fluoride                     | 4                                                  | MCL                               | 0.263                                       | 0.341                                       | 0.282                                       | 0.35                                        | 0.293                                       | 0.331                                       | 0.315                                       | 0.392                                       | 0.325                                       | 0.353                                       | 0.324                                       | 0.358                                       | 0.4                                          |
| Sulfate                      | 250                                                | SDWR                              | 46.6                                        | 47.8                                        | 48.2                                        | 38.9                                        | 44                                          | 40.7                                        | 46.4                                        | 38.4                                        | 43.3                                        | 35.1                                        | 45.6                                        | 37                                          | 67.1                                         |
| Total Organic Halides (TOX)  | -                                                  | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0529                                      | -                                           | 0.0513                                      | -                                           | 0.0339 J                                    | -                                           | 0.099                                       | -                                            |
| Total Organic Halides (2)    | -                                                  | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0531                                      | -                                           | 0.052                                       | -                                           | -                                           | -                                           | 0.113                                       | -                                            |
| Total Organic Halides (3)    | -                                                  | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | 0.0848                                      | -                                            |
| Total Organic Halogens       | -                                                  | -                                 | -                                           | 0.0231 J                                    | -                                           | 0.021 J                                     | -                                           | 0.0529                                      | -                                           | 0.0513                                      | -                                           | -                                           | -                                           | 0.099                                       | -                                            |
| Total Phenols                | 2                                                  | IDNR AL                           | -                                           | ND (0.01)                                   | -                                           | ND (0.0196)                                 | -                                           | ND (0.0204)                                 | -                                           | ND (0.02)                                   | -                                           | ND (0.02)                                   | -                                           | ND (0.01)                                   | -                                            |

Notes:

1. Results in **bold** were detected.

2. ND: Not detected above reporting limit

J: Estimated result

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3. Results exceeding IDNR Action Levels are highlighted gray.

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TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | MW-16<br>10/09/2018<br>N<br>UPPER<br>AQUIFER | MW-16<br>04/14/2019<br>N<br>UPPER<br>AQUIFER | MW-16<br>10/02/2019<br>N<br>UPPER<br>AQUIFER | MW-16<br>04/09/2020<br>N<br>UPPER<br>AQUIFER | MW-16<br>10/01/2020<br>N<br>UPPER<br>AQUIFER | MW-16<br>04/15/2021<br>N<br>UPPER<br>AQUIFER | MW-16<br>10/14/2021<br>N<br>UPPER<br>AQUIFER | MW-16<br>04/19/2022<br>N<br>UPPER<br>AQUIFER | MW-16<br>09/28/2022<br>N<br>UPPER<br>AQUIFER | MW-16<br>04/18/2023<br>N<br>UPPER<br>AQUIFER | MW-16<br>08/24/2023<br>N<br>UPPER<br>AQUIFER | MW-20<br>04/17/2018<br>N<br>WATER TABLE | MW-20<br>10/10/2018<br>N<br>WATER TABLE |            |       |
|------------------------------------------------|-----------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------|-----------------------------------------|------------|-------|
| Field Parameters                               | Temperature (Deg C)               | -                                            | -                                            | 13.71                                        | 9.80                                         | 16.81                                        | 10.59                                        | 13.72                                        | 11.88                                        | 17.32                                        | 12.56                                        | 15.28                                        | 14.65                                   | 21.28                                   | 11.62      | 13.77 |
|                                                | Conductivity, Field (mS/cm)       | -                                            | -                                            | 1.008                                        | 0.907                                        | 0.984                                        | 0.93                                         | 1.55                                         | 0.947                                        | 0.928                                        | 0.992                                        | 1.13                                         | 0.819                                   | 0.963                                   | 0.806      | 0.924 |
|                                                | pH, Field (pH units)              | 6.5-8.5                                      | SDWR                                         | 6.23                                         | 6.72                                         | 6.87                                         | 6.90                                         | 6.31                                         | 6.84                                         | 6.73                                         | 5.83                                         | 6.52                                         | 7.35                                    | 6.82                                    | 6.48       | 9.21  |
| Inorganic Compounds (mg/L)                     |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                         |                                         |            |       |
| Boron, Total                                   | 6                                 | HAL                                          | 0.0516                                       | 0.0638                                       | 0.0767 J                                     | 0.0504 J                                     | 0.079 J                                      | 0.066 J                                      | 0.0658 J                                     | 0.0785 J                                     | 0.0799 J                                     | 0.0764 J                                     | 0.0769 J                                | 0.0201 J                                | ND (0.05)  |       |
| Iron, Dissolved                                | 0.3                               | SDWR                                         | 0.0454                                       | 0.025 R                                      | ND (0.1)                                     | 0.159                                        | ND (0.1)                                     | 0.137                                        | 0.216                                        | 0.175                                        | 0.113                                        | 0.819                                        | 0.204                                   | 0.0254                                  | ND (0.025) |       |
| Iron, Total <sup>5</sup>                       | 0.3                               | SDWR                                         | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                       | -                                       | -          |       |
| Lithium, Total                                 | 0.014                             | IDNR AL                                      | 0.0893                                       | 0.0648                                       | 0.0617                                       | 0.0543                                       | 0.0618                                       | 0.0512                                       | 0.063                                        | 0.0684 J+                                    | 0.058                                        | 0.0498 J                                     | 0.0556                                  | 0.0336 J                                | 0.0566     |       |
| Manganese, Total                               | 0.3                               | HAL                                          | 0.091                                        | 0.0971                                       | 0.0723                                       | 0.0578                                       | 0.0742                                       | 0.0755                                       | 0.0735                                       | 0.126                                        | 0.181                                        | 0.0595                                       | 0.11                                    | ND (0.004)                              | ND (0.08)  |       |
| Sodium, Total                                  | 20                                | HAL                                          | 64.7                                         | 53.1 J+                                      | 44.8                                         | 47.6                                         | 45.1                                         | 47.6                                         | 49.3                                         | 50.9                                         | 46.8                                         | 51.6                                         | 47.7                                    | 67.7                                    | 97.8       |       |
| Strontium, Stable, Total                       | 4                                 | HAL                                          | 0.496                                        | 0.485                                        | 0.489                                        | 0.498                                        | 0.451                                        | 0.44                                         | 0.513                                        | 0.488                                        | 0.484                                        | 0.525                                        | 0.497                                   | 0.329 J-                                | 0.338      |       |
| Other (mg/L)                                   |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                         |                                         |            |       |
| Ammonia (as N)                                 | 30                                | IDNR AL                                      | ND (0.1) J                                   | 0.135                                        | ND (0.2)                                     | ND (0.2)                                     | ND (0.5)                                     | ND (0.2)                                     | ND (0.5)                                     | ND (0.2) J                                   | ND (0.5)                                     | ND (0.2)                                     | ND (0.2)                                | ND (0.1)                                | ND (0.1) J |       |
| Chemical Oxygen Demand (COD)                   | -                                 | -                                            | ND (20)                                      | 6.31 J                                       | ND (10)                                      | 13.4                                         | 48.9 J+                                      | ND (10)                                      | 25 J                                         | ND (10)                                      | ND (25)                                      | ND (10) J                                    | ND (10)                                 | ND (20)                                 | ND (20)    |       |
| Chloride                                       | 250                               | SDWR                                         | 3.39                                         | 4.3                                          | 3.45                                         | 4.66                                         | 3.65                                         | 4.37                                         | 3.94                                         | 4.34                                         | 3.36                                         | 4.44                                         | 4.22                                    | 27.9                                    | 34.1       |       |
| Fluoride                                       | 4                                 | MCL                                          | 0.412                                        | 0.437                                        | 0.461                                        | 0.432                                        | 0.47                                         | 0.469                                        | 0.493                                        | 0.481                                        | 0.436                                        | 0.463                                        | 0.464                                   | 0.45                                    | 0.455      |       |
| Sulfate                                        | 250                               | SDWR                                         | 62.6                                         | 63                                           | 69.8                                         | 60.2                                         | 69.8                                         | 65.7                                         | 71.9                                         | 66.8                                         | 70.3                                         | 72.4                                         | 70                                      | 41.3                                    | 30.9       |       |
| Total Organic Halides (TOX)                    | -                                 | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0185 J                                     | -                                            | 0.0269 J                                     | -                                            | 0.0182 J                                     | -                                            | ND (0.04)                               | -                                       | -          |       |
| Total Organic Halides (2)                      | -                                 | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0182 J                                     | -                                            | 0.0165 J                                     | -                                            | -                                            | -                                            | ND (0.04)                               | -                                       | -          |       |
| Total Organic Halides (3)                      | -                                 | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | ND (0.04)                               | -                                       | -          |       |
| Total Organic Halogens                         | -                                 | -                                            | ND (0.03)                                    | -                                            | ND (0.01) J                                  | -                                            | 0.0185 J                                     | -                                            | 0.0269 J                                     | -                                            | -                                            | -                                            | ND (0.04)                               | -                                       | 0.0158 J   |       |
| Total Phenols                                  | 2                                 | IDNR AL                                      | ND (0.01)                                    | -                                            | ND (0.02)                                    | -                                            | ND (0.0196)                                  | -                                            | ND (0.0188)                                  | -                                            | ND (0.02)                                    | -                                            | ND (0.01)                               | -                                       | ND (0.01)  |       |

Notes:

1. Results in **bold** were detected.

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J: Estimated result

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3. Results exceeding IDNR Action Levels are highlighted gray.

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2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br><br>Unit | IDNR<br>Action<br>Level<br>Source | MW-20<br>04/14/2019<br>N<br><br>WATER TABLE | MW-20<br>10/02/2019<br>N<br><br>WATER TABLE | MW-20<br>04/09/2020<br>N<br><br>WATER TABLE | MW-20<br>10/02/2020<br>N<br><br>WATER TABLE | MW-20<br>04/15/2021<br>N<br><br>WATER TABLE | MW-20<br>10/12/2021<br>N<br><br>WATER TABLE | MW-20<br>10/12/2021<br>FD<br><br>WATER TABLE | MW-20<br>04/20/2022<br>N<br><br>WATER TABLE | MW-20<br>09/28/2022<br>N<br><br>WATER TABLE | MW-20<br>04/19/2023<br>N<br><br>WATER TABLE | MW-20<br>08/23/2023<br>N<br><br>WATER TABLE | MW-20<br>08/23/2023<br>FD<br><br>WATER TABLE | MW-21<br>04/17/2018<br>N<br>UPPER<br>AQUIFER |            |
|----------------------------------------------------|-----------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|----------------------------------------------|----------------------------------------------|------------|
| Field Parameters                                   |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                              |                                             |                                             |                                             |                                             |                                              |                                              |            |
|                                                    |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                              |                                             |                                             |                                             |                                             |                                              |                                              |            |
|                                                    |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                              |                                             |                                             |                                             |                                             |                                              |                                              |            |
| Temperature (Deg C)                                | -                                 | -                                           | 9.47                                        | 16.93                                       | 12.26                                       | 13.83                                       | 12.95                                       | 14.99                                        | -                                           | 11.02                                       | 15.15                                       | 13.71                                       | 26.75                                        | -                                            | 10.41      |
| Conductivity, Field (mS/cm)                        | -                                 | -                                           | 0.927                                       | 0.91                                        | 0.939                                       | 1.41                                        | 0.895                                       | 0.672                                        | -                                           | 0.889                                       | 1.04                                        | 0.802                                       | 0.802                                        | -                                            | 1.01       |
| pH, Field (pH units)                               | 6.5-8.5                           | SDWR                                        | 6.80                                        | 7.07                                        | 6.94                                        | 6.56                                        | 6.72                                        | 6.98                                         | -                                           | 7.43                                        | 6.59                                        | 7.25                                        | 7.4                                          | -                                            | 6.20       |
| Inorganic Compounds (mg/L)                         |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                              |                                             |                                             |                                             |                                             |                                              |                                              |            |
| Boron, Total                                       | 6                                 | HAL                                         | ND (0.05)                                   | 0.0305 J                                    | ND (0.1)                                    | 0.0308 J                                    | ND (0.1)                                    | ND (0.1)                                     | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                     | ND (0.1)                                     | 0.11       |
| Iron, Dissolved                                    | 0.3                               | SDWR                                        | 0.025 R                                     | ND (0.1)                                    | 0.0705 J                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                     | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                    | ND (0.1)                                     | ND (0.1)                                     | ND (0.025) |
| Iron, Total <sup>5</sup>                           | 0.3                               | SDWR                                        | -                                           | -                                           | -                                           | -                                           | -                                           | -                                            | -                                           | -                                           | -                                           | -                                           | -                                            | -                                            | -          |
| Lithium, Total                                     | 0.014                             | IDNR AL                                     | 0.0316 J                                    | 0.0295 J                                    | 0.0291 J                                    | 0.0308 J                                    | 0.0195 J                                    | 0.0251 J                                     | 0.0252 J                                    | ND (0.05)                                   | 0.0291 J                                    | 0.0293 J                                    | 0.0287 J                                     | 0.0296 J                                     | 0.0507     |
| Manganese, Total                                   | 0.3                               | HAL                                         | ND (0.004)                                  | ND (0.005)                                  | 0.00268 J                                   | ND (0.005)                                  | 0.005                                       | ND (0.01)                                    | ND (0.01)                                   | ND (0.01)                                   | ND (0.01)                                   | ND (0.005)                                  | ND (0.005)                                   | ND (0.005)                                   | 0.553      |
| Sodium, Total                                      | 20                                | HAL                                         | 86.9 J+                                     | 67.6                                        | 82.6                                        | 66.2                                        | 73.7                                        | 66.9                                         | 65.6                                        | 77.4                                        | 71                                          | 76.2                                        | 66.7                                         | 69.2                                         | 63.9       |
| Strontium, Stable, Total                           | 4                                 | HAL                                         | 0.336                                       | 0.354                                       | 0.376                                       | 0.315                                       | 0.302                                       | 0.299                                        | 0.283                                       | 0.324                                       | 0.345                                       | 0.349                                       | 0.367                                        | 0.365                                        | 0.719 J-   |
| Other (mg/L)                                       |                                   |                                             |                                             |                                             |                                             |                                             |                                             |                                              |                                             |                                             |                                             |                                             |                                              |                                              |            |
| Ammonia (as N)                                     | 30                                | IDNR AL                                     | 0.12                                        | ND (0.2)                                    | ND (0.2)                                    | ND (0.5)                                    | 0.102 J                                     | ND (0.5)                                     | ND (0.5)                                    | ND (0.2) J                                  | ND (0.5)                                    | ND (0.2)                                    | ND (0.2)                                     | ND (0.2)                                     | 0.267      |
| Chemical Oxygen Demand (COD)                       | -                                 | -                                           | 8.15 J                                      | ND (10)                                     | 9.25 J                                      | 38.9 J+                                     | ND (10)                                     | 33.8                                         | ND (25)                                     | 7.5 J                                       | ND (25)                                     | 5.42 J                                      | 5.62 J                                       | 2.38 J                                       | ND (20)    |
| Chloride                                           | 250                               | SDWR                                        | 29.7                                        | 40.5                                        | 34.3                                        | 43.7                                        | 42.9                                        | 45.5                                         | 45.4                                        | 40                                          | 44.9                                        | 46.7                                        | 48.3                                         | 48.1                                         | 1.4        |
| Fluoride                                           | 4                                 | MCL                                         | 0.479                                       | 0.532                                       | 0.526                                       | 0.524                                       | 0.514                                       | 0.565                                        | 0.564                                       | 0.523                                       | 0.49                                        | 0.499                                       | 0.503                                        | 0.498                                        | 0.36       |
| Sulfate                                            | 250                               | SDWR                                        | 61.3                                        | 40                                          | 63.7                                        | 27.8                                        | 39.8                                        | 26.9                                         | 27.2                                        | 48.7                                        | 24.6                                        | 40                                          | 23.3                                         | 23.4                                         | 45.9       |
| Total Organic Halides (TOX)                        | -                                 | -                                           | -                                           | -                                           | -                                           | 0.0508                                      | -                                           | 0.0588                                       | 0.0599                                      | -                                           | 0.0385 J                                    | -                                           | 0.0183 J                                     | 0.0193 J                                     | -          |
| Total Organic Halides (2)                          | -                                 | -                                           | -                                           | -                                           | -                                           | 0.0501                                      | -                                           | 0.0544                                       | 0.061                                       | -                                           | -                                           | -                                           | 0.0304 J                                     | 0.0317 J                                     | -          |
| Total Organic Halides (3)                          | -                                 | -                                           | -                                           | -                                           | -                                           | -                                           | -                                           | -                                            | -                                           | -                                           | -                                           | -                                           | ND (0.04)                                    | ND (0.04)                                    | -          |
| Total Organic Halogens                             | -                                 | -                                           | -                                           | 0.0678 J                                    | -                                           | 0.0508                                      | -                                           | 0.0588                                       | 0.0599                                      | -                                           | -                                           | -                                           | 0.0183 J                                     | 0.0193 J                                     | -          |
| Total Phenols                                      | 2                                 | IDNR AL                                     | -                                           | ND (0.018)                                  | -                                           | ND (0.0196)                                 | -                                           | ND (0.0184)                                  | ND (0.0192)                                 | -                                           | ND (0.02)                                   | -                                           | ND (0.01)                                    | ND (0.01) J                                  | -          |

Notes:

1. Results in **bold** were detected.

2. ND: Not detected above reporting limit

J: Estimated result

R: Rejected during validation

3. Results exceeding IDNR Action Levels are highlighted gray.

4. HAL: Health Advisory Level (EPA 822-S-12-001; March 2018)

MCL: Maximum Contaminant Level (EPA, May 2009)

SDWR: Secondary Drinking Water Regulation (EPA 822-S-12-001; March 2018)

IDNR AL: Statewide Standards for a Protected Groundwater Source (February 2017)

5. Surface water samples collected in September 2022 were not lab filtered for iron analysis, results are reported as total.

TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | MW-21<br>10/10/2018<br>N<br>UPPER<br>AQUIFER | MW-21<br>04/13/2019<br>N<br>UPPER<br>AQUIFER | MW-21<br>10/01/2019<br>N<br>UPPER<br>AQUIFER | MW-21<br>04/07/2020<br>N<br>UPPER<br>AQUIFER | MW-21<br>04/07/2020<br>FD<br>UPPER<br>AQUIFER | MW-21<br>09/30/2020<br>N<br>UPPER<br>AQUIFER | MW-21<br>04/14/2021<br>N<br>UPPER<br>AQUIFER | MW-21<br>10/12/2021<br>N<br>UPPER<br>AQUIFER | MW-21<br>04/20/2022<br>N<br>UPPER<br>AQUIFER | MW-21<br>09/29/2022<br>N<br>UPPER<br>AQUIFER | MW-21<br>04/18/2023<br>N<br>UPPER<br>AQUIFER | MW-21<br>08/23/2023<br>N<br>UPPER<br>AQUIFER | MW-25<br>04/17/2018<br>N<br>WATER TABLE |
|------------------------------------------------|-----------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------|
| Field Parameters                               |                                   |                                              |                                              |                                              |                                              |                                               |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                         |
| Temperature (Deg C)                            | -                                 | -                                            | 12.59                                        | 11.73                                        | 16.01                                        | 17.78                                         | -                                            | 16.04                                        | 11.72                                        | 17.89                                        | 8.95                                         | 16.30                                        | 17.04                                        | 11.28                                   |
| Conductivity, Field (mS/cm)                    | -                                 | -                                            | 1.056                                        | 0.9                                          | 0.996                                        | 0.75                                          | -                                            | 1.32                                         | 0.816                                        | 0.695                                        | 0.963                                        | 1.04                                         | 0.841                                        | 1.036                                   |
| pH, Field (pH units)                           | 6.5-8.5                           | SDWR                                         | 9.25                                         | 6.63                                         | 6.87                                         | 6.97                                          | -                                            | 6.77                                         | 5.38                                         | 6.66                                         | 4.40                                         | 6.39                                         | 6.97                                         | 5.79                                    |
| Inorganic Compounds (mg/L)                     |                                   |                                              |                                              |                                              |                                              |                                               |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                         |
| Boron, Total                                   | 6                                 | HAL                                          | 0.044 J                                      | 0.0567                                       | 0.0627 J                                     | 0.0375 J                                      | 0.0395 J                                     | 0.0622 J                                     | 0.051 J                                      | ND (0.1)                                     | 0.0691 J                                     | ND (0.1)                                     | 0.0919 J                                     | 0.0652 J                                |
| Iron, Dissolved                                | 0.3                               | SDWR                                         | 0.0356                                       | 0.025 R                                      | ND (0.1)                                     | 0.186                                         | 0.219                                        | ND (0.1)                                     | 0.219                                        | 0.0768 J                                     | 0.246                                        | ND (0.1)                                     | 0.0792 J                                     | ND (0.1)                                |
| Iron, Total <sup>5</sup>                       | 0.3                               | SDWR                                         | -                                            | -                                            | -                                            | -                                             | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                       |
| Lithium, Total                                 | 0.014                             | IDNR AL                                      | 0.066                                        | 0.0442 J                                     | 0.0381 J                                     | 0.0409 J                                      | 0.0387 J                                     | 0.0362 J                                     | 0.0328 J                                     | 0.0401 J                                     | ND (0.05)                                    | 0.035 J                                      | 0.0346 J                                     | 0.0352 J                                |
| Manganese, Total                               | 0.3                               | HAL                                          | 0.0695 J                                     | 0.0676                                       | 0.0475                                       | 0.0436                                        | 0.0459                                       | 0.0486                                       | 0.0512                                       | 0.0217                                       | 0.079                                        | 0.0444                                       | 0.161                                        | 0.0216                                  |
| Sodium, Total                                  | 20                                | HAL                                          | 63.2                                         | 62 J+                                        | 54.2                                         | 54.8                                          | 54.8                                         | 50.1                                         | 51.4                                         | 54.5                                         | 57.2                                         | 51.1                                         | 58                                           | 52.7                                    |
| Strontium, Stable, Total                       | 4                                 | HAL                                          | 0.449                                        | 0.463                                        | 0.441                                        | 0.477                                         | 0.494                                        | 0.41                                         | 0.406                                        | 0.44                                         | 0.464                                        | 0.421                                        | 0.556                                        | 0.458                                   |
| Other (mg/L)                                   |                                   |                                              |                                              |                                              |                                              |                                               |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                         |
| Ammonia (as N)                                 | 30                                | IDNR AL                                      | ND (0.1) J                                   | 0.173                                        | ND (0.2)                                     | ND (0.2)                                      | ND (0.2)                                     | ND (0.5)                                     | ND (0.2)                                     | ND (0.5)                                     | 0.0881 J                                     | ND (0.5)                                     | 0.11 J                                       | ND (0.2)                                |
| Chemical Oxygen Demand (COD)                   | -                                 | -                                            | ND (20)                                      | ND (20)                                      | ND (10)                                      | 6.68 J                                        | 11.3                                         | 36.3 J+                                      | 6.11 J                                       | 26.6                                         | ND (10)                                      | ND (25)                                      | 2.27 J                                       | 3.03 J                                  |
| Chloride                                       | 250                               | SDWR                                         | 1.53                                         | 1.58                                         | 1.86                                         | 2.05                                          | 2.04                                         | 2.2                                          | 2.57                                         | 2.86                                         | 2.98                                         | 3.16                                         | 2.88                                         | 4.18                                    |
| Fluoride                                       | 4                                 | MCL                                          | 0.34                                         | 0.355                                        | 0.393                                        | 0.372                                         | 0.382                                        | 0.393                                        | 0.372                                        | 0.387                                        | 0.392                                        | 0.335                                        | 0.427                                        | 0.297                                   |
| Sulfate                                        | 250                               | SDWR                                         | 31.9                                         | 20.7                                         | 29.1                                         | 19.7                                          | 20.3                                         | 23.5                                         | 18.5                                         | 19.7                                         | 18.2                                         | 17.9                                         | 32.3                                         | 14.9                                    |
| Total Organic Halides (TOX)                    | -                                 | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | 0.0214 J                                     | -                                            | 0.0348 J                                     | -                                            | ND (0.06)                                    | -                                            | ND (0.04)                               |
| Total Organic Halides (2)                      | -                                 | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | 0.0176 J                                     | -                                            | 0.0322 J                                     | -                                            | -                                            | -                                            | ND (0.04)                               |
| Total Organic Halides (3)                      | -                                 | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0141 J                                |
| Total Organic Halogens                         | -                                 | -                                            | ND (0.03)                                    | -                                            | ND (0.01)                                    | -                                             | -                                            | 0.0214 J                                     | -                                            | 0.0348 J                                     | -                                            | -                                            | -                                            | ND (0.04)                               |
| Total Phenols                                  | 2                                 | IDNR AL                                      | ND (0.01)                                    | -                                            | ND (0.02)                                    | -                                             | -                                            | ND (0.02)                                    | -                                            | ND (0.0192)                                  | -                                            | ND (0.02)                                    | -                                            | ND (0.01)                               |

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TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | MW-25<br>04/17/2018<br>FD<br>WATER TABLE | MW-25<br>10/09/2018<br>N<br>WATER TABLE | MW-25<br>10/09/2018<br>FD<br>WATER TABLE | MW-25<br>04/13/2019<br>N<br>WATER TABLE | MW-25<br>04/13/2019<br>FD<br>WATER TABLE | MW-25<br>10/01/2019<br>N<br>WATER TABLE | MW-25<br>10/01/2019<br>FD<br>WATER TABLE | MW-25<br>04/08/2020<br>N<br>WATER TABLE | MW-25<br>10/01/2020<br>N<br>WATER TABLE | MW-25<br>04/14/2021<br>N<br>WATER TABLE | MW-25<br>10/13/2021<br>N<br>WATER TABLE | MW-25<br>04/19/2022<br>N<br>WATER TABLE | MW-25<br>09/29/2022<br>N<br>WATER TABLE |           |
|------------------------------------------------|-----------------------------------|------------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------|
| Field Parameters                               |                                   |                                          |                                         |                                          |                                         |                                          |                                         |                                          |                                         |                                         |                                         |                                         |                                         |                                         |           |
| Temperature (Deg C)                            | -                                 | -                                        | -                                       | 16.38                                    | -                                       | 9.79                                     | -                                       | 18.34                                    | -                                       | 14.27                                   | 15.86                                   | 10.75                                   | 17.05                                   | 11.50                                   | 14.68     |
| Conductivity, Field (mS/cm)                    | -                                 | -                                        | -                                       | 1.156                                    | -                                       | 0.929                                    | -                                       | 1.037                                    | -                                       | 0.96                                    | 1.8                                     | 0.749                                   | 1.065                                   | 1.04                                    | 1.39      |
| pH, Field (pH units)                           | 6.5-8.5                           | SDWR                                     | -                                       | 7.90                                     | -                                       | 6.59                                     | -                                       | 6.97                                     | -                                       | 6.97                                    | 6.32                                    | 5.36                                    | 6.79                                    | 7.13                                    | 6.07      |
| Inorganic Compounds (mg/L)                     |                                   |                                          |                                         |                                          |                                         |                                          |                                         |                                          |                                         |                                         |                                         |                                         |                                         |                                         |           |
| Boron, Total                                   | 6                                 | HAL                                      | 0.143                                   | 0.167                                    | 0.17                                    | 0.163                                    | ND (0.05)                               | 0.234                                    | 0.235                                   | 0.188                                   | 0.278                                   | 0.165                                   | 0.26                                    | 0.198                                   | 0.258     |
| Iron, Dissolved                                | 0.3                               | SDWR                                     | ND (0.025)                              | ND (0.025)                               | ND (0.025)                              | 0.972 R                                  | 1.01                                    | ND (0.1)                                 | ND (0.1)                                | ND (0.1)                                | ND (0.1)                                | ND (0.1)                                | ND (0.1)                                | ND (0.1)                                | ND (0.1)  |
| Iron, Total <sup>5</sup>                       | 0.3                               | SDWR                                     | -                                       | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                       | -                                       | -                                       | -                                       | -                                       | -         |
| Lithium, Total                                 | 0.014                             | IDNR AL                                  | 0.039 J                                 | 0.0737                                   | 0.0657                                  | 0.0273 J                                 | ND (0.05)                               | 0.0442 J                                 | 0.0439 J                                | 0.0358 J                                | 0.0487 J                                | 0.0134 J                                | 0.0429 J                                | ND (0.05)                               | 0.0427 J  |
| Manganese, Total                               | 0.3                               | HAL                                      | 0.0346 J                                | 0.277 J                                  | 0.0556 J                                | 0.0301                                   | 0.00171 J                               | 0.0792                                   | 0.0585                                  | 0.0545                                  | 0.0241                                  | 0.0167                                  | 0.0297                                  | 0.0937                                  | 0.0223    |
| Sodium, Total                                  | 20                                | HAL                                      | 51.5                                    | 85.4                                     | 94.1                                    | 42.3 J+                                  | ND (1)                                  | 50                                       | 50.8                                    | 46.5                                    | 49.8                                    | 26.5                                    | 53                                      | 61.9                                    | 59.5      |
| Strontium, Stable, Total                       | 4                                 | HAL                                      | 0.52 J-                                 | 0.56                                     | 0.564                                   | 0.483                                    | ND (0.05)                               | 0.542                                    | 0.521                                   | 0.541                                   | 0.551                                   | 0.363                                   | 0.592                                   | 0.548                                   | 0.563     |
| Other (mg/L)                                   |                                   |                                          |                                         |                                          |                                         |                                          |                                         |                                          |                                         |                                         |                                         |                                         |                                         |                                         |           |
| Ammonia (as N)                                 | 30                                | IDNR AL                                  | 0.0604 J                                | ND (0.1) J                               | 0.303 J                                 | 0.123                                    | ND (0.1)                                | ND (0.2)                                 | ND (0.2)                                | ND (0.2)                                | ND (0.5)                                | ND (0.2)                                | ND (0.5)                                | ND (0.2) J                              | ND (0.5)  |
| Chemical Oxygen Demand (COD)                   | -                                 | -                                        | 6.74 J+                                 | ND (20)                                  | ND (20)                                 | 6.5 J                                    | ND (20)                                 | 5.63 J                                   | ND (10)                                 | 12.3                                    | ND (25)                                 | 10.7                                    | 35.6                                    | ND (10)                                 | ND (25)   |
| Chloride                                       | 250                               | SDWR                                     | 12.8                                    | 14.5                                     | 14.8                                    | 6.5                                      | ND (1)                                  | 10.4                                     | 10.4                                    | 11.6                                    | 18                                      | 9.36                                    | 22.5                                    | 28.1                                    | 31.5      |
| Fluoride                                       | 4                                 | MCL                                      | 2.44                                    | 1.77                                     | 1.73                                    | 2.53                                     | ND (0.1)                                | 2.01                                     | 1.99                                    | 2.01                                    | 2.09                                    | 3.8                                     | 2.4                                     | 1.56                                    | 2.16      |
| Sulfate                                        | 250                               | SDWR                                     | 61.1                                    | 53.3                                     | 53                                      | 43.2                                     | ND (1)                                  | 49.9                                     | 49.6                                    | 50                                      | 57.3                                    | 40.7                                    | 60.6                                    | 55.3                                    | 57.7      |
| Total Organic Halides (TOX)                    | -                                 | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                       | 0.018 J                                 | -                                       | 0.0444                                  | -                                       | 0.0282 J  |
| Total Organic Halides (2)                      | -                                 | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                       | ND (0.04)                               | -                                       | 0.0483                                  | -                                       | -         |
| Total Organic Halides (3)                      | -                                 | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                        | -                                       | -                                       | -                                       | -                                       | -                                       | -                                       | -         |
| Total Organic Halogens                         | -                                 | -                                        | -                                       | 0.0184 J                                 | 0.0166 J                                | -                                        | -                                       | 0.0165                                   | 0.015                                   | -                                       | 0.018 J                                 | -                                       | 0.0444                                  | -                                       | -         |
| Total Phenols                                  | 2                                 | IDNR AL                                  | -                                       | ND (0.01)                                | ND (0.01)                               | -                                        | -                                       | ND (0.018)                               | ND (0.02)                               | -                                       | ND (0.018)                              | -                                       | ND (0.0196)                             | -                                       | ND (0.02) |

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2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | MW-25<br>04/19/2023<br>N<br>WATER TABLE | MW-25<br>08/24/2023<br>N<br>WATER TABLE | MW-26<br>04/17/2018<br>N<br>UPPER<br>AQUIFER | MW-26<br>10/09/2018<br>N<br>UPPER<br>AQUIFER | MW-26<br>04/13/2019<br>N<br>UPPER<br>AQUIFER | MW-26<br>10/01/2019<br>N<br>UPPER<br>AQUIFER | MW-26<br>04/08/2020<br>N<br>UPPER<br>AQUIFER | MW-26<br>10/01/2020<br>N<br>UPPER<br>AQUIFER | MW-26<br>04/14/2021<br>N<br>UPPER<br>AQUIFER | MW-26<br>10/13/2021<br>N<br>UPPER<br>AQUIFER | MW-26<br>04/19/2022<br>N<br>UPPER<br>AQUIFER | MW-26<br>09/29/2022<br>N<br>UPPER<br>AQUIFER | MW-26<br>04/19/2023<br>N<br>UPPER<br>AQUIFER |           |
|------------------------------------------------|-----------------------------------|-----------------------------------------|-----------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------|
| Field Parameters                               |                                   |                                         |                                         |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |           |
| Temperature (Deg C)                            | -                                 | -                                       | 14.4                                    | 22.86                                        | 13.75                                        | 15.12                                        | 11.89                                        | 18.05                                        | 14.50                                        | 15.41                                        | 14.15                                        | 16.94                                        | 11.70                                        | 13.56                                        | 15.15     |
| Conductivity, Field (mS/cm)                    | -                                 | -                                       | 0.812                                   | 1.2                                          | 2.705                                        | 2.972                                        | 2.854                                        | 2.951                                        | 2.8                                          | 4.86                                         | 2.64                                         | 2.742                                        | 2.86                                         | 3.24                                         | 2.8       |
| pH, Field (pH units)                           | 6.5-8.5                           | SDWR                                    | 7.22                                    | 6.82                                         | 6.29                                         | 7.70                                         | 6.55                                         | 6.71                                         | 6.63                                         | 6.21                                         | 4.99                                         | 6.41                                         | 7.04                                         | 5.92                                         | 6.89      |
| Inorganic Compounds (mg/L)                     |                                   |                                         |                                         |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |           |
| Boron, Total                                   | 6                                 | HAL                                     | 0.207                                   | 0.222                                        | 0.203                                        | 0.104                                        | 0.2                                          | 0.271                                        | 0.273                                        | 0.26                                         | 0.217                                        | 0.177                                        | 0.285                                        | 0.248                                        | 0.358     |
| Iron, Dissolved                                | 0.3                               | SDWR                                    | 0.0711 J                                | ND (0.1)                                     | 0.0186 J                                     | 0.5                                          | 0.025 R                                      | ND (0.1)                                     | 1.25                                         | ND (0.1)                                     | 1.15                                         | 1.58                                         | 1.53                                         | 1.86                                         | 1.85      |
| Iron, Total <sup>5</sup>                       | 0.3                               | SDWR                                    | -                                       | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -         |
| Lithium, Total                                 | 0.014                             | IDNR AL                                 | 0.037 J                                 | 0.044 J                                      | 0.0284 J                                     | ND (0.05)                                    | 0.0325 J                                     | 0.0177 J                                     | 0.0143 J                                     | 0.0287 J                                     | 0.012 J                                      | 0.0147 J                                     | ND (0.05)                                    | 0.021 J                                      | ND (0.05) |
| Manganese, Total                               | 0.3                               | HAL                                     | 0.00376 J                               | 0.00912                                      | 4                                            | 5.14                                         | 2.63                                         | 3.45                                         | 2.62                                         | 3.07                                         | 2.72                                         | 2.5                                          | 2.67                                         | 3.39                                         | 3.35      |
| Sodium, Total                                  | 20                                | HAL                                     | 49.8                                    | 61.1                                         | 89.6                                         | 123                                          | 87 J+                                        | 82.5                                         | 85.7                                         | 81.1                                         | 81.5                                         | 74.7                                         | 81.3                                         | 81.3                                         | 86.7      |
| Strontium, Stable, Total                       | 4                                 | HAL                                     | 0.476                                   | 0.571                                        | 2.16 J-                                      | 2.03                                         | 1.92                                         | 2.1                                          | 2.18                                         | 1.82                                         | 1.7                                          | 1.59                                         | 1.88                                         | 1.92                                         | 2.08      |
| Other (mg/L)                                   |                                   |                                         |                                         |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |           |
| Ammonia (as N)                                 | 30                                | IDNR AL                                 | ND (0.2)                                | ND (0.2)                                     | 1.21                                         | 0.951 J                                      | 0.825                                        | 0.702 J+                                     | 0.921                                        | 1.18                                         | 0.818                                        | 0.93                                         | 1.03 J                                       | 1.32                                         | 1.26      |
| Chemical Oxygen Demand (COD)                   | -                                 | -                                       | 5.42 J                                  | ND (10)                                      | 5.4 J+                                       | ND (20)                                      | 10.8 J                                       | 6.68 J                                       | 56                                           | 37.2 J+                                      | ND (10)                                      | ND (25)                                      | 7.5 J                                        | ND (25)                                      | 3.53 J    |
| Chloride                                       | 250                               | SDWR                                    | 22.1                                    | 34.4                                         | 2.87                                         | 3.06                                         | 2.87                                         | 3                                            | 2.91                                         | 2.9                                          | 2.94                                         | 3.04                                         | 3.04                                         | 2.8                                          | 2.84      |
| Fluoride                                       | 4                                 | MCL                                     | 2.38                                    | 1.83                                         | 0.201                                        | 0.189                                        | 0.37                                         | 0.213                                        | 0.255                                        | 0.234                                        | 0.248                                        | 0.23                                         | 0.245                                        | 0.187                                        | 0.228     |
| Sulfate                                        | 250                               | SDWR                                    | 61.5                                    | 55.8                                         | 1390                                         | 1330                                         | 1420                                         | 1370                                         | 1430                                         | 1410                                         | 1390                                         | 1600                                         | 1440                                         | 1450                                         | 1500      |
| Total Organic Halides (TOX)                    | -                                 | -                                       | -                                       | 0.0341 J                                     | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0724                                       | -                                            | 0.0388 J                                     | -                                            | ND (0.06)                                    | -         |
| Total Organic Halides (2)                      | -                                 | -                                       | -                                       | 0.0302 J                                     | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0727                                       | -                                            | 0.0283 J                                     | -                                            | -                                            | -         |
| Total Organic Halides (3)                      | -                                 | -                                       | -                                       | 0.038 J                                      | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -         |
| Total Organic Halogens                         | -                                 | -                                       | -                                       | 0.0341 J                                     | -                                            | ND (0.03)                                    | -                                            | ND (0.01) J                                  | -                                            | 0.0724                                       | -                                            | 0.0388 J                                     | -                                            | -                                            | -         |
| Total Phenols                                  | 2                                 | IDNR AL                                 | -                                       | ND (0.01)                                    | -                                            | ND (0.01)                                    | -                                            | ND (0.0208)                                  | -                                            | ND (0.0184)                                  | -                                            | ND (0.0204)                                  | -                                            | ND (0.02)                                    | -         |

Notes:

1. Results in **bold** were detected.

2. ND: Not detected above reporting limit

J: Estimated result

R: Rejected during validation

3. Results exceeding IDNR Action Levels are highlighted gray.

4. HAL: Health Advisory Level (EPA 822-S-12-001; March 2018)

MCL: Maximum Contaminant Level (EPA, May 2009)

SDWR: Secondary Drinking Water Regulation (EPA 822-S-12-001; March 2018)

IDNR AL: Statewide Standards for a Protected Groundwater Source (February 2017)

5. Surface water samples collected in September 2022 were not lab filtered for iron analysis, results are reported as total.

TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | IDNR<br>Action<br>Level<br>Source | MW-26<br>08/24/2023<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/18/2018<br>N<br>UPPER<br>AQUIFER | MW-27<br>10/09/2018<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/13/2019<br>N<br>UPPER<br>AQUIFER | MW-27<br>10/01/2019<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/09/2020<br>N<br>UPPER<br>AQUIFER | MW-27<br>10/01/2020<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/14/2021<br>N<br>UPPER<br>AQUIFER | MW-27<br>10/13/2021<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/20/2022<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/20/2022<br>FD<br>UPPER<br>AQUIFER | MW-27<br>09/28/2022<br>N<br>UPPER<br>AQUIFER | MW-27<br>09/28/2022<br>FD<br>UPPER<br>AQUIFER |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------|----------------------------------------------|-----------------------------------------------|-----------------|
| <b>Field Parameters</b><br>Temperature (Deg C)<br>Conductivity, Field (mS/cm)<br>pH, Field (pH units)<br><br><b>Inorganic Compounds (mg/L)</b><br>Boron, Total<br>Iron, Dissolved<br>Iron, Total <sup>5</sup><br>Lithium, Total<br>Manganese, Total<br>Sodium, Total<br>Strontium, Stable, Total<br><br><b>Other (mg/L)</b><br>Ammonia (as N)<br>Chemical Oxygen Demand (COD)<br>Chloride<br>Fluoride<br>Sulfate<br>Total Organic Halides (TOX)<br>Total Organic Halides (2)<br>Total Organic Halides (3)<br>Total Organic Halogens<br>Total Phenols | -                                 | -                                            | <b>23.42</b>                                 | <b>10.28</b>                                 | <b>15.38</b>                                 | <b>11.98</b>                                 | <b>16.39</b>                                 | <b>11.73</b>                                 | <b>14.31</b>                                 | <b>13.26</b>                                 | <b>15.20</b>                                 | <b>11.21</b>                                  | -                                            | <b>13.82</b>                                  | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                 | -                                            | <b>2.94</b>                                  | <b>1.206</b>                                 | <b>1.354</b>                                 | <b>1.312</b>                                 | <b>1.299</b>                                 | <b>1.3</b>                                   | <b>2.11</b>                                  | <b>1.24</b>                                  | <b>0.951</b>                                 | <b>1.32</b>                                   | -                                            | <b>1.46</b>                                   | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.5-8.5                           | SDWR                                         | <b>6.55</b>                                  | <b>6.45</b>                                  | <b>7.61</b>                                  | <b>6.55</b>                                  | <b>6.81</b>                                  | <b>6.55</b>                                  | <b>6.28</b>                                  | <b>5.24</b>                                  | <b>6.66</b>                                  | <b>3.62</b>                                   | -                                            | <b>6.38</b>                                   | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6                                 | HAL                                          | <b>0.275</b>                                 | <b>0.15</b>                                  | <b>0.142</b>                                 | <b>0.152</b>                                 | <b>0.172</b>                                 | <b>0.152</b>                                 | <b>0.177</b>                                 | <b>0.144</b>                                 | <b>0.117</b>                                 | <b>0.153</b>                                  | <b>0.159</b>                                 | <b>0.168</b>                                  | <b>0.159</b>    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.3                               | SDWR                                         | <b>1.94</b>                                  | ND (0.025)                                   | <b>0.377</b>                                 | 0.025 R                                      | ND (0.1)                                     | <b>2.56</b>                                  | ND (0.1)                                     | <b>2.32</b>                                  | <b>2.2</b>                                   | <b>2.62</b>                                   | <b>3.2</b>                                   | <b>2.56</b>                                   | <b>2.53</b>     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.3                               | SDWR                                         | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | -                                             | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.014                             | IDNR AL                                      | ND (0.05)                                    | <b>0.0566</b>                                | <b>0.077</b>                                 | <b>0.0584</b>                                | <b>0.0516</b>                                | <b>0.0466 J</b>                              | <b>0.0525</b>                                | <b>0.041 J</b>                               | <b>0.0391 J</b>                              | ND (0.0556)                                   | ND (0.0543)                                  | <b>0.0479 J</b>                               | <b>0.0411 J</b> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.3                               | HAL                                          | <b>2.83</b>                                  | <b>0.139</b>                                 | <b>0.186</b>                                 | <b>0.138</b>                                 | <b>0.134</b>                                 | <b>0.147</b>                                 | <b>0.128</b>                                 | <b>0.114</b>                                 | <b>0.135</b>                                 | <b>0.131</b>                                  | <b>0.137</b>                                 | <b>0.22</b>                                   | <b>0.233</b>    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 20                                | HAL                                          | <b>83.1</b>                                  | <b>44.8</b>                                  | <b>59.1</b>                                  | <b>46.6 J+</b>                               | <b>41.4</b>                                  | <b>43.6</b>                                  | <b>41.3</b>                                  | <b>40.7</b>                                  | <b>37.7</b>                                  | <b>42.8</b>                                   | <b>43.8</b>                                  | <b>43.4</b>                                   | <b>43.8</b>     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4                                 | HAL                                          | <b>1.97</b>                                  | <b>0.826 J-</b>                              | <b>0.787</b>                                 | <b>0.826</b>                                 | <b>0.828</b>                                 | <b>0.845</b>                                 | <b>0.733</b>                                 | <b>0.681</b>                                 | <b>0.611</b>                                 | <b>0.7</b>                                    | <b>0.726</b>                                 | <b>0.753</b>                                  | <b>0.749</b>    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 30                                | IDNR AL                                      | <b>1.19</b>                                  | <b>1.49</b>                                  | <b>1.52 J</b>                                | <b>1.54</b>                                  | <b>1.82</b>                                  | <b>1.48</b>                                  | <b>1.44</b>                                  | <b>1.42</b>                                  | <b>1.32</b>                                  | <b>1.4 J</b>                                  | <b>1.38 J</b>                                | <b>1.27</b>                                   | <b>1.5</b>      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                 | -                                            | ND (10)                                      | ND (20)                                      | ND (20)                                      | <b>4.14 J</b>                                | ND (10)                                      | <b>7.2 J</b>                                 | <b>30.5 J+</b>                               | ND (10)                                      | ND (25)                                      | ND (10)                                       | ND (10)                                      | <b>42.6</b>                                   | <b>44.9</b>     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 250                               | SDWR                                         | <b>2.85</b>                                  | <b>1.56</b>                                  | <b>1.81</b>                                  | <b>1.61</b>                                  | <b>1.78</b>                                  | <b>1.73</b>                                  | <b>1.79</b>                                  | <b>1.8</b>                                   | <b>1.81</b>                                  | <b>1.79</b>                                   | <b>1.8</b>                                   | <b>1.74</b>                                   | <b>1.77</b>     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4                                 | MCL                                          | <b>0.2</b>                                   | <b>0.29</b>                                  | <b>0.283</b>                                 | <b>0.333</b>                                 | <b>0.34</b>                                  | <b>0.354</b>                                 | <b>0.358</b>                                 | <b>0.391</b>                                 | <b>0.312</b>                                 | <b>0.335</b>                                  | <b>0.334</b>                                 | <b>0.288</b>                                  | <b>0.269</b>    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 250                               | SDWR                                         | <b>1500</b>                                  | <b>263</b>                                   | <b>263</b>                                   | <b>266</b>                                   | <b>268</b>                                   | <b>264</b>                                   | <b>275</b>                                   | <b>264</b>                                   | <b>270</b>                                   | <b>275</b>                                    | <b>262</b>                                   | <b>261</b>                                    | <b>261</b>      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                 | -                                            | ND (0.04)                                    | -                                            | -                                            | -                                            | -                                            | -                                            | <b>0.0175 J</b>                              | -                                            | ND (0.04)                                    | -                                             | -                                            | ND (0.06)                                     | ND (0.06)       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                 | -                                            | ND (0.04)                                    | -                                            | -                                            | -                                            | -                                            | -                                            | <b>0.0142 J</b>                              | -                                            | ND (0.04)                                    | -                                             | -                                            | -                                             | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                 | -                                            | ND (0.04)                                    | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                             | -                                            | -                                             | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                 | -                                            | ND (0.04)                                    | -                                            | <b>0.0139 J</b>                              | -                                            | ND (0.01) J                                  | -                                            | <b>0.0175 J</b>                              | -                                            | ND (0.04)                                    | -                                             | -                                            | -                                             | -               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2                                 | IDNR AL                                      | ND (0.01)                                    | -                                            | ND (0.01)                                    | -                                            | ND (0.0188)                                  | -                                            | ND (0.0184)                                  | -                                            | ND (0.0192)                                  | -                                             | -                                            | ND (0.02)                                     | ND (0.02)       |

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TABLE 8  
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2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | MW-27<br>04/19/2023<br>N<br>UPPER<br>AQUIFER | MW-27<br>04/19/2023<br>FD<br>UPPER<br>AQUIFER | MW-27<br>08/24/2023<br>N<br>UPPER<br>AQUIFER | SW-01<br>04/16/2018<br>N<br>SURFACE<br>WATER | SW-01<br>10/08/2018<br>N<br>SURFACE<br>WATER | SW-01<br>04/13/2019<br>N<br>SURFACE<br>WATER | SW-01<br>09/30/2019<br>N<br>SURFACE<br>WATER | SW-01<br>04/07/2020<br>N<br>SURFACE<br>WATER | SW-01<br>10/02/2020<br>N<br>SURFACE<br>WATER | SW-01<br>04/13/2021<br>N<br>SURFACE<br>WATER | SW-01<br>10/14/2021<br>N<br>SURFACE<br>WATER | SW-01<br>04/19/2022<br>N<br>SURFACE<br>WATER | SW-01<br>09/27/2022<br>N<br>SURFACE<br>WATER |           |
|------------------------------------------------|-----------------------------------|----------------------------------------------|-----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|-----------|
| Field Parameters                               |                                   |                                              |                                               |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |           |
| Temperature (Deg C)                            | -                                 | -                                            | 14.05                                         | -                                            | 19.37                                        | 7.89                                         | 18.67                                        | 9.73                                         | 23.51                                        | 13.50                                        | 15.20                                        | 13.50                                        | 18.45                                        | 7.30                                         | 18.05     |
| Conductivity, Field (mS/cm)                    | -                                 | -                                            | 1.18                                          | -                                            | 1.33                                         | 0.523                                        | 0.486                                        | 0.339                                        | 0.447                                        | 0.446                                        | 0.765                                        | 0.447                                        | 0.482                                        | 0.509                                        | 0.445     |
| pH, Field (pH units)                           | 6.5-8.5                           | SDWR                                         | 6.98                                          | -                                            | 6.59                                         | 7.25                                         | 7.81                                         | 6.66                                         | 7.39                                         | 7.14                                         | 7.09                                         | 7.31                                         | 7.77                                         | 6.82                                         | 7.00      |
| Inorganic Compounds (mg/L)                     |                                   |                                              |                                               |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |           |
| Boron, Total                                   | 6                                 | HAL                                          | 0.183                                         | 0.183                                        | 0.165                                        | 0.253                                        | 0.229                                        | 0.199                                        | 0.239                                        | 0.193                                        | 0.301                                        | 0.2                                          | 0.187                                        | 0.155                                        | 0.251     |
| Iron, Dissolved                                | 0.3                               | SDWR                                         | 3.11                                          | 2.93                                         | 2.34                                         | 0.21                                         | 0.379                                        | 1.35 J+                                      | 0.298                                        | 4.06                                         | ND (0.1)                                     | ND (0.1)                                     | 1.34                                         | ND (0.1)                                     | -         |
| Iron, Total <sup>5</sup>                       | 0.3                               | SDWR                                         | -                                             | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | 1.62      |
| Lithium, Total                                 | 0.014                             | IDNR AL                                      | 0.0553                                        | 0.051                                        | 0.0447 J                                     | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05) |
| Manganese, Total                               | 0.3                               | HAL                                          | 0.153                                         | 0.149                                        | 0.162                                        | 0.375                                        | 0.184                                        | 0.51                                         | 0.275                                        | 0.817                                        | 0.533                                        | 0.254                                        | 0.245                                        | 0.34                                         | 0.572     |
| Sodium, Total                                  | 20                                | HAL                                          | 43.9                                          | 43.6                                         | 43.6                                         | 19.6                                         | 14.8 J                                       | 19.4                                         | 12.3                                         | 19.8                                         | 13.1                                         | 14.3                                         | 16.9                                         | 18.2                                         | 19.7      |
| Strontium, Stable, Total                       | 4                                 | HAL                                          | 0.797                                         | 0.794                                        | 0.764                                        | 0.252                                        | 0.201                                        | 0.209                                        | 0.174                                        | 0.253                                        | 0.206                                        | 0.202                                        | 0.168                                        | 0.23                                         | 0.213     |
| Other (mg/L)                                   |                                   |                                              |                                               |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |           |
| Ammonia (as N)                                 | 30                                | IDNR AL                                      | 1.37                                          | 1.37                                         | 1.37                                         | 0.212                                        | 0.271 J                                      | 0.298 J+                                     | 2.78                                         | 0.281                                        | 0.483 J                                      | 0.17 J                                       | ND (0.5)                                     | 0.147 J                                      | 0.399 J   |
| Chemical Oxygen Demand (COD)                   | -                                 | -                                            | ND (10) J                                     | ND (10) J                                    | ND (10)                                      | 11.5 J                                       | 15.1 J                                       | 4.45 J                                       | 20.3                                         | 20.1                                         | 35.6 J+                                      | 14.3                                         | 42.8                                         | 11                                           | ND (25)   |
| Chloride                                       | 250                               | SDWR                                         | 1.8                                           | 1.79                                         | 1.66                                         | 13.7                                         | 7.22                                         | 18.5                                         | 10.8                                         | 14.5                                         | 8.78                                         | 10.7                                         | 18.6                                         | 13.3                                         | 21.8      |
| Fluoride                                       | 4                                 | MCL                                          | 0.356                                         | 0.362                                        | 0.303                                        | 0.636                                        | 0.374                                        | 0.988                                        | 0.569                                        | 0.944                                        | 1.14                                         | 0.742                                        | 0.842                                        | 0.566                                        | 0.901     |
| Sulfate                                        | 250                               | SDWR                                         | 257                                           | 260                                          | 254                                          | 56.2                                         | 26.3                                         | 27                                           | 37                                           | 29.7                                         | 16.9                                         | 31.3                                         | 33.1                                         | 38                                           | 29.5      |
| Total Organic Halides (TOX)                    | -                                 | -                                            | -                                             | -                                            | 0.0222 J                                     | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0385 J                                     | -                                            | 0.0167 J                                     | -                                            | 0.0212 J  |
| Total Organic Halides (2)                      | -                                 | -                                            | -                                             | -                                            | 0.018 J                                      | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0433                                       | -                                            | ND (0.04)                                    | -                                            | -         |
| Total Organic Halides (3)                      | -                                 | -                                            | -                                             | -                                            | 0.0264 J                                     | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -         |
| Total Organic Halogens                         | -                                 | -                                            | -                                             | -                                            | 0.0222 J                                     | -                                            | ND (0.03)                                    | -                                            | 0.0125 J                                     | -                                            | 0.0385 J                                     | -                                            | 0.0167 J                                     | -                                            | -         |
| Total Phenols                                  | 2                                 | IDNR AL                                      | -                                             | -                                            | ND (0.01)                                    | -                                            | ND (0.01)                                    | -                                            | ND (0.0204)                                  | -                                            | ND (0.0192)                                  | -                                            | ND (0.0196)                                  | -                                            | ND (0.02) |

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2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

|                              | Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level<br>Source | SW-01<br>04/18/2023<br>N<br>SURFACE<br>WATER | SW-01<br>08/22/2023<br>N<br>SURFACE<br>WATER | SW-02<br>04/16/2018<br>N<br>SURFACE<br>WATER | SW-02<br>10/08/2018<br>N<br>SURFACE<br>WATER | SW-02<br>04/13/2019<br>N<br>SURFACE<br>WATER | SW-02<br>09/30/2019<br>N<br>SURFACE<br>WATER | SW-02<br>04/07/2020<br>N<br>SURFACE<br>WATER | SW-02<br>10/02/2020<br>N<br>SURFACE<br>WATER | SW-02<br>04/13/2021<br>N<br>SURFACE<br>WATER | SW-02<br>10/14/2021<br>N<br>SURFACE<br>WATER | SW-02<br>04/19/2022<br>N<br>SURFACE<br>WATER | SW-02<br>09/27/2022<br>N<br>SURFACE<br>WATER | SW-02<br>04/18/2023<br>N<br>SURFACE<br>WATER |
|------------------------------|------------------------------------------------|-----------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| Field Parameters             |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
|                              |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
|                              |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
| Temperature (Deg C)          | -                                              | -                                 | 12.34                                        | 23.77                                        | 8.57                                         | 18.54                                        | 15.94                                        | 23.00                                        | 18.47                                        | 10.25                                        | 9.20                                         | 17.54                                        | 5.12                                         | 15.72                                        | 10.17                                        |
| Conductivity, Field (mS/cm)  | -                                              | -                                 | 0.454                                        | 0.536                                        | 0.79                                         | 0.586                                        | 0.545                                        | 0.355                                        | 0.56                                         | 0.936                                        | 0.547                                        | 0.464                                        | 0.721                                        | 0.33                                         | 0.595                                        |
| pH, Field (pH units)         | 6.5-8.5                                        | SDWR                              | 7.58                                         | 7.19                                         | 6.91                                         | 8.18                                         | 8.18                                         | 9.06                                         | 7.18                                         | 7.18                                         | 8.30                                         | 8.10                                         | 8.48                                         | 8.30                                         | 6.71                                         |
|                              |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
| Inorganic Compounds (mg/L)   |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
| Boron, Total                 | 6                                              | HAL                               | 0.205                                        | 0.528                                        | 0.193                                        | 0.135                                        | 0.167                                        | 0.144                                        | 0.145                                        | 0.224                                        | 0.101                                        | 0.173                                        | 0.0828 J                                     | 0.127                                        | 0.116                                        |
| Iron, Dissolved              | 0.3                                            | SDWR                              | -                                            | 0.276                                        | 0.0319                                       | 0.191                                        | 1.04 J+                                      | ND (0.1)                                     | 1.14                                         | 0.0712 J                                     | ND (0.1)                                     | 0.408                                        | ND (0.1)                                     | -                                            | -                                            |
| Iron, Total <sup>5</sup>     | 0.3                                            | SDWR                              | 1.44                                         | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | 0.359                                        | 0.682                                        |
| Lithium, Total               | 0.014                                          | IDNR AL                           | ND (0.05)                                    | ND (0.05)                                    | 0.0103 J                                     | ND (0.05)                                    | ND (0.05)                                    | 0.0103 J                                     | ND (0.05)                                    | 0.00972 J                                    | ND (0.05)                                    | 0.00794 J                                    | ND (0.05)                                    | ND (0.05)                                    | ND (0.05)                                    |
| Manganese, Total             | 0.3                                            | HAL                               | 0.497                                        | 0.71                                         | 0.506                                        | 0.188                                        | 0.35                                         | 0.091                                        | 0.417                                        | 0.292                                        | 0.0882                                       | 0.195                                        | 0.624                                        | 0.164                                        | 0.741                                        |
| Sodium, Total                | 20                                             | HAL                               | 19.7                                         | 25.2                                         | 71.2                                         | 40.6                                         | 47.9                                         | 24.4                                         | 41                                           | 35.6                                         | 33.9                                         | 33.7                                         | 44.1                                         | 36.4                                         | 39.3                                         |
| Strontium, Stable, Total     | 4                                              | HAL                               | 0.219                                        | 0.165                                        | 0.254                                        | 0.237                                        | 0.258                                        | 0.169                                        | 0.217                                        | 0.203                                        | 0.13                                         | 0.177                                        | 0.255                                        | 0.156                                        | 0.251                                        |
|                              |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
| Other (mg/L)                 |                                                |                                   |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
| Ammonia (as N)               | 30                                             | IDNR AL                           | 0.212                                        | 7.68                                         | 0.452                                        | 0.554 J                                      | 0.381 J+                                     | 0.323 J+                                     | 0.16 J                                       | ND (0.5)                                     | 0.29                                         | ND (0.5)                                     | 0.117 J                                      | 0.307 J                                      | 0.191 J                                      |
| Chemical Oxygen Demand (COD) | -                                              | -                                 | 2.58 J                                       | 5.07 J                                       | 14.4 J                                       | 14.1 J                                       | 16.2 J                                       | 11.8                                         | 36.5                                         | 47.3 J+                                      | 10.2                                         | 41                                           | 18                                           | ND (25)                                      | 6.69 J                                       |
| Chloride                     | 250                                            | SDWR                              | 15.1                                         | 26.1                                         | 13.4 J+                                      | 31.8                                         | 61.7                                         | 27.7                                         | 50                                           | 47.2                                         | 42.1                                         | 46.4                                         | 60.5                                         | 47.6                                         | 48.4                                         |
| Fluoride                     | 4                                              | MCL                               | 0.82                                         | 0.887                                        | 0.505                                        | 0.326                                        | 0.507                                        | 0.382                                        | 0.806                                        | 0.484                                        | 0.332                                        | 0.404                                        | 0.371                                        | 0.416                                        | 0.494                                        |
| Sulfate                      | 250                                            | SDWR                              | 38.8                                         | 69.2                                         | 56.3                                         | 31.4                                         | 35.7                                         | 30.7                                         | 39.2                                         | 25.3                                         | 32                                           | 34.9                                         | 38.9                                         | 37.4                                         | 40                                           |
| Total Organic Halides (TOX)  | -                                              | -                                 | -                                            | 0.0208 J                                     | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0669                                       | -                                            | 0.0439                                       | -                                            | 0.0271 J                                     | -                                            |
| Total Organic Halides (2)    | -                                              | -                                 | -                                            | 0.0265 J                                     | -                                            | -                                            | -                                            | -                                            | -                                            | 0.0635                                       | -                                            | 0.0475                                       | -                                            | -                                            | -                                            |
| Total Organic Halides (3)    | -                                              | -                                 | -                                            | 0.015 J                                      | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            | -                                            |
| Total Organic Halogens       | -                                              | -                                 | -                                            | 0.0208 J                                     | -                                            | 0.0162 J                                     | -                                            | 0.015                                        | -                                            | 0.0669                                       | -                                            | 0.0439                                       | -                                            | -                                            | -                                            |
| Total Phenols                | 2                                              | IDNR AL                           | -                                            | ND (0.01)                                    | -                                            | ND (0.01)                                    | -                                            | ND (0.0204)                                  | -                                            | ND (0.0188)                                  | -                                            | ND (0.018)                                   | -                                            | ND (0.02)                                    | -                                            |

Notes:

1. Results in **bold** were detected.

2. ND: Not detected above reporting limit

J: Estimated result

R: Rejected during validation

3. Results exceeding IDNR Action Levels are highlighted gray.

4. HAL: Health Advisory Level (EPA 822-S-12-001; March 2018)

MCL: Maximum Contaminant Level (EPA, May 2009)

SDWR: Secondary Drinking Water Regulation (EPA 822-S-12-001; March 2018)

IDNR AL: Statewide Standards for a Protected Groundwater Source (February 2017)

5. Surface water samples collected in September 2022 were not lab filtered for iron analysis, results are reported as total.

TABLE 8  
SUMMARY OF ANALYTICAL RESULTS  
2023 ANNUAL GROUNDWATER MONITORING REPORT  
AMSTED - KEOKUK, IOWA

| Location<br>Sample Date<br>Sample Type<br>Unit | IDNR<br>Action<br>Level | Action<br>Level<br>Source | SW-02<br>08/22/2023<br>N<br>SURFACE<br>WATER |
|------------------------------------------------|-------------------------|---------------------------|----------------------------------------------|
| Field Parameters                               |                         |                           |                                              |
| Temperature (Deg C)                            | -                       | -                         | 27.59                                        |
| Conductivity, Field (mS/cm)                    | -                       | -                         | 0.745                                        |
| pH, Field (pH units)                           | 6.5-8.5                 | SDWR                      | 7.96                                         |
| Inorganic Compounds (mg/L)                     |                         |                           |                                              |
| Boron, Total                                   | 6                       | HAL                       | 0.267                                        |
| Iron, Dissolved                                | 0.3                     | SDWR                      | ND (0.1)                                     |
| Iron, Total <sup>5</sup>                       | 0.3                     | SDWR                      | -                                            |
| Lithium, Total                                 | 0.014                   | IDNR AL                   | ND (0.05)                                    |
| Manganese, Total                               | 0.3                     | HAL                       | 0.229                                        |
| Sodium, Total                                  | 20                      | HAL                       | 35.2                                         |
| Strontium, Stable, Total                       | 4                       | HAL                       | 0.223                                        |
| Other (mg/L)                                   |                         |                           |                                              |
| Ammonia (as N)                                 | 30                      | IDNR AL                   | 0.134 J                                      |
| Chemical Oxygen Demand (COD)                   | -                       | -                         | ND (10)                                      |
| Chloride                                       | 250                     | SDWR                      | 49.7                                         |
| Fluoride                                       | 4                       | MCL                       | 0.561                                        |
| Sulfate                                        | 250                     | SDWR                      | 30.6                                         |
| Total Organic Halides (TOX)                    | -                       | -                         | 0.0257 J                                     |
| Total Organic Halides (2)                      | -                       | -                         | 0.0329 J                                     |
| Total Organic Halides (3)                      | -                       | -                         | 0.0184 J                                     |
| Total Organic Halogens                         | -                       | -                         | 0.0257 J                                     |
| Total Phenols                                  | 2                       | IDNR AL                   | ND (0.01)                                    |

- Notes:
- 1. Results in **bold** were detected.
  - 2. ND: Not detected above reporting limit  
J: Estimated result  
R: Rejected during validation
  - 3. Results exceeding IDNR Action Levels are highlighted gray.
  - 4. HAL: Health Advisory Level (EPA 822-S-12-001; March 2018)  
MCL: Maximum Contaminant Level (EPA, May 2009)  
SDWR: Secondary Drinking Water Regulation (EPA 822-S-12-001; March 2018)  
IDNR AL: Statewide Standards for a Protected Groundwater Source (February 2017)
  - 5. Surface water samples collected in September 2022 were not lab filtered for iron analysis, results are reported as total.

TABLE 9  
HISTORICAL CONTROL LIMIT & ACTION LEVEL EXCEEDANCES  
2023 ANNUAL WATER QUALITY REPORT  
GRIFFIN WHEEL - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Key: 1 = exceeds control limit; 2 = exceeds action level |                        | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L |
|----------------------------------------------------------|------------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|
| Well                                                     | Constituent            | 2018                       | 2018             | 2019                       | 2019             | 2020                       | 2020             | 2021                       | 2021             | 2022                       | 2022             | 2023                       | 2023             |
| MW-5                                                     | Manganese              |                            | 1                |                            |                  | 1                          | 1                |                            |                  |                            | 1                |                            |                  |
|                                                          | Lithium                | 2                          | 1&2              | 2                          | 2                | 2                          | 2                | 2                          | 2                |                            | 2                | 2                          | 2                |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | pH (Field)             | 2                          | 2                |                            |                  |                            | 2                | 1&2                        |                  | 1&2                        | 2                |                            |                  |
| MW-6                                                     | Chemical Oxygen Demand |                            |                  |                            |                  |                            | 1                |                            | 1                |                            |                  |                            |                  |
|                                                          | Lithium                | 2                          |                  | 2                          | 2                |                            |                  |                            |                  |                            |                  |                            |                  |
|                                                          | Manganese              | 1&2                        | 1                | 1&2                        | 1&2              | 1                          | 1                | 1                          | 1                | 1                          | 1                |                            | 1                |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | Temperature            |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            | 1                |
|                                                          | pH (Field)             | 2                          |                  |                            |                  |                            |                  | 2                          | 2                |                            | 1&2              |                            |                  |
| MW-7                                                     | Ammonia                |                            | 1                |                            | 1                |                            | 1                | 1                          | 1                | 1                          | 1                |                            | 1                |
|                                                          | Boron                  | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Chemical Oxygen Demand |                            |                  |                            |                  | 1                          | 1                |                            |                  |                            |                  |                            |                  |
|                                                          | Conductivity (Field)   | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Temperature (Field)    |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            | 1                |
|                                                          | Iron                   |                            |                  |                            |                  | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Lithium                | 1&2                        | 1&2              | 1&2                        | 2                | 2                          | 2                | 2                          | 2                | 1&2                        | 2                | 2                          | 2                |
|                                                          | Manganese              |                            | 1&2              |                            | 1&2              | 2                          | 2                | 2                          | 2                | 1&2                        | 2                |                            | 2                |
|                                                          | pH (Field)             |                            | 2                |                            |                  |                            |                  | 2                          |                  |                            | 2                |                            |                  |
|                                                          | Sodium                 | 2                          | 1&2              | 1&2                        | 2                | 2                          | 2                | 2                          | 2                | 1&2                        | 2                | 2                          | 2                |
|                                                          | Strontium              | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Sulfate                | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Total Organic Halogens |                            |                  |                            |                  |                            | 1                |                            |                  |                            |                  |                            |                  |
| MW-12                                                    | Lithium                | 2                          |                  | 2                          |                  |                            |                  |                            |                  |                            |                  |                            |                  |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | pH (Field)             | 2                          |                  |                            |                  |                            | 2                |                            |                  | 2                          | 2                |                            |                  |
| MW-16                                                    | Lithium                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | pH (Field)             | 2                          | 2                |                            |                  |                            | 2                |                            |                  | 2                          |                  |                            |                  |
|                                                          | Iron                   |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  | 2                          |                  |
|                                                          | Manganese              | 2                          |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |
| MW-20                                                    | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | Lithium                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |                            | 2                | 2                          | 2                |
|                                                          | pH (Field)             | 2                          | 2                |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |
| MW-21                                                    | Lithium                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |                            | 2                | 2                          | 2                |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | pH (Field)             | 2                          | 2                |                            |                  |                            |                  | 2                          |                  | 2                          | 2                |                            |                  |
|                                                          | Manganese              | 2                          |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |
| MW-25                                                    | Boron                  |                            | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Conductivity (Field)   |                            |                  |                            |                  |                            | 1                |                            |                  |                            | 1                |                            |                  |
|                                                          | Fluoride               | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | pH (Field)             | 2                          |                  |                            |                  |                            | 2                | 2                          |                  |                            | 2                |                            |                  |
|                                                          | Temperature (Field)    |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            | 1                |
|                                                          | Lithium                | 2                          | 1&2              | 2                          | 2                | 2                          | 2                |                            | 2                |                            | 2                | 2                          | 2                |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | Chemical Oxygen Demand |                            |                  |                            |                  |                            |                  |                            | 1                |                            |                  |                            |                  |
|                                                          | Sulfate                | 1                          |                  |                            |                  |                            |                  |                            |                  |                            |                  | 1                          |                  |
|                                                          | Manganese              |                            | 1                |                            | 1                |                            |                  |                            |                  | 1                          |                  |                            |                  |
| MW-26                                                    | Ammonia                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Boron                  | 1                          |                  | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Chemical Oxygen Demand |                            |                  |                            |                  | 1                          |                  |                            |                  |                            |                  |                            |                  |
|                                                          | Conductivity (Field)   | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Temperature (Field)    |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            | 1                |
|                                                          | Iron                   |                            | 1&2              |                            |                  | 1&2                        |                  | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Manganese              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Lithium                | 2                          |                  | 2                          | 2                | 2                          | 2                |                            | 2                |                            | 2                |                            |                  |
|                                                          | pH (Field)             | 2                          |                  |                            |                  |                            | 2                | 2                          | 2                |                            | 2                |                            |                  |
|                                                          | Sodium                 | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Strontium              | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Sulfate                | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Total Organic Halogens |                            |                  |                            |                  |                            | 1                |                            |                  |                            | 1                |                            |                  |

TABLE 9  
HISTORICAL CONTROL LIMIT & ACTION LEVEL EXCEEDANCES  
2023 ANNUAL WATER QUALITY REPORT  
GRIFFIN WHEEL - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Key: 1 = exceeds control limit; 2 = exceeds action level |                        | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L | S<br>P<br>R<br>I<br>N<br>G | F<br>A<br>L<br>L |
|----------------------------------------------------------|------------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|----------------------------|------------------|
| Well                                                     | Constituent            | 2018                       | 2018             | 2019                       | 2019             | 2020                       | 2020             | 2021                       | 2021             | 2022                       | 2022             | 2023                       | 2023             |
| MW-27                                                    | Ammonia                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Boron                  | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Chemical Oxygen Demand |                            |                  |                            |                  |                            |                  |                            |                  |                            | 1                |                            |                  |
|                                                          | Conductivity (Field)   |                            | 1                |                            |                  |                            | 1                |                            |                  |                            | 1                |                            | 1                |
|                                                          | Iron                   |                            | 2                |                            |                  | 1&2                        |                  | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Lithium                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |                            | 2                | 2                          | 2                |
|                                                          | Manganese              |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |
|                                                          | pH (Field)             | 2                          |                  |                            |                  |                            | 2                | 2                          |                  | 1&2                        |                  | 2                          |                  |
|                                                          | Strontium              | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Sodium                 | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                | 2                          | 2                |
|                                                          | Total Organic Halogens |                            |                  |                            |                  |                            |                  |                            |                  |                            | 1                |                            |                  |
|                                                          | Sulfate                | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
| SW-1                                                     | Iron                   |                            | 2                | 2                          |                  | 2                          |                  |                            | 2                |                            | 2                | 2                          |                  |
|                                                          | Sodium                 |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            | 2                |
|                                                          | Manganese              | 2                          |                  | 2                          |                  | 2                          | 2                |                            |                  | 2                          | 2                | 2                          | 2                |
| SW-2                                                     | Chemical Oxygen Demand |                            |                  |                            |                  |                            | 1                |                            |                  |                            |                  |                            |                  |
|                                                          | Chloride               | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                | 1                          | 1                |
|                                                          | Conductivity (Field)   | 1                          |                  |                            |                  |                            | 1                |                            |                  |                            |                  |                            | 1                |
|                                                          | Iron                   |                            |                  | 2                          |                  | 2                          |                  |                            | 2                |                            | 2                | 2                          |                  |
|                                                          | Manganese              | 2                          |                  | 2                          |                  | 2                          |                  |                            |                  | 2                          |                  | 2                          |                  |
|                                                          | Temperature (Field)    |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |                            |                  |
|                                                          | pH (Field)             |                            | 1                | 1                          | 1&2              |                            |                  | 1                          | 1                | 1                          | 1                |                            | 1                |
|                                                          | Sodium                 | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              | 1&2                        | 1&2              |
|                                                          | Total Organic Halogens |                            |                  |                            |                  |                            | 1                |                            | 1                |                            |                  |                            |                  |

If the control limit and action level are both exceeded, the box is highlighted in black.

**TABLE 10**  
**GROUNDWATER QUALITY ASSESSMENT PLAN TREND ANALYSIS**  
 2023 ANNUAL WATER QUALITY REPORT  
 AMSTED - KEOKUK, IOWA  
 PERMIT NO. 56-SDP-15-89-91C

| Well  | Current SSL | Trend <sup>1</sup> |
|-------|-------------|--------------------|
| MW-5  | Lithium     | Stable             |
|       | Sodium      | Stable             |
| MW-6  | Lithium     | Stable             |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |
| MW-7  | Iron        | Stable             |
|       | Lithium     | Decreasing         |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |
|       | Sulfate     | Increasing         |
| MW-12 | Lithium     | Stable             |
|       | Sodium      | Decreasing         |
| MW-16 | Iron        | Increasing         |
|       | Lithium     | Decreasing         |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |
| MW-20 | Lithium     | Stable             |
|       | Sodium      | Stable             |
| MW-21 | Lithium     | Decreasing         |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |
| MW-25 | Lithium     | Stable             |
|       | Sodium      | Stable             |
| MW-26 | Iron        | Increasing         |
|       | Lithium     | Stable             |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |
|       | Sulfate     | Increasing         |
| MW-27 | Iron        | Increasing         |
|       | Lithium     | Stable             |
|       | Sodium      | Stable             |
|       | Sulfate     | Stable             |
| SW-1  | Iron        | Stable             |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |
| SW-2  | Iron        | Stable             |
|       | Manganese   | Stable             |
|       | Sodium      | Stable             |

**Notes:**

SSL: Statistically Significant Level above groundwater protection standard

1: Two tailed trend analysis (Mann-Kendall) test performed at 95% confidence interval.

**TABLE 11**  
**LEACHATE MANAGEMENT SUMMARY**  
2023 ANNUAL WATER QUALITY REPORT  
AMSTED - KEOKUK, IOWA  
PERMIT NO. 56-SDP-15-89-91C

| Month                                                       | Maximum Head on Liner (ft) | Leachate Collected (gal) | Volume Utilized for<br>Dust Control (gal) | Discharge to |
|-------------------------------------------------------------|----------------------------|--------------------------|-------------------------------------------|--------------|
| Leachate management system is not applicable for this Site. |                            |                          |                                           |              |

**TABLE 12****GAS MONITORING SUMMARY**

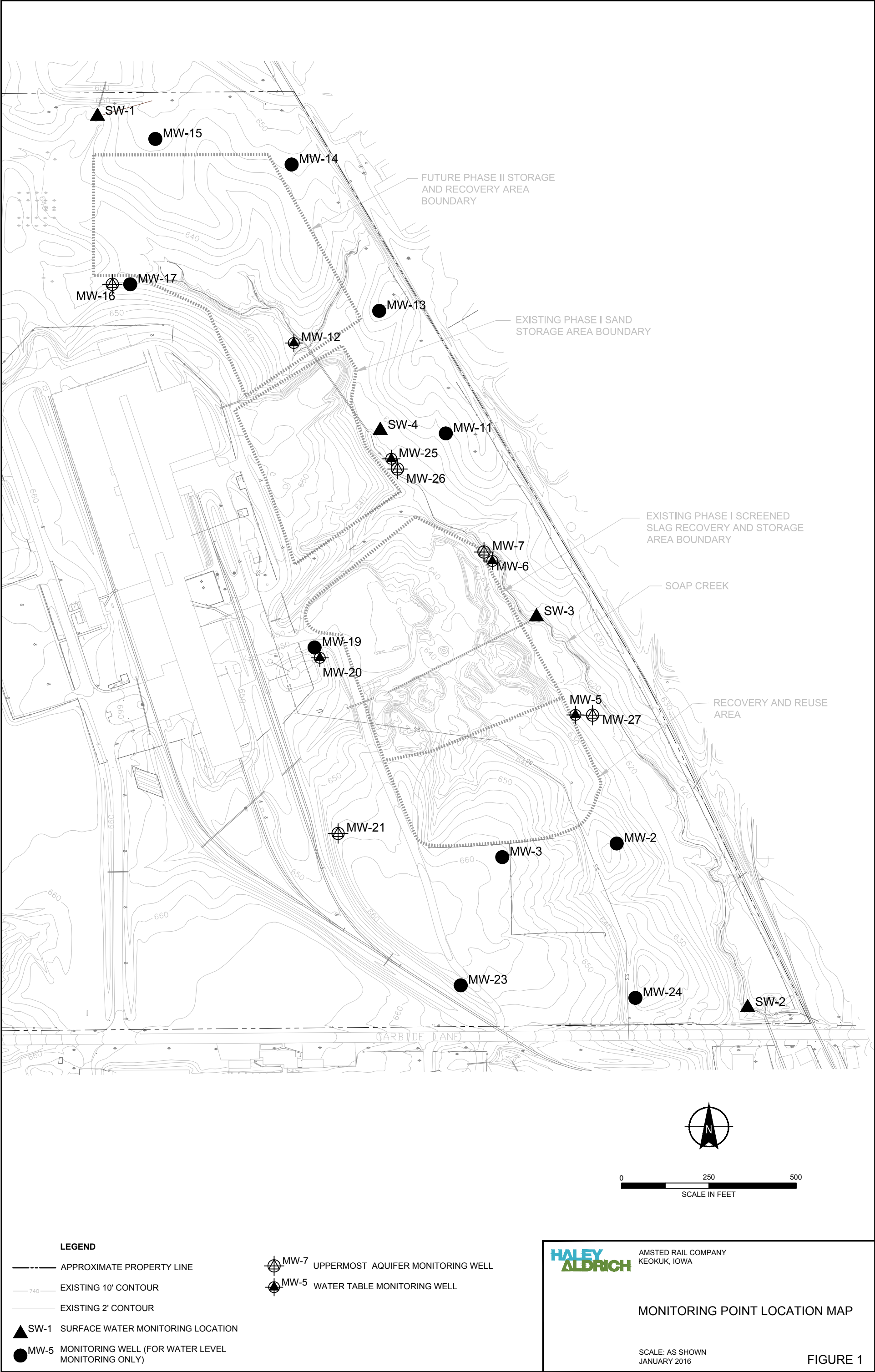
2023 ANNUAL WATER QUALITY REPORT

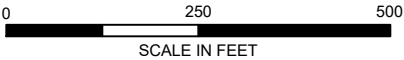
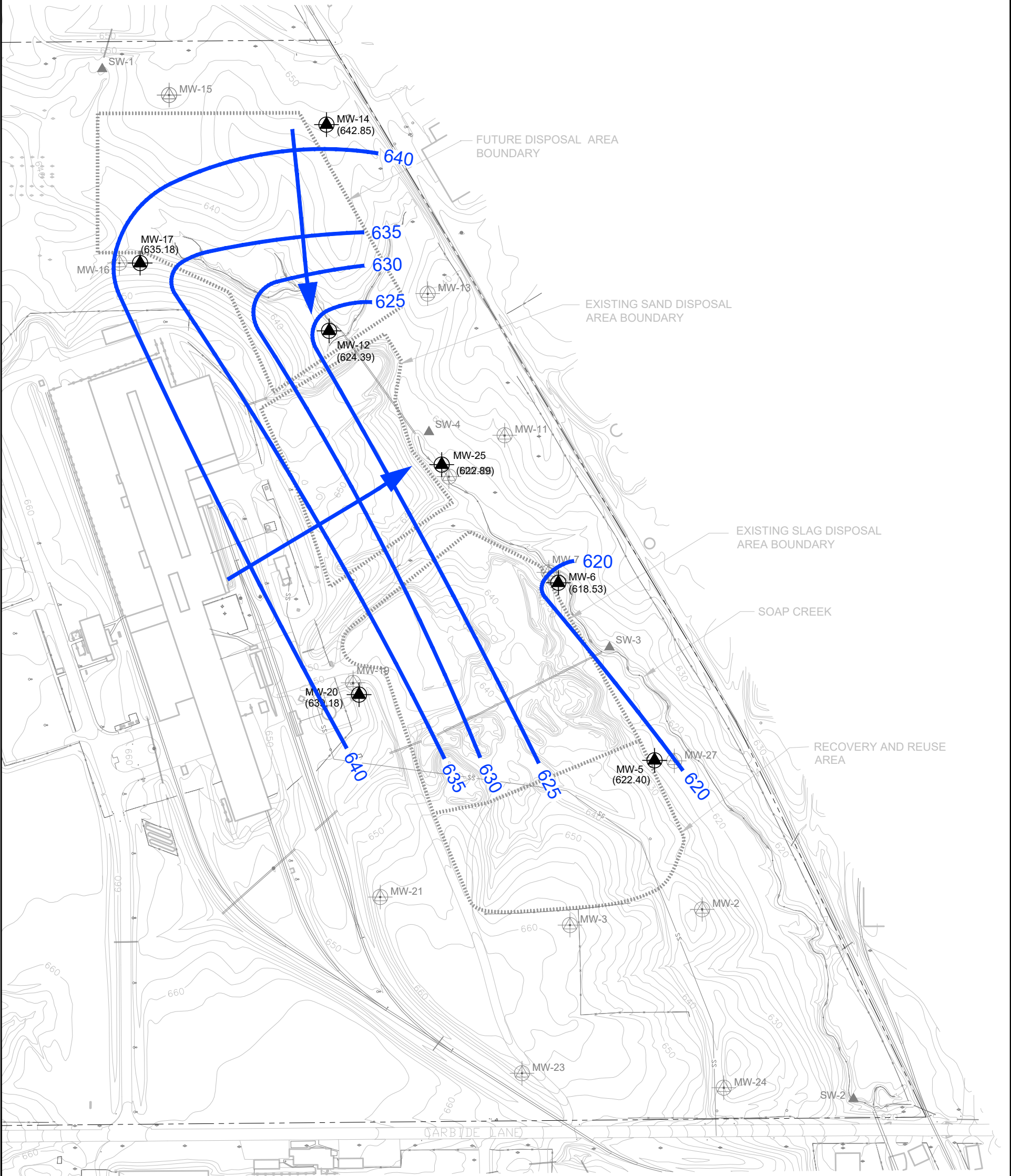
AMSTED - KEOKUK, IOWA

PERMIT NO. 56-SDP-15-89-91C

| Monitoring Points                               |      |             | Methane Results (% LEL) |
|-------------------------------------------------|------|-------------|-------------------------|
| Name                                            | Type | Description | Date                    |
| Gas monitoring is not applicable for this Site. |      |             |                         |

## FIGURES





LEGEND

- |  |                                                |  |                                                |
|--|------------------------------------------------|--|------------------------------------------------|
|  | APPROXIMATE PROPERTY LINE                      |  | WATER TABLE MONITORING WELL                    |
|  | EXISTING 10' CONTOUR                           |  | UPPER MOST AQUIFER MONITORING WELL (NOT USED)  |
|  | EXISTING 2' CONTOUR                            |  | GROUNDWATER ELEVATION (MEASURED 18 APRIL 2023) |
|  | POTENTIOMETRIC SURFACE CONTOUR (INTERVAL 5 FT) |  | SURFACE WATER MONITORING LOCATION              |
|  | INFERRED SURFACE CONTOUR                       |  |                                                |
|  | GROUNDWATER FLOW DIRECTION                     |  |                                                |

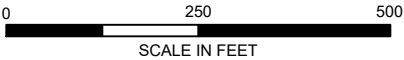
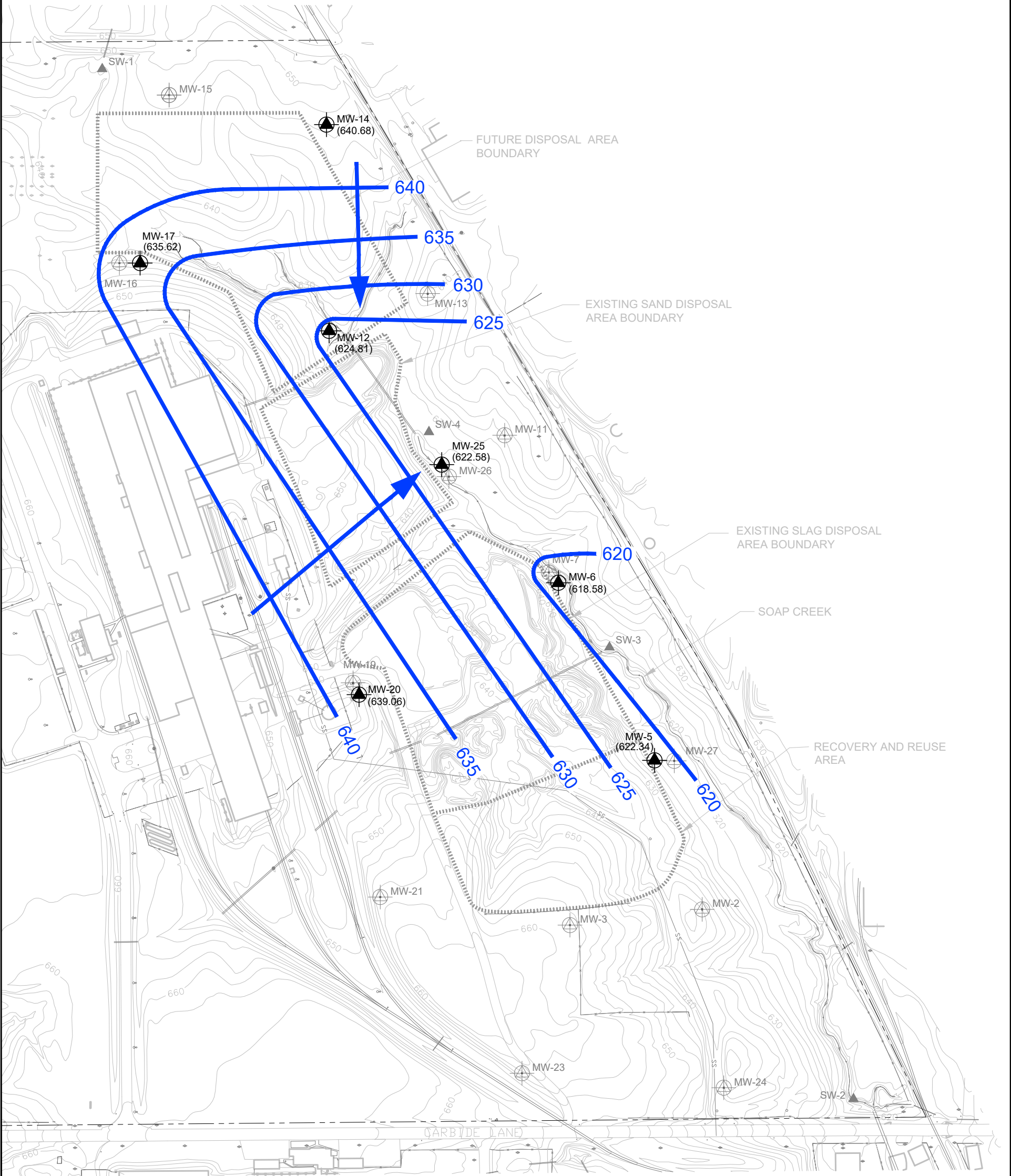


AMSTED RAIL COMPANY  
KEOKUK PLANT  
KEOKUK, IOWA

WATER TABLE ELEVATIONS  
APRIL 2023

SCALE: AS SHOWN  
SEPTEMBER 2023

FIGURE 2



LEGEND

- |  |                                                |  |                                                 |
|--|------------------------------------------------|--|-------------------------------------------------|
|  | APPROXIMATE PROPERTY LINE                      |  | WATER TABLE MONITORING WELL                     |
|  | EXISTING 10' CONTOUR                           |  | UPPER MOST AQUIFER MONITORING WELL (NOT USED)   |
|  | EXISTING 2' CONTOUR                            |  | GROUNDWATER ELEVATION (MEASURED 22 AUGUST 2023) |
|  | POTENTIOMETRIC SURFACE CONTOUR (INTERVAL 5 FT) |  | SURFACE WATER MONITORING LOCATION               |
|  | INFERRED SURFACE CONTOUR                       |  |                                                 |
|  | GROUNDWATER FLOW DIRECTION                     |  |                                                 |

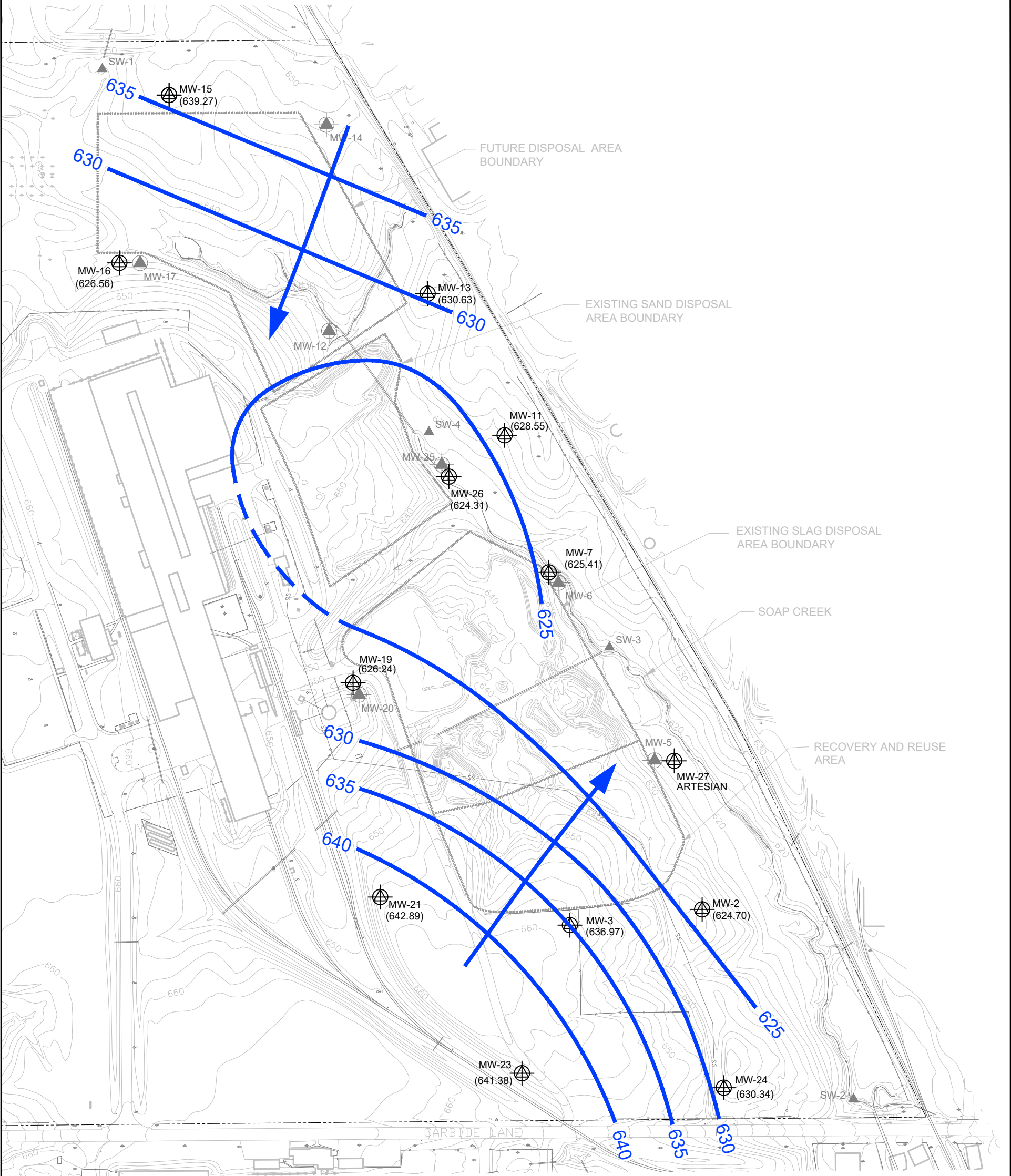


AMSTED RAIL COMPANY  
KEOKUK PLANT  
KEOKUK, IOWA

WATER TABLE ELEVATIONS  
AUGUST 2023

SCALE: AS SHOWN  
SEPTEMBER 2023

FIGURE 3



0 250 500  
SCALE IN FEET

LEGEND

- |  |                                                |  |          |                                    |
|--|------------------------------------------------|--|----------|------------------------------------|
|  | APPROXIMATE PROPERTY LINE                      |  | MW-5     | WATER TABLE MONITORING WELL        |
|  | EXISTING 10' CONTOUR                           |  | MW-24    | UPPER MOST AQUIFER MONITORING WELL |
|  | EXISTING 2' CONTOUR                            |  | (630.24) | GROUNDWATER ELEVATION (MSL)        |
|  | POTENTIOMETRIC SURFACE CONTOUR (INTERVAL 5 FT) |  | (630.24) | GROUNDWATER ELEVATION (MSL)        |
|  | INFERRED SURFACE CONTOUR                       |  | SW-2     | SURFACE WATER MONITORING LOCATION  |
|  | GROUNDWATER FLOW DIRECTION                     |  |          |                                    |

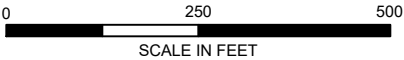
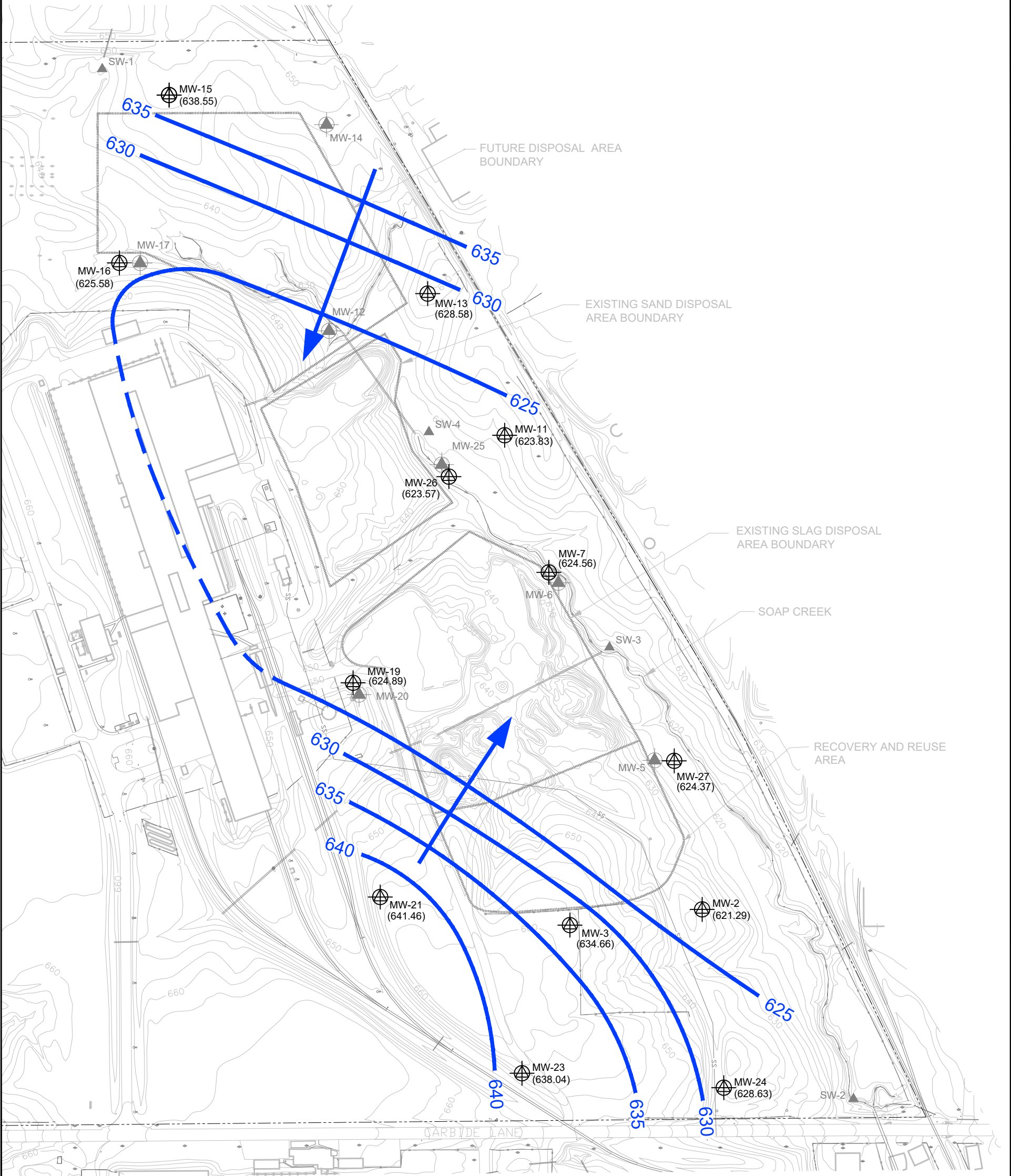
HALEY  
ALDRICH

AMSTED RAIL COMPANY  
KEOKUK PLANT  
KEOKUK, IOWA

UPPER MOST AQUIFER ELEVATIONS  
APRIL 2023

SCALE: AS SHOWN  
SEPTEMBER 2023

FIGURE 4



LEGEND

- |  |                                                |  |                                                 |
|--|------------------------------------------------|--|-------------------------------------------------|
|  | APPROXIMATE PROPERTY LINE                      |  | WATER TABLE MONITORING WELL                     |
|  | EXISTING 10' CONTOUR                           |  | UPPER MOST AQUIFER MONITORING WELL              |
|  | EXISTING 2' CONTOUR                            |  |                                                 |
|  | POTENTIOMETRIC SURFACE CONTOUR (INTERVAL 5 FT) |  | GROUNDWATER ELEVATION (MEASURED 22 AUGUST 2023) |
|  | INFERRED SURFACE CONTOUR                       |  |                                                 |
|  | GROUNDWATER FLOW DIRECTION                     |  | SURFACE WATER MONITORING LOCATION               |



AMSTED RAIL COMPANY  
KEOKUK PLANT  
KEOKUK, IOWA

UPPER MOST AQUIFER ELEVATIONS  
AUGUST 2023

SCALE: AS SHOWN  
SEPTEMBER 2023

FIGURE 5

## **APPENDIX A**

### **IDNR Sampling Forms**

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-5                        |                       |
| Upgradient                                                 | Downgradient XX       |
| Name of person sampling R. Elwer                           |                       |

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>A. MONITORING WELL/PIEZOMETER CONDITIONS</b> |                                                                     |
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

|                                                                               |                 |                                        |                       |
|-------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------|
| <b>B. GROUNDWATER ELEVATION MEASUREMENT (<math>\pm</math> 0.01 foot, MSL)</b> |                 |                                        |                       |
| Elevation:                                                                    |                 |                                        |                       |
| Top of inner well casing 625.07                                               |                 | Ground Elevation 622.60                |                       |
| Depth of Well 20.00                                                           |                 | Inside Casing Diameter (in inches) 2.0 |                       |
| Equipment Used Solonist Water Level Meter                                     |                 |                                        |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL):          |                 |                                        |                       |
|                                                                               | Date/Time       | Depth to Groundwater                   | Groundwater Elevation |
| Before Purging                                                                | 18-APR-23, 0855 | 2.67                                   |                       |
| *After Purging                                                                | 19-APR-23, 1023 | 5.38                                   |                       |
| *Before Purging                                                               | 19-APR-23, 0948 | 2.62                                   |                       |

|                                                                                       |                      |
|---------------------------------------------------------------------------------------|----------------------|
| <b>*C. WELL PURGING</b>                                                               |                      |
| Quantity of Water Removed from Well (gallons) 1                                       |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Cloudy, 60 deg F       |             |
| Field Measurements (after stabilization): |             |
| Temperature 13.41                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 6.98                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.693                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                                      |                     |
|--------------------------------------|---------------------|
| <b>Signature</b> <i>Raegen Elver</i> | <b>Date</b> 4/19/23 |
|--------------------------------------|---------------------|

|                               |                         |                                                                                   |
|-------------------------------|-------------------------|-----------------------------------------------------------------------------------|
| <b>Telephone</b> 614-353-8403 | <b>Fax</b> 937-384-9946 | <b>Email</b> <a href="mailto:relwer@haleyaldrich.com">relwer@haleyaldrich.com</a> |
|-------------------------------|-------------------------|-----------------------------------------------------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

06/2011 cmz

DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-6                        |                       |
| Upgradient                                                 | Downgradient XX       |
| Name of person sampling K. Lindenschmidt                   |                       |

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>A. MONITORING WELL/PIEZOMETER CONDITIONS</b> |                                                                     |
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

|                                                                               |                 |                                        |                       |
|-------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------|
| <b>B. GROUNDWATER ELEVATION MEASUREMENT (<math>\pm</math> 0.01 foot, MSL)</b> |                 |                                        |                       |
| Elevation:                                                                    |                 |                                        |                       |
| Top of inner well casing 627.76                                               |                 | Ground Elevation 624.00                |                       |
| Depth of Well 23.46                                                           |                 | Inside Casing Diameter (in inches) 2.0 |                       |
| Equipment Used Solonist Water Level Meter                                     |                 |                                        |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL):          |                 |                                        |                       |
|                                                                               | Date/Time       | Depth to Groundwater                   | Groundwater Elevation |
| Before Purging                                                                | 19-APR-22, 0932 | 8.30                                   | 619.46                |
| *After Purging                                                                | 20-APR-22, 0931 | 12.72                                  | 611.28                |
| *Before Purging                                                               | 20-APR-22, 0851 | 8.44                                   | 615.56                |

|                                                                                       |                              |
|---------------------------------------------------------------------------------------|------------------------------|
| <b>*C. WELL PURGING</b>                                                               |                              |
| Quantity of Water Removed from Well (gallons) 1.2                                     |                              |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                              |
| Was well pumped/bailed dry? No                                                        |                              |
| Equipment used:                                                                       |                              |
| Bailer type NA                                                                        | Dedicated Bailer? NA 4/19/23 |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes          |
| If not dedicated, method of cleaning Not Applicable                                   |                              |

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



# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-7                        |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> K. Lindenschmidt                   |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                                               |                      |                       |
|----------------------------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                               |                      |                       |
| <b>Top of inner well casing</b> 626.06                               | <b>Ground Elevation</b> 624.10                |                      |                       |
| <b>Depth of Well</b> 60.00                                           | <b>Inside Casing Diameter (in inches)</b> 2.0 |                      |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                                               |                      |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                                               |                      |                       |
|                                                                      | Date/Time                                     | Depth to Groundwater | Groundwater Elevation |
| <b>Before Purging</b>                                                | 19-APR-22, 0930                               | 0.92                 | 625.14                |
| <b>*After Purging</b>                                                | 20-APR-22, 1052                               | 1.70                 | 624.36                |
| <b>*Before Purging</b>                                               | 20-APR-22, 1012                               | 0.89                 | 625.17                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 2.6                                     |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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



# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-12                       |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                 |                                               |                       |
|----------------------------------------------------------------------|-----------------|-----------------------------------------------|-----------------------|
| Elevation:                                                           |                 |                                               |                       |
| <b>Top of inner well casing</b> 633.27                               |                 | <b>Ground Elevation</b> 630.70                |                       |
| <b>Depth of Well</b> 20.00                                           |                 | <b>Inside Casing Diameter (in inches)</b> 2.0 |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                 |                                               |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                 |                                               |                       |
|                                                                      | Date/Time       | Depth to Groundwater                          | Groundwater Elevation |
| <b>Before Purging</b>                                                | 18-APR-23, 0920 | 8.88                                          |                       |
| <b>*After Purging</b>                                                | 18-APR-23, 1520 | 8.71                                          |                       |
| <b>*Before Purging</b>                                               | 18-APR-23, 1440 | 6.84                                          |                       |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 1                                       |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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



# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-16                       |                       |
| Upgradient XX                                              | Downgradient          |
| Name of person sampling F. Reed                            |                       |

| A. MONITORING WELL/PIEZOMETER CONDITIONS        |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                                        |                      |                       |
|----------------------------------------------------------------------|----------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                        |                      |                       |
| Top of inner well casing 640.50                                      | Ground Elevation 637.20                |                      |                       |
| Depth of Well 46.37                                                  | Inside Casing Diameter (in inches) 2.0 |                      |                       |
| Equipment Used Solonist Water Level Meter                            |                                        |                      |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                                        |                      |                       |
|                                                                      | Date/Time                              | Depth to Groundwater | Groundwater Elevation |
| Before Purging                                                       | 18-APR-23, 0919                        | 13.94                |                       |
| *After Purging                                                       | 18-APR-23, 1800                        | 24.11                |                       |
| *Before Purging                                                      | 18-APR-23, 1625                        | 13.93                |                       |

| *C. WELL PURGING                                                                      |                      |
|---------------------------------------------------------------------------------------|----------------------|
| Quantity of Water Removed from Well (gallons) 2                                       |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 65 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 14.65                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 7.35                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.819                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

| Comments                 |
|--------------------------|
|                          |
| Sample MW-16-041823-1800 |
| DO (mg/l): 3.62          |
| ORP (mV): 69             |
| Turbidity (NTU): 10.0    |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |

| CERTIFICATION                                                                                                                                                  |                  |                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|
| I certify under penalty of law I believe the information reported above is true, accurate and complete.                                                        |                  |                              |
| Signature <i>Francis Reed</i>                                                                                                                                  |                  | Date 4/18/23                 |
| Telephone 614-288-8619                                                                                                                                         | Fax 937-384-9946 | Email freed@haleyaldrich.com |
| <b>NOTE:</b> Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round. |                  |                              |

\*Omit if only measuring groundwater elevations.

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-20                       |                              |
| <b>Upgradient</b> XX                                              | <b>Downgradient</b>          |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                 |                                               |                       |
|----------------------------------------------------------------------|-----------------|-----------------------------------------------|-----------------------|
| Elevation:                                                           |                 |                                               |                       |
| <b>Top of inner well casing</b> 650.39                               |                 | <b>Ground Elevation</b> 648.50                |                       |
| <b>Depth of Well</b> 30.10                                           |                 | <b>Inside Casing Diameter (in inches)</b> 2.0 |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                 |                                               |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                 |                                               |                       |
|                                                                      | Date/Time       | Depth to Groundwater                          | Groundwater Elevation |
| <b>Before Purging</b>                                                | 18-APR-23, 0830 | 11.21                                         |                       |
| <b>*After Purging</b>                                                | 19-APR-23, 0930 | 11.58                                         |                       |
| <b>*Before Purging</b>                                               | 19-APR-23, 0835 | 11.12                                         |                       |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 2                                       |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

|                                                  |                    |
|--------------------------------------------------|--------------------|
| <b>*D. FIELD MEASUREMENT</b>                     |                    |
| <b>Weather Conditions</b> Cloudy, 60 deg F       |                    |
| <b>Field Measurements (after stabilization):</b> |                    |
| <b>Temperature</b> 13.71                         | <b>Units</b> Deg C |
| <b>Equipment Used</b> Horiba U-52                |                    |
| <b>pH</b> 7.25                                   |                    |
| <b>Equipment Used</b> Horiba U-52                |                    |
| <b>Specific Conductance</b> 0.802                | <b>Units</b> mS/cm |
| <b>Equipment Used</b> Horiba U-52                |                    |

[illegible]

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

|                               |              |
|-------------------------------|--------------|
| Signature <i>Francis Reed</i> | Date 4/19/23 |
|-------------------------------|--------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

06/2011 cmz

DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-21                       |                              |
| <b>Upgradient</b> XX                                              | <b>Downgradient</b>          |
| <b>Name of person sampling</b> R. Elwer                           |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                 |                                               |                       |
|----------------------------------------------------------------------|-----------------|-----------------------------------------------|-----------------------|
| Elevation:                                                           |                 |                                               |                       |
| <b>Top of inner well casing</b> 660.72                               |                 | <b>Ground Elevation</b> 658.00                |                       |
| <b>Depth of Well</b> 66.65                                           |                 | <b>Inside Casing Diameter (in inches)</b> 2.0 |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                 |                                               |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                 |                                               |                       |
|                                                                      | Date/Time       | Depth to Groundwater                          | Groundwater Elevation |
| <b>Before Purging</b>                                                | 19-APR-22, 0900 | 17.79                                         | 642.93                |
| <b>*After Purging</b>                                                | 20-APR-22, 1255 | 20.93                                         | 639.79                |
| <b>*Before Purging</b>                                               | 20-APR-22, 1145 | 18.08                                         | 642.67                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 2                                       |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Rain, 45 deg F         |             |
| Field Measurements (after stabilization): |             |
| Temperature 8.95                          | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 4.40                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.963                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                                     |                     |
|-------------------------------------|---------------------|
| <b>Signature</b> <i>Raegen Ewer</i> | <b>Date</b> 4/20/23 |
|-------------------------------------|---------------------|

|                               |                         |                                                                                   |
|-------------------------------|-------------------------|-----------------------------------------------------------------------------------|
| <b>Telephone</b> 614-353-8403 | <b>Fax</b> 937-384-9946 | <b>Email</b> <a href="mailto:relwer@haleyaldrich.com">relwer@haleyaldrich.com</a> |
|-------------------------------|-------------------------|-----------------------------------------------------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

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DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-25                       |                       |
| Upgradient                                                 | Downgradient XX       |
| Name of person sampling F. Reed                            |                       |

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>A. MONITORING WELL/PIEZOMETER CONDITIONS</b> |                                                                     |
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

|                                                                               |                 |                                        |                       |
|-------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------|
| <b>B. GROUNDWATER ELEVATION MEASUREMENT (<math>\pm</math> 0.01 foot, MSL)</b> |                 |                                        |                       |
| Elevation:                                                                    |                 |                                        |                       |
| Top of inner well casing 631.77                                               |                 | Ground Elevation 628.56                |                       |
| Depth of Well 18.54                                                           |                 | Inside Casing Diameter (in inches) 2.0 |                       |
| Equipment Used Solonist Water Level Meter                                     |                 |                                        |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL):          |                 |                                        |                       |
|                                                                               | Date/Time       | Depth to Groundwater                   | Groundwater Elevation |
| Before Purging                                                                | 18-APR-23,      | 8.88                                   |                       |
| *After Purging                                                                | 19-APR-23, 1120 | 9.23                                   |                       |
| *Before Purging                                                               | 19-APR-23, 1045 | 8.89                                   |                       |

|                                                                                       |                      |
|---------------------------------------------------------------------------------------|----------------------|
| <b>*C. WELL PURGING</b>                                                               |                      |
| Quantity of Water Removed from Well (gallons) 1                                       |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Cloudy, 60 deg F       |             |
| Field Measurements (after stabilization): |             |
| Temperature 14.40                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 7.22                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.812                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                               |              |
|-------------------------------|--------------|
| Signature <i>Francis Reed</i> | Date 4/19/23 |
|-------------------------------|--------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

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DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-26                       |                       |
| Upgradient                                                 | Downgradient XX       |
| Name of person sampling F. Reed                            |                       |

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>A. MONITORING WELL/PIEZOMETER CONDITIONS</b> |                                                                     |
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

|                                                                               |                 |                                        |                       |
|-------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------|
| <b>B. GROUNDWATER ELEVATION MEASUREMENT (<math>\pm 0.01</math> foot, MSL)</b> |                 |                                        |                       |
| Elevation:                                                                    |                 |                                        |                       |
| Top of inner well casing 631.03                                               |                 | Ground Elevation 628.29                |                       |
| Depth of Well 48.45                                                           |                 | Inside Casing Diameter (in inches) 2.0 |                       |
| Equipment Used Solonist Water Level Meter                                     |                 |                                        |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL):          |                 |                                        |                       |
|                                                                               | Date/Time       | Depth to Groundwater                   | Groundwater Elevation |
| Before Purging                                                                | 18-APR-23, 0907 | 6.72                                   |                       |
| *After Purging                                                                | 19-APR-23, 1255 | 10.60                                  |                       |
| *Before Purging                                                               | 19-APR-23, 1200 | 6.68                                   |                       |

|                                                                                       |                      |
|---------------------------------------------------------------------------------------|----------------------|
| <b>*C. WELL PURGING</b>                                                               |                      |
| Quantity of Water Removed from Well (gallons) 1                                       |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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



# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-27                       |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> R. Elwer                           |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain Hinge on riser is broken                |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                                               |                      |                       |
|----------------------------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                               |                      |                       |
| <b>Top of inner well casing</b> 624.57                               | <b>Ground Elevation</b> 622.20                |                      |                       |
| <b>Depth of Well</b> 41.80                                           | <b>Inside Casing Diameter (in inches)</b> 2.0 |                      |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                                               |                      |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                                               |                      |                       |
|                                                                      | Date/Time                                     | Depth to Groundwater | Groundwater Elevation |
| <b>Before Purging</b>                                                | 18-APR-23, 1147                               | Artesian             | 624.57                |
| <b>*After Purging</b>                                                | 19-APR-23, 0856                               | Artesian             | 624.57                |
| <b>*Before Purging</b>                                               | 19-APR-23, 0826                               | Artesian             | 624.57                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 1.1                                     |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Rain, 45 deg F         |             |
| Field Measurements (after stabilization): |             |
| Temperature 14.05                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 6.98                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 1.18                 | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                                      |                     |
|--------------------------------------|---------------------|
| <b>Signature</b> <i>Raegen Elver</i> | <b>Date</b> 4/19/23 |
|--------------------------------------|---------------------|

|                               |                         |                                      |
|-------------------------------|-------------------------|--------------------------------------|
| <b>Telephone</b> 614-353-8403 | <b>Fax</b> 937-384-9946 | <b>Email</b> relwer@haleyaldrich.com |
|-------------------------------|-------------------------|--------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

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DNR Form 542-1322

# SURFACE WATER SAMPLING FORM

|                                                                   |                                 |
|-------------------------------------------------------------------|---------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-15-89P |
| <b>Surface Monitoring Point No.</b> SW-1                          | <b>Date/Time</b> 4-19-22 1045   |
| <b>Name of person sampling</b> K. Lindenschmidt                   |                                 |

## A. TYPE OF MONITORING POINT

|                                                   |                                                  |
|---------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> <b>Stream</b> | <input type="checkbox"/> <b>Open Tile</b>        |
| <input type="checkbox"/> <b>Road Ditch</b>        | <input type="checkbox"/> <b>Tile with Riser</b>  |
| <input type="checkbox"/> <b>Drainage Ditch</b>    | <input type="checkbox"/> <b>Other (describe)</b> |

## B. PURPOSE OF MONITORING POINT

|                                                     |                                                  |
|-----------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> <b>Upstream</b> | <input type="checkbox"/> <b>Downstream</b>       |
| <input type="checkbox"/> <b>Within Landfill</b>     | <input type="checkbox"/> <b>Other (describe)</b> |

## C. MONITORING POINT CONDITIONS

|                                                          |                                                                                   |
|----------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>General description/condition of monitoring point</b> |                                                                                   |
| Soap Creek as it enters site                             |                                                                                   |
|                                                          |                                                                                   |
| <b>Was monitoring point dry?</b> No                      | <b>Too little water to sample?</b> No                                             |
| <b>Was water flowing?</b>                                | <input checked="" type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> |
| <b>If yes, estimate quantity</b>                         | <b>If yes, estimate depth</b> 1 FOOT                                              |
| <b>Was water discolored?</b>                             | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                  |                                                                                   |
| <b>Does water have odor?</b>                             | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                  |                                                                                   |
| <b>Was ground discolored?</b>                            | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                  |                                                                                   |
| <b>Litter present?</b>                                   | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                  |                                                                                   |

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

**Weather Conditions** Sunny ~45

**Field Measurements (after stabilization):**

| Temperature 7.30 | Units deg C |
|------------------|-------------|
|------------------|-------------|

**Equipment Used Horiba U-52**

#### D. FIELD MEASUREMENT (continued)

|                            |
|----------------------------|
| Equipment Used Horiba U-52 |
|----------------------------|

| Specific Conditions 0.509 | Units mS/cm |
|---------------------------|-------------|
|---------------------------|-------------|

**Equipment Used Horiba U-52**

Sample SW-1-041922-1045

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[illegible]

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4/

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

|                                   |              |
|-----------------------------------|--------------|
| Signature <i>K. Lindenschmidt</i> | Date 4/19/23 |
|-----------------------------------|--------------|

|                                     |                  |                                       |
|-------------------------------------|------------------|---------------------------------------|
| Signature: <i>K. Klindenschmidt</i> |                  | Date: 11/1/12                         |
| Telephone 513.546.3668              | Fax 037.384.0046 | Email klindenschmidt@holaveldrich.com |

**NOTE:** Attach 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points.

|                             |  |  |  |
|-----------------------------|--|--|--|
| One map per sampling round. |  |  |  |
|-----------------------------|--|--|--|

|                             |  |  |  |
|-----------------------------|--|--|--|
| One map per sampling round. |  |  |  |
|-----------------------------|--|--|--|

# SURFACE WATER SAMPLING FORM

|                                                            |                          |
|------------------------------------------------------------|--------------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-15-89P |
| Surface Monitoring Point No. SW-2                          | Date/Time 4-19-22 1000   |
| Name of person sampling K. Lindenschmidt                   |                          |

## A. TYPE OF MONITORING POINT

|                                            |                                           |
|--------------------------------------------|-------------------------------------------|
| <input checked="" type="checkbox"/> Stream | <input type="checkbox"/> Open Tile        |
| <input type="checkbox"/> Road Ditch        | <input type="checkbox"/> Tile with Riser  |
| <input type="checkbox"/> Drainage Ditch    | <input type="checkbox"/> Other (describe) |

## B. PURPOSE OF MONITORING POINT

|                                          |                                                |
|------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Upstream        | <input checked="" type="checkbox"/> Downstream |
| <input type="checkbox"/> Within Landfill | <input type="checkbox"/> Other (describe)      |

## C. MONITORING POINT CONDITIONS

|                                                   |                                                                     |
|---------------------------------------------------|---------------------------------------------------------------------|
| General description/condition of monitoring point |                                                                     |
| Soap Creek before it exits site                   |                                                                     |
|                                                   |                                                                     |
| Was monitoring point dry? No                      | Too little water to sample? No                                      |
| Was water flowing?                                | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, estimate quantity                         | If yes, estimate depth                                              |
| Was water discolored?                             | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, describe                                  |                                                                     |
| Does water have odor?                             | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, describe                                  |                                                                     |
| Was ground discolored?                            | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, describe                                  |                                                                     |
| Litter present?                                   | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If yes, describe Plastic drinking bottles         |                                                                     |

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

**D. FIELD MEASUREMENT**

Weather Conditions Sunny ~45 deg F

**Field Measurements (after stabilization):**

Temperature 5.12

Units deg C

Equipment Used Horiba U-52

**D. FIELD MEASUREMENT (continued)**

pH 8.48

Equipment Used Horiba U-52

Specific Conditions 0.721

Units mS/cm

Equipment Used Horiba U-52

**Comments**

Sample SW-2-041922-1000

**CERTIFICATION**

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

Signature *K. Lindenschmidt*

Date 4/19/23

Telephone 513-546-3668

Fax 937-384-9946

Email [klindenschmidt@haleyaldrich.com](mailto:klindenschmidt@haleyaldrich.com)**NOTE:** Attach 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points.  
One map per sampling round.

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-5                        |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                 |                                               |                       |
|----------------------------------------------------------------------|-----------------|-----------------------------------------------|-----------------------|
| Elevation:                                                           |                 |                                               |                       |
| <b>Top of inner well casing</b> 625.07                               |                 | <b>Ground Elevation</b> 622.60                |                       |
| <b>Depth of Well</b> 20.00                                           |                 | <b>Inside Casing Diameter (in inches)</b> 2.0 |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                 |                                               |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                 |                                               |                       |
|                                                                      | Date/Time       | Depth to Groundwater                          | Groundwater Elevation |
| <b>Before Purging</b>                                                | 22-AUG-23, 1141 | 2.73                                          | 622.34                |
| <b>*After Purging</b>                                                | 24-AUG-23, 1850 | 6.13                                          | 618.94                |
| <b>*Before Purging</b>                                               | 24-AUG-23, 1800 | 2.76                                          | 622.31                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 1.188                                   |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 20.68                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 6.66                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.772                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                               |              |
|-------------------------------|--------------|
| Signature <i>Francis Reed</i> | Date 8/24/23 |
|-------------------------------|--------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

06/2011 cmz

DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-6                        |                       |
| Upgradient                                                 | Downgradient XX       |
| Name of person sampling F. Reed                            |                       |

| A. MONITORING WELL/PIEZOMETER CONDITIONS        |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                                        |                      |                       |
|----------------------------------------------------------------------|----------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                        |                      |                       |
| Top of inner well casing 627.76                                      | Ground Elevation 624.00                |                      |                       |
| Depth of Well 23.46                                                  | Inside Casing Diameter (in inches) 2.0 |                      |                       |
| Equipment Used Solonist Water Level Meter                            |                                        |                      |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                                        |                      |                       |
|                                                                      | Date/Time                              | Depth to Groundwater | Groundwater Elevation |
| Before Purging                                                       | 22-AUG-23; 1200                        | 9.18                 | 618.58                |
| *After Purging                                                       | 23-AUG-23, 1915                        | 12.72                | 615.04                |
| *Before Purging                                                      | 23-AUG-23, 1820                        | 9.23                 | 618.53                |

| *C. WELL PURGING                                                                      |                      |
|---------------------------------------------------------------------------------------|----------------------|
| Quantity of Water Removed from Well (gallons) 1.188                                   |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 28.77                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 7.25                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.774                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                               |              |
|-------------------------------|--------------|
| Signature <i>Francis Reed</i> | Date 8/23/23 |
|-------------------------------|--------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

06/2011 cmz

DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-7                        |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                 |                                               |                       |
|----------------------------------------------------------------------|-----------------|-----------------------------------------------|-----------------------|
| Elevation:                                                           |                 |                                               |                       |
| <b>Top of inner well casing</b> 626.06                               |                 | <b>Ground Elevation</b> 624.10                |                       |
| <b>Depth of Well</b> 60.00                                           |                 | <b>Inside Casing Diameter (in inches)</b> 2.0 |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                 |                                               |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                 |                                               |                       |
|                                                                      | Date/Time       | Depth to Groundwater                          | Groundwater Elevation |
| <b>Before Purging</b>                                                | 22-AUG-23, 1156 | 1.50                                          | 624.56                |
| <b>*After Purging</b>                                                | 23-AUG-23, 1750 | 1.68                                          | 624.38                |
| <b>*Before Purging</b>                                               | 23-AUG-23, 1710 | 1.44                                          | 624.62                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 0.792                                   |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 28.99                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 7.15                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 2.48                 | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                               |              |
|-------------------------------|--------------|
| Signature <i>Francis Reed</i> | Date 8/23/23 |
|-------------------------------|--------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

06/2011 cmz

DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-12                       |                       |
| Upgradient                                                 | Downgradient XX       |
| Name of person sampling F. Reed                            |                       |

| A. MONITORING WELL/PIEZOMETER CONDITIONS        |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                                        |                      |                       |
|----------------------------------------------------------------------|----------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                        |                      |                       |
| Top of inner well casing 633.27                                      | Ground Elevation 630.70                |                      |                       |
| Depth of Well 20.00                                                  | Inside Casing Diameter (in inches) 2.0 |                      |                       |
| Equipment Used Solonist Water Level Meter                            |                                        |                      |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                                        |                      |                       |
|                                                                      | Date/Time                              | Depth to Groundwater | Groundwater Elevation |
| Before Purging                                                       | 22-AUG-23, 1305                        | 8.46                 | 624.81                |
| *After Purging                                                       | 24-AUG-23, 1705                        | 10.38                | 622.89                |
| *Before Purging                                                      | 24-AUG-23, 1620                        | 8.63                 | 624.64                |

| *C. WELL PURGING                                                                      |                      |
|---------------------------------------------------------------------------------------|----------------------|
| Quantity of Water Removed from Well (gallons) 0.924                                   |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 95 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 20.95                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 6.71                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.867                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

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

|                               |              |
|-------------------------------|--------------|
| Signature <i>Francis Reed</i> | Date 8/24/23 |
|-------------------------------|--------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

\*Omit if only measuring groundwater elevations.

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

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-16                       |                       |
| Upgradient XX                                              | Downgradient          |
| Name of person sampling F. Reed                            |                       |

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>A. MONITORING WELL/PIEZOMETER CONDITIONS</b> |                                                                     |
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

|                                                                               |                 |                                        |                       |
|-------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------|
| <b>B. GROUNDWATER ELEVATION MEASUREMENT (<math>\pm</math> 0.01 foot, MSL)</b> |                 |                                        |                       |
| Elevation:                                                                    |                 |                                        |                       |
| Top of inner well casing 640.50                                               |                 | Ground Elevation 637.20                |                       |
| Depth of Well 46.37                                                           |                 | Inside Casing Diameter (in inches) 2.0 |                       |
| Equipment Used Solonist Water Level Meter                                     |                 |                                        |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL):          |                 |                                        |                       |
|                                                                               | Date/Time       | Depth to Groundwater                   | Groundwater Elevation |
| Before Purging                                                                | 22-AUG-23, 1250 | 14.92                                  | 625.58                |
| *After Purging                                                                | 24-AUG-23, 1540 | 38.02                                  | 602.48                |
| *Before Purging                                                               | 24-AUG-23, 1625 | 14.94                                  | 625.56                |

|                                                                                       |                      |
|---------------------------------------------------------------------------------------|----------------------|
| <b>*C. WELL PURGING</b>                                                               |                      |
| Quantity of Water Removed from Well (gallons) 3.569                                   |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 21.28                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 6.82                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.963                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

| Comments                 |
|--------------------------|
|                          |
| Sample MW-16-082423-1540 |
| DO (mg/l): 2.02          |
| ORP (mV): 13             |
| Turbidity (NTU): 0.0     |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |
|                          |

| CERTIFICATION                                                                                                                                           |                  |                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|
| I certify under penalty of law I believe the information reported above is true, accurate and complete.                                                 |                  |                              |
| Signature <i>Francis Reed</i>                                                                                                                           |                  | Date 8/24/23                 |
| Telephone 614-288-8619                                                                                                                                  | Fax 937-384-9946 | Email freed@haleyaldrich.com |
| NOTE: Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round. |                  |                              |

\*Omit if only measuring groundwater elevations.

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Site Name Amsted Foundry Materials Recovery and Reuse Area | Permit No. 56-SDP-89P |
| Monitoring Well/Piezometer No. MW-20                       |                       |
| Upgradient XX                                              | Downgradient          |
| Name of person sampling F. Reed                            |                       |

|                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| <b>A. MONITORING WELL/PIEZOMETER CONDITIONS</b> |                                                                     |
| Well/Piezometer Properly Capped? (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                  |                                                                     |
| Standing Water or Litter? (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                 |                                                                     |

|                                                                               |                 |                                        |                       |
|-------------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------|
| <b>B. GROUNDWATER ELEVATION MEASUREMENT (<math>\pm</math> 0.01 foot, MSL)</b> |                 |                                        |                       |
| Elevation:                                                                    |                 |                                        |                       |
| Top of inner well casing 650.39                                               |                 | Ground Elevation 648.50                |                       |
| Depth of Well 30.10                                                           |                 | Inside Casing Diameter (in inches) 2.0 |                       |
| Equipment Used Solonist Water Level Meter                                     |                 |                                        |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL):          |                 |                                        |                       |
|                                                                               | Date/Time       | Depth to Groundwater                   | Groundwater Elevation |
| Before Purging                                                                | 22-AUG-23, 0945 | 11.33                                  | 639.06                |
| *After Purging                                                                | 23-AUG-23, 1515 | 11.61                                  | 638.78                |
| *Before Purging                                                               | 23-AUG-23, 1430 | 11.16                                  | 639.23                |

|                                                                                       |                      |
|---------------------------------------------------------------------------------------|----------------------|
| <b>*C. WELL PURGING</b>                                                               |                      |
| Quantity of Water Removed from Well (gallons) 0.924                                   |                      |
| No. of Well Volumes (based on current water level) Not applicable - low flow sampling |                      |
| Was well pumped/bailed dry? No                                                        |                      |
| Equipment used:                                                                       |                      |
| Bailer type NA                                                                        | Dedicated Bailer? NA |
| Pump type Bladder Pump                                                                | Dedicated Pump? Yes  |
| If not dedicated, method of cleaning Not Applicable                                   |                      |

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

|                                                  |                    |
|--------------------------------------------------|--------------------|
| <b>*D. FIELD MEASUREMENT</b>                     |                    |
| <b>Weather Conditions</b> Sunny, 90 deg F        |                    |
| <b>Field Measurements (after stabilization):</b> |                    |
| <b>Temperature</b> 26.75                         | <b>Units</b> Deg C |
| <b>Equipment Used</b> Horiba U-52                |                    |
| <b>pH</b> 7.40                                   |                    |
| <b>Equipment Used</b> Horiba U-52                |                    |
| <b>Specific Conductance</b> 0.802                | <b>Units</b> mS/cm |
| <b>Equipment Used</b> Horiba U-52                |                    |

[illegible]

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

|                                      |                     |
|--------------------------------------|---------------------|
| <b>Signature</b> <i>Francis Reed</i> | <b>Date</b> 8/23/23 |
|--------------------------------------|---------------------|

|                               |                         |                                     |
|-------------------------------|-------------------------|-------------------------------------|
| <b>Telephone</b> 614-288-8619 | <b>Fax</b> 937-384-9946 | <b>Email</b> freed@haleyaldrich.com |
|-------------------------------|-------------------------|-------------------------------------|

**NOTE:** Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

06/2011 cmz

DNR Form 542-1322

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-21                       |                              |
| <b>Upgradient</b> XX                                              | <b>Downgradient</b>          |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm$ 0.01 foot, MSL)         |                                               |                      |                       |
|----------------------------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                               |                      |                       |
| <b>Top of inner well casing</b> 660.72                               | <b>Ground Elevation</b> 658.00                |                      |                       |
| <b>Depth of Well</b> 66.65                                           | <b>Inside Casing Diameter (in inches)</b> 2.0 |                      |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                                               |                      |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL): |                                               |                      |                       |
|                                                                      | Date/Time                                     | Depth to Groundwater | Groundwater Elevation |
| <b>Before Purging</b>                                                | 22-AUG-23, 1003                               | 19.26                | 641.46                |
| <b>*After Purging</b>                                                | 23-AUG-23, 1325                               | 41.45                | 619.27                |
| <b>*Before Purging</b>                                               | 23-AUG-23, 1100                               | 19.15                | 641.57                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 5.27                                    |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 22.32                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 7.51                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 0.841                | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

|                                                                                                                                                                |                  |                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|
| <b>CERTIFICATION</b>                                                                                                                                           |                  |                              |
| I certify under penalty of law I believe the information reported above is true, accurate and complete.                                                        |                  |                              |
| Signature <i>Francis Reed</i>                                                                                                                                  |                  | Date 8/23/23                 |
| Telephone 614-288-8619                                                                                                                                         | Fax 937-384-9946 | Email freed@haleyaldrich.com |
| <b>NOTE:</b> Attach Laboratory Report and 8 ½" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round. |                  |                              |

\*Omit if only measuring groundwater elevations.

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-25                       |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm$ 0.01 foot, MSL)         |                                               |                      |                       |
|----------------------------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                               |                      |                       |
| <b>Top of inner well casing</b> 631.77                               | <b>Ground Elevation</b> 628.56                |                      |                       |
| <b>Depth of Well</b> 18.54                                           | <b>Inside Casing Diameter (in inches)</b> 2.0 |                      |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                                               |                      |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL): |                                               |                      |                       |
|                                                                      | Date/Time                                     | Depth to Groundwater | Groundwater Elevation |
| <b>Before Purging</b>                                                | 22-AUG-23, 1214                               | 9.19                 | 622.58                |
| <b>*After Purging</b>                                                | 24-AUG-23, 1315                               | 9.71                 | 622.06                |
| <b>*Before Purging</b>                                               | 24-AUG-23, 1240                               | 9.29                 | 622.48                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 0.792                                   |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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



# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-26                       |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm$ 0.01 foot, MSL)         |                                               |                      |                       |
|----------------------------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                               |                      |                       |
| <b>Top of inner well casing</b> 631.03                               | <b>Ground Elevation</b> 628.29                |                      |                       |
| <b>Depth of Well</b> 48.45                                           | <b>Inside Casing Diameter (in inches)</b> 2.0 |                      |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                                               |                      |                       |
| Groundwater Level ( $\pm$ 0.01 foot below top of inner casing, MSL): |                                               |                      |                       |
|                                                                      | Date/Time                                     | Depth to Groundwater | Groundwater Elevation |
| <b>Before Purging</b>                                                | 22-AUG-23, 1216                               | 7.46                 | 623.57                |
| <b>*After Purging</b>                                                | 24-AUG-23, 1200                               | 11.66                | 619.37                |
| <b>*Before Purging</b>                                               | 24-AUG-23, 1100                               | 7.36                 | 623.67                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 1.32                                    |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

#### \*D. FIELD MEASUREMENT

**Weather Conditions Sunny, 90 deg F**

**Field Measurements (after stabilization):**

Temperature 23.42

Units Deg C

**Equipment Used** Horiba U-52

pH 6.55

**Equipment Used** Horiba U-52

**Specific Conductance** 2.94

Units mS/cm

Equipment Used Horiba U-52

## Comments

Sample MW-26-082423-1200

DO (mg/l): 1.02

ORP (mV): -30

Turbidity (NTU): 0.0

## CERTIFICATION

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

Signature *Francis Reed*

Date 8/24/23

Telephone 614-288-8619

Fax 937-384-9946

**Email** freed@haleyaldrich.com

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

\*Omit if only measuring groundwater elevations.

# GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT FORM

|                                                                   |                              |
|-------------------------------------------------------------------|------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-89P |
| <b>Monitoring Well/Piezometer No.</b> MW-27                       |                              |
| <b>Upgradient</b>                                                 | <b>Downgradient</b> XX       |
| <b>Name of person sampling</b> F. Reed                            |                              |

| A. MONITORING WELL/PIEZOMETER CONDITIONS               |                                                                     |
|--------------------------------------------------------|---------------------------------------------------------------------|
| <b>Well/Piezometer Properly Capped?</b> (please check) | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |
| If no, explain                                         |                                                                     |
| <b>Standing Water or Litter?</b> (please check)        | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| If yes, explain                                        |                                                                     |

| B. GROUNDWATER ELEVATION MEASUREMENT ( $\pm 0.01$ foot, MSL)         |                                               |                      |                       |
|----------------------------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|
| Elevation:                                                           |                                               |                      |                       |
| <b>Top of inner well casing</b> 624.57                               | <b>Ground Elevation</b> 622.20                |                      |                       |
| <b>Depth of Well</b> 41.80                                           | <b>Inside Casing Diameter (in inches)</b> 2.0 |                      |                       |
| <b>Equipment Used</b> Solonist Water Level Meter                     |                                               |                      |                       |
| Groundwater Level ( $\pm 0.01$ foot below top of inner casing, MSL): |                                               |                      |                       |
|                                                                      | Date/Time                                     | Depth to Groundwater | Groundwater Elevation |
| <b>Before Purging</b>                                                | 22-AUG-23, 1145                               | 0.20                 | 624.7                 |
| <b>*After Purging</b>                                                | 24-AUG-23, 2015                               | 0.60                 | 624.57                |
| <b>*Before Purging</b>                                               | 24-AUG-23, 1915                               | 0.0                  | 623.97                |

| *C. WELL PURGING                                                                             |                             |
|----------------------------------------------------------------------------------------------|-----------------------------|
| <b>Quantity of Water Removed from Well (gallons)</b> 1.452                                   |                             |
| <b>No. of Well Volumes (based on current water level)</b> Not applicable - low flow sampling |                             |
| <b>Was well pumped/bailed dry?</b> No                                                        |                             |
| Equipment used:                                                                              |                             |
| <b>Bailer type</b> NA                                                                        | <b>Dedicated Bailer?</b> NA |
| <b>Pump type</b> Bladder Pump                                                                | <b>Dedicated Pump?</b> Yes  |
| <b>If not dedicated, method of cleaning</b> Not Applicable                                   |                             |

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

| *D. FIELD MEASUREMENT                     |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 deg F        |             |
| Field Measurements (after stabilization): |             |
| Temperature 19.37                         | Units Deg C |
| Equipment Used Horiba U-52                |             |
| pH 6.59                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conductance 1.33                 | Units mS/cm |
| Equipment Used Horiba U-52                |             |

[illegible]

|                                                                                                                                                                  |                  |                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|
| <b>CERTIFICATION</b>                                                                                                                                             |                  |                              |
| I certify under penalty of law I believe the information reported above is true, accurate and complete.                                                          |                  |                              |
| Signature <i>Francis Reed</i>                                                                                                                                    |                  | Date 8/24/23                 |
| Telephone 614-288-8619                                                                                                                                           | Fax 937-384-9946 | Email freed@haleyaldrich.com |
| <b>NOTE:</b> Attach Laboratory Report and 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round. |                  |                              |

\*Omit if only measuring groundwater elevations.

# SURFACE WATER SAMPLING FORM

|                                                                   |                                  |
|-------------------------------------------------------------------|----------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-15-89P  |
| <b>Surface Monitoring Point No.</b> SW-1                          | <b>Date/Time</b> 22-AUG-23, 1620 |
| <b>Name of person sampling</b> F.Reed                             |                                  |

## A. TYPE OF MONITORING POINT

|                                                   |                                                  |
|---------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> <b>Stream</b> | <input type="checkbox"/> <b>Open Tile</b>        |
| <input type="checkbox"/> <b>Road Ditch</b>        | <input type="checkbox"/> <b>Tile with Riser</b>  |
| <input type="checkbox"/> <b>Drainage Ditch</b>    | <input type="checkbox"/> <b>Other (describe)</b> |

## B. PURPOSE OF MONITORING POINT

|                                                     |                                                  |
|-----------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> <b>Upstream</b> | <input type="checkbox"/> <b>Downstream</b>       |
| <input type="checkbox"/> <b>Within Landfill</b>     | <input type="checkbox"/> <b>Other (describe)</b> |

## C. MONITORING POINT CONDITIONS

|                                                                                 |                                                                                   |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>General description/condition of monitoring point</b>                        |                                                                                   |
| Soap Creek as it enters site                                                    |                                                                                   |
|                                                                                 |                                                                                   |
| <b>Was monitoring point dry?</b> No                                             | <b>Too little water to sample?</b> No                                             |
| <b>Was water flowing?</b>                                                       | <input checked="" type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> |
| <b>If yes, estimate quantity</b>                                                | <b>If yes, estimate depth</b> 0.3 FOOT                                            |
| <b>Was water discolored?</b>                                                    | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                                         |                                                                                   |
| <b>Does water have odor?</b>                                                    | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                                         |                                                                                   |
| <b>Was ground discolored?</b>                                                   | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                                         |                                                                                   |
| <b>Litter present?</b>                                                          | <input checked="" type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b> Plastic bottles, plastic/poly debris, and aluminum foil |                                                                                   |

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

| D. FIELD MEASUREMENT                      |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 degree F     |             |
| Field Measurements (after stabilization): |             |
| Temperature 23.77                         | Units deg C |
| Equipment Used Horiba U-52                |             |
| D. FIELD MEASUREMENT (continued)          |             |
| pH 7.19                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conditions 0.536                 | Units mS/cm |
| Equipment Used Horiba U-52                |             |

| Comments                    |
|-----------------------------|
| Sample SW-1-082223-1620     |
| ORP: 136 mV                 |
| Turbidity: 3.9 NTU          |
| Dissolved Oxygen: 5.59 mg/L |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |

| CERTIFICATION                                                                                                                          |                  |                              |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|
| I certify under penalty of law I believe the information reported above is true, accurate and complete.                                |                  |                              |
| Signature <i>Francis Reed</i>                                                                                                          |                  | Date 8-22-23                 |
| Telephone 614-288-8619                                                                                                                 | Fax 937-384-9946 | Email freed@haleyaldrich.com |
| NOTE: Attach 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points.<br>One map per sampling round. |                  |                              |

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

# SURFACE WATER SAMPLING FORM

|                                                                   |                                  |
|-------------------------------------------------------------------|----------------------------------|
| <b>Site Name</b> Amsted Foundry Materials Recovery and Reuse Area | <b>Permit No.</b> 56-SDP-15-89P  |
| <b>Surface Monitoring Point No.</b> SW-2                          | <b>Date/Time</b> 22-AUG-23, 1730 |
| <b>Name of person sampling</b> F. Reed                            |                                  |

| A. TYPE OF MONITORING POINT                       |                                                  |
|---------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> <b>Stream</b> | <input type="checkbox"/> <b>Open Tile</b>        |
| <input type="checkbox"/> <b>Road Ditch</b>        | <input type="checkbox"/> <b>Tile with Riser</b>  |
| <input type="checkbox"/> <b>Drainage Ditch</b>    | <input type="checkbox"/> <b>Other (describe)</b> |

| B. PURPOSE OF MONITORING POINT                  |                                                       |
|-------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> <b>Upstream</b>        | <input checked="" type="checkbox"/> <b>Downstream</b> |
| <input type="checkbox"/> <b>Within Landfill</b> | <input type="checkbox"/> <b>Other (describe)</b>      |

| C. MONITORING POINT CONDITIONS                                 |                                                                                   |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>General description/condition of monitoring point</b>       |                                                                                   |
| Soap Creek before it exits site                                |                                                                                   |
|                                                                |                                                                                   |
| <b>Was monitoring point dry?</b> No                            | <b>Too little water to sample?</b> No                                             |
| <b>Was water flowing?</b>                                      | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, estimate quantity</b>                               | <b>If yes, estimate depth</b>                                                     |
| <b>Was water discolored?</b>                                   | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                        |                                                                                   |
| <b>Does water have odor?</b>                                   | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                        |                                                                                   |
| <b>Was ground discolored?</b>                                  | <input type="checkbox"/> <b>YES</b> <input checked="" type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b>                                        |                                                                                   |
| <b>Litter present?</b>                                         | <input checked="" type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> |
| <b>If yes, describe</b> Plastic food wrappers and aluminum can |                                                                                   |

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

| D. FIELD MEASUREMENT                      |             |
|-------------------------------------------|-------------|
| Weather Conditions Sunny, 90 degree F     |             |
| Field Measurements (after stabilization): |             |
| Temperature 27.59                         | Units deg C |
| Equipment Used Horiba U-52                |             |
| D. FIELD MEASUREMENT (continued)          |             |
| pH 7.96                                   |             |
| Equipment Used Horiba U-52                |             |
| Specific Conditions 0.745                 | Units mS/cm |
| Equipment Used Horiba U-52                |             |

| Comments                    |
|-----------------------------|
| Sample SW-2-082223-1730     |
| ORP: 152 mV                 |
| Turbidity: 22.0 NTU         |
| Dissolved Oxygen: 3.19 mg/L |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |
|                             |

| CERTIFICATION                                                                                                                          |                  |                              |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|
| I certify under penalty of law I believe the information reported above is true, accurate and complete.                                |                  |                              |
| Signature <i>Francis Reed</i>                                                                                                          |                  | Date 8/22/23                 |
| Telephone 614-288-8619                                                                                                                 | Fax 937-384-9946 | Email freed@haleyaldrich.com |
| NOTE: Attach 8 1/2" x 11" site plan showing locations of all surface and groundwater monitoring points.<br>One map per sampling round. |                  |                              |

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

**APPENDIX B**  
**Analytical Laboratory Reports and Data Usability Summary**  
**Reports**

# ANALYTICAL REPORT

## PREPARED FOR

Attn: Thomas Vanage  
Haley & Aldrich, Inc.  
8899 Gander Creek Drive  
Miamisburg, Ohio 45342-4418

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## JOB DESCRIPTION

Amsted - Keokuk, Iowa GW

## JOB NUMBER

240-183868-1

# Eurofins Cleveland

## Job Notes

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

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

## Authorization



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Authorized for release by  
Denise Heckler, Project Manager II  
[Denise.Heckler@et.eurofinsus.com](mailto:Denise.Heckler@et.eurofinsus.com)  
(330)966-9477

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# Definitions/Glossary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Qualifiers

### 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                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------------|
| B         | Compound was found in the blank and sample.                                                                    |
| F1        | MS and/or MSD recovery exceeds control limits.                                                                 |
| J         | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## 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                                                                                       |

# Case Narrative

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Job ID: 240-183868-1**

**Laboratory: Eurofins Cleveland**

## Narrative

### Job Narrative 240-183868-1

#### Comments

The SW samples and the equipment blank were not field filtered. Insufficient volume was provided for the lab to filter. Iron was reported as total in these cases. For the field dup, the COC is marked as not filtered, but according to H&A it was field filtered.

#### Receipt

The samples were received on 4/20/2023 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 2.5° C and 2.6° C.

#### Metals

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

#### General Chemistry

Method 4500 NH3 H: An incorrect volume of spiking solution was inadvertently added to matrix spike (MS), and matrix spike duplicate (MSD) associated with analytical batch 240-571657. Percent recoveries are based on the amount spiked.

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

# Method Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

| Method          | Method Description                                 | Protocol | Laboratory |
|-----------------|----------------------------------------------------|----------|------------|
| 6010C           | Metals (ICP)                                       | SW846    | EET CLE    |
| 6020A           | Metals (ICP/MS)                                    | SW846    | EET CLE    |
| 4500 NH3 H-2011 | Ammonia                                            | SM       | EET CLE    |
| 5220D-2011      | Chemical Oxygen Demand                             | SM       | EET CLE    |
| 9056A           | Anions, Ion Chromatography                         | SW846    | EET CLE    |
| 3005A           | Preparation, Total Recoverable or Dissolved Metals | SW846    | EET CLE    |

## Protocol References:

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.

## Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

# Sample Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

| Lab Sample ID | Client Sample ID  | Matrix | Collected      | Received       |
|---------------|-------------------|--------|----------------|----------------|
| 240-183868-1  | SW-2-041823-1035  | Water  | 04/18/23 10:35 | 04/20/23 10:00 |
| 240-183868-2  | SW-1-041823-1135  | Water  | 04/18/23 11:35 | 04/20/23 10:00 |
| 240-183868-3  | MW-21-041823-1517 | Water  | 04/18/23 15:17 | 04/20/23 10:00 |
| 240-183868-4  | MW-7-041823-1656  | Water  | 04/18/23 16:56 | 04/20/23 10:00 |
| 240-183868-5  | MW-12-041823-1520 | Water  | 04/18/23 15:20 | 04/20/23 10:00 |
| 240-183868-6  | MW-6-041823-1751  | Water  | 04/18/23 17:51 | 04/20/23 10:00 |
| 240-183868-7  | MW-16-041823-1800 | Water  | 04/18/23 18:00 | 04/20/23 10:00 |
| 240-183868-8  | MW-27-041923-0856 | Water  | 04/19/23 08:56 | 04/20/23 10:00 |
| 240-183868-9  | 20609-041923-0001 | Water  | 04/19/23 09:00 | 04/20/23 10:00 |
| 240-183868-10 | MW-20-041923-0930 | Water  | 04/19/23 09:30 | 04/20/23 10:00 |
| 240-183868-11 | 20760-041923-0001 | Water  | 04/19/23 10:00 | 04/20/23 10:00 |
| 240-183868-12 | MW-25-041923-1120 | Water  | 04/19/23 11:20 | 04/20/23 10:00 |
| 240-183868-13 | MW-5-041923-1023  | Water  | 04/19/23 10:30 | 04/20/23 10:00 |
| 240-183868-14 | MW-26-041923-1255 | Water  | 04/19/23 12:55 | 04/20/23 10:00 |

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Client Sample ID: SW-2-041823-1035

## Lab Sample ID: 240-183868-1

| Analyte                | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method             | Prep Type   |
|------------------------|--------|-----------|---------|---------|------|---------|---|--------------------|-------------|
| Boron                  | 0.116  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Strontium              | 0.251  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Manganese              | 0.741  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Sodium                 | 39.3   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Iron                   | 0.682  |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Ammonia                | 0.191  | J         | 0.200   | 0.0760  | mg/L | 1       |   | 4500 NH3<br>H-2011 | Total/NA    |
| Chemical Oxygen Demand | 6.69   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011         | Total/NA    |
| Chloride               | 48.4   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A              | Total/NA    |
| Fluoride               | 0.494  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A              | Total/NA    |
| Sulfate                | 40.0   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A              | Total/NA    |

## Client Sample ID: SW-1-041823-1135

## Lab Sample ID: 240-183868-2

| Analyte                | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method             | Prep Type   |
|------------------------|--------|-----------|---------|---------|------|---------|---|--------------------|-------------|
| Boron                  | 0.205  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Strontium              | 0.219  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Manganese              | 0.497  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Sodium                 | 19.7   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Iron                   | 1.44   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Ammonia                | 0.212  |           | 0.200   | 0.0760  | mg/L | 1       |   | 4500 NH3<br>H-2011 | Total/NA    |
| Chemical Oxygen Demand | 2.58   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011         | Total/NA    |
| Chloride               | 15.1   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A              | Total/NA    |
| Fluoride               | 0.820  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A              | Total/NA    |
| Sulfate                | 38.8   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A              | Total/NA    |

## Client Sample ID: MW-21-041823-1517

## Lab Sample ID: 240-183868-3

| Analyte                | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method             | Prep Type   |
|------------------------|--------|-----------|---------|---------|------|---------|---|--------------------|-------------|
| Boron                  | 0.0919 | J         | 0.100   | 0.0573  | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Strontium              | 0.556  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Lithium                | 0.0346 | J         | 0.0500  | 0.0172  | mg/L | 1       |   | 6010C              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Manganese              | 0.161  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Sodium                 | 58.0   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A              | Total       |
|                        |        |           |         |         |      |         |   |                    | Recoverable |
| Iron                   | 0.0792 | J         | 0.100   | 0.0470  | mg/L | 1       |   | 6020A              | Dissolved   |
| Ammonia                | 0.110  | J         | 0.200   | 0.0760  | mg/L | 1       |   | 4500 NH3<br>H-2011 | Total/NA    |
| Chemical Oxygen Demand | 2.27   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011         | Total/NA    |
| Chloride               | 2.88   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A              | Total/NA    |
| Fluoride               | 0.427  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A              | Total/NA    |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Client Sample ID: MW-21-041823-1517 (Continued)

## Lab Sample ID: 240-183868-3

| Analyte | Result | Qualifier | RL   | MDL   | Unit | Dil Fac | D | Method | Prep Type |
|---------|--------|-----------|------|-------|------|---------|---|--------|-----------|
| Sulfate | 32.3   |           | 1.00 | 0.348 | mg/L | 1       |   | 9056A  | Total/NA  |

## Client Sample ID: MW-7-041823-1656

## Lab Sample ID: 240-183868-4

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method | Prep Type            |
|-----------|--------|-----------|---------|---------|------|---------|---|--------|----------------------|
| Boron     | 0.317  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Strontium | 1.81   |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Lithium   | 0.0573 |           | 0.0500  | 0.0172  | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Manganese | 0.0543 |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A  | Total<br>Recoverable |
| Sodium    | 59.1   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A  | Total<br>Recoverable |
| Iron      | 2.42   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020A  | Dissolved            |
| Chloride  | 1.51   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A  | Total/NA             |
| Fluoride  | 0.309  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA             |
| Sulfate   | 1330   |           | 10.0    | 3.48    | mg/L | 10      |   | 9056A  | Total/NA             |

## Client Sample ID: MW-12-041823-1520

## Lab Sample ID: 240-183868-5

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | Dil Fac | D | Method | Prep Type            |
|-----------|--------|-----------|--------|---------|------|---------|---|--------|----------------------|
| Strontium | 0.490  |           | 0.0500 | 0.00927 | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Sodium    | 30.8   |           | 1.00   | 0.329   | mg/L | 1       |   | 6020A  | Total<br>Recoverable |
| Chloride  | 8.24   | B         | 1.00   | 0.128   | mg/L | 1       |   | 9056A  | Total/NA             |
| Fluoride  | 0.324  |           | 0.0500 | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA             |
| Sulfate   | 45.6   |           | 1.00   | 0.348   | mg/L | 1       |   | 9056A  | Total/NA             |

## Client Sample ID: MW-6-041823-1751

## Lab Sample ID: 240-183868-6

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method | Prep Type            |
|-----------|--------|-----------|---------|---------|------|---------|---|--------|----------------------|
| Strontium | 0.377  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Manganese | 0.0149 |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A  | Total<br>Recoverable |
| Sodium    | 42.5   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A  | Total<br>Recoverable |
| Chloride  | 13.9   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A  | Total/NA             |
| Fluoride  | 0.344  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA             |
| Sulfate   | 15.7   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A  | Total/NA             |

## Client Sample ID: MW-16-041823-1800

## Lab Sample ID: 240-183868-7

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method | Prep Type            |
|-----------|--------|-----------|---------|---------|------|---------|---|--------|----------------------|
| Boron     | 0.0764 | J         | 0.100   | 0.0573  | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Strontium | 0.525  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Lithium   | 0.0498 | J         | 0.0500  | 0.0172  | mg/L | 1       |   | 6010C  | Total<br>Recoverable |
| Manganese | 0.0595 |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A  | Total<br>Recoverable |
| Sodium    | 51.6   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A  | Total<br>Recoverable |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Client Sample ID: MW-16-041823-1800 (Continued)

## Lab Sample ID: 240-183868-7

| Analyte  | Result | Qualifier | RL     | MDL    | Unit | Dil Fac | D | Method | Prep Type |
|----------|--------|-----------|--------|--------|------|---------|---|--------|-----------|
| Iron     | 0.819  |           | 0.100  | 0.0470 | mg/L | 1       |   | 6020A  | Dissolved |
| Chloride | 4.44   | B         | 1.00   | 0.128  | mg/L | 1       |   | 9056A  | Total/NA  |
| Fluoride | 0.463  |           | 0.0500 | 0.0240 | mg/L | 1       |   | 9056A  | Total/NA  |
| Sulfate  | 72.4   |           | 1.00   | 0.348  | mg/L | 1       |   | 9056A  | Total/NA  |

## Client Sample ID: MW-27-041923-0856

## Lab Sample ID: 240-183868-8

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method             | Prep Type            |
|-----------|--------|-----------|---------|---------|------|---------|---|--------------------|----------------------|
| Boron     | 0.183  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C              | Total<br>Recoverable |
| Strontium | 0.797  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C              | Total<br>Recoverable |
| Lithium   | 0.0553 |           | 0.0500  | 0.0172  | mg/L | 1       |   | 6010C              | Total<br>Recoverable |
| Manganese | 0.153  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A              | Total<br>Recoverable |
| Sodium    | 43.9   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A              | Total<br>Recoverable |
| Iron      | 3.11   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020A              | Dissolved            |
| Ammonia   | 1.37   |           | 0.200   | 0.0760  | mg/L | 1       |   | 4500 NH3<br>H-2011 | Total/NA             |
| Chloride  | 1.80   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A              | Total/NA             |
| Fluoride  | 0.356  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A              | Total/NA             |
| Sulfate   | 257    |           | 5.00    | 1.74    | mg/L | 5       |   | 9056A              | Total/NA             |

## Client Sample ID: 20609-041923-0001

## Lab Sample ID: 240-183868-9

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method             | Prep Type            |
|-----------|--------|-----------|---------|---------|------|---------|---|--------------------|----------------------|
| Boron     | 0.183  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C              | Total<br>Recoverable |
| Strontium | 0.794  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C              | Total<br>Recoverable |
| Lithium   | 0.0510 |           | 0.0500  | 0.0172  | mg/L | 1       |   | 6010C              | Total<br>Recoverable |
| Manganese | 0.149  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A              | Total<br>Recoverable |
| Sodium    | 43.6   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A              | Total<br>Recoverable |
| Iron      | 2.93   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020A              | Dissolved            |
| Ammonia   | 1.37   |           | 0.200   | 0.0760  | mg/L | 1       |   | 4500 NH3<br>H-2011 | Total/NA             |
| Chloride  | 1.79   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A              | Total/NA             |
| Fluoride  | 0.362  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A              | Total/NA             |
| Sulfate   | 260    |           | 5.00    | 1.74    | mg/L | 5       |   | 9056A              | Total/NA             |

## Client Sample ID: MW-20-041923-0930

## Lab Sample ID: 240-183868-10

| Analyte                | Result | Qualifier | RL     | MDL     | Unit | Dil Fac | D | Method     | Prep Type            |
|------------------------|--------|-----------|--------|---------|------|---------|---|------------|----------------------|
| Strontium              | 0.349  |           | 0.0500 | 0.00927 | mg/L | 1       |   | 6010C      | Total<br>Recoverable |
| Lithium                | 0.0293 | J         | 0.0500 | 0.0172  | mg/L | 1       |   | 6010C      | Total<br>Recoverable |
| Sodium                 | 76.2   |           | 1.00   | 0.329   | mg/L | 1       |   | 6020A      | Total<br>Recoverable |
| Chemical Oxygen Demand | 5.42   | J F1      | 10.0   | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA             |
| Chloride               | 46.7   | B         | 1.00   | 0.128   | mg/L | 1       |   | 9056A      | Total/NA             |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Client Sample ID: MW-20-041923-0930 (Continued)

Lab Sample ID: 240-183868-10

| Analyte  | Result | Qualifier | RL     | MDL    | Unit | Dil Fac | D | Method | Prep Type |
|----------|--------|-----------|--------|--------|------|---------|---|--------|-----------|
| Fluoride | 0.499  |           | 0.0500 | 0.0240 | mg/L | 1       |   | 9056A  | Total/NA  |
| Sulfate  | 40.0   |           | 1.00   | 0.348  | mg/L | 1       |   | 9056A  | Total/NA  |

## Client Sample ID: 20760-041923-0001

Lab Sample ID: 240-183868-11

No Detections.

## Client Sample ID: MW-25-041923-1120

Lab Sample ID: 240-183868-12

| Analyte                | Result  | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method     | Prep Type             |
|------------------------|---------|-----------|---------|---------|------|---------|---|------------|-----------------------|
| Boron                  | 0.207   |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C      | Total                 |
| Strontium              | 0.476   |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C      | Recoverable Total     |
| Lithium                | 0.0370  | J         | 0.0500  | 0.0172  | mg/L | 1       |   | 6010C      | Recoverable Total     |
| Manganese              | 0.00376 | J         | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A      | Recoverable Total     |
| Sodium                 | 49.8    |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A      | Total                 |
| Iron                   | 0.0711  | J         | 0.100   | 0.0470  | mg/L | 1       |   | 6020A      | Recoverable Dissolved |
| Chemical Oxygen Demand | 5.42    | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA              |
| Chloride               | 22.1    | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A      | Total/NA              |
| Fluoride               | 2.38    |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A      | Total/NA              |
| Sulfate                | 61.5    |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A      | Total/NA              |

## Client Sample ID: MW-5-041923-1023

Lab Sample ID: 240-183868-13

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | Dil Fac | D | Method | Prep Type         |
|-----------|--------|-----------|--------|---------|------|---------|---|--------|-------------------|
| Strontium | 0.300  |           | 0.0500 | 0.00927 | mg/L | 1       |   | 6010C  | Total             |
| Lithium   | 0.0255 | J         | 0.0500 | 0.0172  | mg/L | 1       |   | 6010C  | Recoverable Total |
| Sodium    | 42.9   |           | 1.00   | 0.329   | mg/L | 1       |   | 6020A  | Recoverable Total |
| Chloride  | 3.62   | B         | 1.00   | 0.128   | mg/L | 1       |   | 9056A  | Total/NA          |
| Fluoride  | 0.446  |           | 0.0500 | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA          |
| Sulfate   | 36.1   |           | 1.00   | 0.348   | mg/L | 1       |   | 9056A  | Total/NA          |

## Client Sample ID: MW-26-041923-1255

Lab Sample ID: 240-183868-14

| Analyte                | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method          | Prep Type         |
|------------------------|--------|-----------|---------|---------|------|---------|---|-----------------|-------------------|
| Boron                  | 0.358  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010C           | Total             |
| Strontium              | 2.08   |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010C           | Recoverable Total |
| Manganese              | 3.35   |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020A           | Recoverable Total |
| Sodium                 | 86.7   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020A           | Recoverable Total |
| Iron                   | 1.85   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020A           | Dissolved         |
| Ammonia                | 1.26   |           | 0.200   | 0.0760  | mg/L | 1       |   | 4500 NH3 H-2011 | Total/NA          |
| Chemical Oxygen Demand | 3.53   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011      | Total/NA          |
| Chloride               | 2.84   | B         | 1.00    | 0.128   | mg/L | 1       |   | 9056A           | Total/NA          |
| Fluoride               | 0.228  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A           | Total/NA          |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

## Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: MW-26-041923-1255 (Continued)**

**Lab Sample ID: 240-183868-14**

| Analyte | Result | Qualifier | RL   | MDL  | Unit | Dil Fac | D | Method | Prep Type |
|---------|--------|-----------|------|------|------|---------|---|--------|-----------|
| Sulfate | 1500   |           | 10.0 | 3.48 | mg/L | 10      |   | 9056A  | Total/NA  |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: SW-2-041823-1035

Lab Sample ID: 240-183868-1

Date Collected: 04/18/23 10:35

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.116  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:35 | 1       |
| Strontium | 0.251  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 14:35 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:35 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.741  |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:27 | 1       |
| Sodium    | 39.3   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:27 | 1       |
| Iron      | 0.682  |           | 0.100   | 0.0470  | mg/L |   | 04/21/23 10:17 | 04/24/23 21:27 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | 0.191  | J         | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 17:52 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | 6.69   | J         | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:00 | 1       |
| Chloride (SW846 9056A)                 | 48.4   | B         | 1.00   | 0.128  | mg/L |   |          | 05/02/23 23:31 | 1       |
| Fluoride (SW846 9056A)                 | 0.494  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/02/23 23:31 | 1       |
| Sulfate (SW846 9056A)                  | 40.0   |           | 1.00   | 0.348  | mg/L |   |          | 05/02/23 23:31 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: SW-1-041823-1135

Lab Sample ID: 240-183868-2

Date Collected: 04/18/23 11:35

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.205  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:39 | 1       |
| Strontium | 0.219  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 14:39 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:39 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.497  |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:29 | 1       |
| Sodium    | 19.7   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:29 | 1       |
| Iron      | 1.44   |           | 0.100   | 0.0470  | mg/L |   | 04/21/23 10:17 | 04/24/23 21:29 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | 0.212  |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 17:55 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | 2.58   | J         | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:00 | 1       |
| Chloride (SW846 9056A)                 | 15.1   | B         | 1.00   | 0.128  | mg/L |   |          | 05/02/23 23:51 | 1       |
| Fluoride (SW846 9056A)                 | 0.820  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/02/23 23:51 | 1       |
| Sulfate (SW846 9056A)                  | 38.8   |           | 1.00   | 0.348  | mg/L |   |          | 05/02/23 23:51 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-21-041823-1517

Lab Sample ID: 240-183868-3

Date Collected: 04/18/23 15:17

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.0919 | J         | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:44 | 1       |
| Strontium | 0.556  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 14:44 | 1       |
| Lithium   | 0.0346 | J         | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:44 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.161  |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:32 | 1       |
| Sodium    | 58.0   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:32 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 0.0792 | J         | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:15 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | 0.110  | J         | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 17:58 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | 2.27   | J         | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:00 | 1       |
| Chloride (SW846 9056A)                 | 2.88   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 00:11 | 1       |
| Fluoride (SW846 9056A)                 | 0.427  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 00:11 | 1       |
| Sulfate (SW846 9056A)                  | 32.3   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 00:11 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-7-041823-1656

Lab Sample ID: 240-183868-4

Date Collected: 04/18/23 16:56

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.317  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:48 | 1       |
| Strontium | 1.81   |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 14:48 | 1       |
| Lithium   | 0.0573 |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:48 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.0543 |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:35 | 1       |
| Sodium    | 59.1   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:35 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 2.42   |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:17 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:01 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:00 | 1       |
| Chloride (SW846 9056A)                 | 1.51   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 00:52 | 1       |
| Fluoride (SW846 9056A)                 | 0.309  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 00:52 | 1       |
| Sulfate (SW846 9056A)                  | 1330   |           | 10.0   | 3.48   | mg/L |   |          | 05/03/23 01:52 | 10      |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-12-041823-1520

Lab Sample ID: 240-183868-5

Date Collected: 04/18/23 15:20

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:52 | 1       |
| Strontium | 0.490  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 14:52 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:52 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:37 | 1       |
| Sodium    | 30.8   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:37 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:20 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:10 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:00 | 1       |
| Chloride (SW846 9056A)                 | 8.24   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 02:12 | 1       |
| Fluoride (SW846 9056A)                 | 0.324  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 02:12 | 1       |
| Sulfate (SW846 9056A)                  | 45.6   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 02:12 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-6-041823-1751

Lab Sample ID: 240-183868-6

Date Collected: 04/18/23 17:51

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:57 | 1       |
| Strontium | 0.377  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 14:57 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 14:57 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.0149 |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:40 | 1       |
| Sodium    | 42.5   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:40 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:28 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:13 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 13.9   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 02:53 | 1       |
| Fluoride (SW846 9056A)                 | 0.344  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 02:53 | 1       |
| Sulfate (SW846 9056A)                  | 15.7   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 02:53 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-16-041823-1800

Lab Sample ID: 240-183868-7

Date Collected: 04/18/23 18:00

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.0764 | J         | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 15:01 | 1       |
| Strontium | 0.525  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 15:01 | 1       |
| Lithium   | 0.0498 | J         | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/27/23 15:01 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.0595 |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:43 | 1       |
| Sodium    | 51.6   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:43 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 0.819  |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:31 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:22 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 4.44   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 03:53 | 1       |
| Fluoride (SW846 9056A)                 | 0.463  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 03:53 | 1       |
| Sulfate (SW846 9056A)                  | 72.4   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 03:53 | 1       |

Eurofins Cleveland

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-27-041923-0856

Lab Sample ID: 240-183868-8

Date Collected: 04/19/23 08:56

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.183  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 15:13 | 1       |
| Strontium | 0.797  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 15:13 | 1       |
| Lithium   | 0.0553 |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/28/23 16:48 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.153  |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:45 | 1       |
| Sodium    | 43.9   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:45 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 3.11   |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:33 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | 1.37   |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:25 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 1.80   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 04:33 | 1       |
| Fluoride (SW846 9056A)                 | 0.356  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 04:33 | 1       |
| Sulfate (SW846 9056A)                  | 257    |           | 5.00   | 1.74   | mg/L |   |          | 05/03/23 04:53 | 5       |

Eurofins Cleveland

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: 20609-041923-0001

Lab Sample ID: 240-183868-9

Date Collected: 04/19/23 09:00

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.183  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 15:18 | 1       |
| Strontium | 0.794  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 15:18 | 1       |
| Lithium   | 0.0510 |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/28/23 16:52 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.149  |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:53 | 1       |
| Sodium    | 43.6   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:53 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 2.93   |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:36 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | 1.37   |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:28 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 1.79   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 05:54 | 1       |
| Fluoride (SW846 9056A)                 | 0.362  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 05:54 | 1       |
| Sulfate (SW846 9056A)                  | 260    |           | 5.00   | 1.74   | mg/L |   |          | 05/03/23 06:14 | 5       |

Eurofins Cleveland

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-20-041923-0930

Lab Sample ID: 240-183868-10

Date Collected: 04/19/23 09:30

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 15:22 | 1       |
| Strontium | 0.349  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 15:22 | 1       |
| Lithium   | 0.0293 | J         | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/28/23 16:57 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 21:56 | 1       |
| Sodium    | 76.2   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 21:56 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:39 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:31 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | 5.42   | J F1      | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 46.7   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 06:34 | 1       |
| Fluoride (SW846 9056A)                 | 0.499  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 06:34 | 1       |
| Sulfate (SW846 9056A)                  | 40.0   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 06:34 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: 20760-041923-0001

Lab Sample ID: 240-183868-11

Date Collected: 04/19/23 10:00

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/27/23 15:31 | 1       |
| Strontium | ND     |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/27/23 15:31 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/28/23 17:13 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 22:01 | 1       |
| Sodium    | ND     |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 22:01 | 1       |
| Iron      | ND     |           | 0.100   | 0.0470  | mg/L |   | 04/21/23 10:17 | 04/24/23 22:01 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:34 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | ND     |           | 1.00   | 0.128  | mg/L |   |          | 05/03/23 07:14 | 1       |
| Fluoride (SW846 9056A)                 | ND     |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 07:14 | 1       |
| Sulfate (SW846 9056A)                  | ND     |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 07:14 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-25-041923-1120

Lab Sample ID: 240-183868-12

Date Collected: 04/19/23 11:20

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.207  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:18 | 04/27/23 15:35 | 1       |
| Strontium | 0.476  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:18 | 04/27/23 15:35 | 1       |
| Lithium   | 0.0370 | J         | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:18 | 04/28/23 17:18 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result  | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|---------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.00376 | J         | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:18 | 04/24/23 22:04 | 1       |
| Sodium    | 49.8    |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:18 | 04/24/23 22:04 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 0.0711 | J         | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:44 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:37 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | 5.42   | J         | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 22.1   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 07:34 | 1       |
| Fluoride (SW846 9056A)                 | 2.38   |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 07:34 | 1       |
| Sulfate (SW846 9056A)                  | 61.5   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 07:34 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

Client Sample ID: MW-5-041923-1023

Lab Sample ID: 240-183868-13

Date Collected: 04/19/23 10:30

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:18 | 04/27/23 15:39 | 1       |
| Strontium | 0.300  |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:18 | 04/27/23 15:39 | 1       |
| Lithium   | 0.0255 | J         | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:18 | 04/28/23 17:22 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:18 | 04/24/23 22:07 | 1       |
| Sodium    | 42.9   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:18 | 04/24/23 22:07 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:47 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | ND     |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:40 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | ND     |           | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 3.62   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 08:15 | 1       |
| Fluoride (SW846 9056A)                 | 0.446  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 08:15 | 1       |
| Sulfate (SW846 9056A)                  | 36.1   |           | 1.00   | 0.348  | mg/L |   |          | 05/03/23 08:15 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: MW-26-041923-1255**

**Lab Sample ID: 240-183868-14**

Date Collected: 04/19/23 12:55

Matrix: Water

Date Received: 04/20/23 10:00

## Method: SW846 6010C - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.358  |           | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:18 | 04/27/23 15:44 | 1       |
| Strontium | 2.08   |           | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:18 | 04/27/23 15:44 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:18 | 04/28/23 17:26 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 3.35   |           | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:18 | 04/24/23 22:09 | 1       |
| Sodium    | 86.7   |           | 1.00    | 0.329   | mg/L |   | 04/21/23 10:18 | 04/24/23 22:09 | 1       |

## Method: SW846 6020A - Metals (ICP/MS) - Dissolved

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 1.85   |           | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 23:49 | 1       |

## General Chemistry

| Analyte                                | Result | Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------------------------------------|--------|-----------|--------|--------|------|---|----------|----------------|---------|
| Ammonia (SM 4500 NH3 H-2011)           | 1.26   |           | 0.200  | 0.0760 | mg/L |   |          | 05/01/23 18:55 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011) | 3.53   | J         | 10.0   | 1.80   | mg/L |   |          | 05/01/23 14:06 | 1       |
| Chloride (SW846 9056A)                 | 2.84   | B         | 1.00   | 0.128  | mg/L |   |          | 05/03/23 08:35 | 1       |
| Fluoride (SW846 9056A)                 | 0.228  |           | 0.0500 | 0.0240 | mg/L |   |          | 05/03/23 08:35 | 1       |
| Sulfate (SW846 9056A)                  | 1500   |           | 10.0   | 3.48   | mg/L |   |          | 05/03/23 08:55 | 10      |

# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Method: 6010C - Metals (ICP)

Lab Sample ID: MB 240-570336/1-A  
Matrix: Water  
Analysis Batch: 570976

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 570336

| Analyte   | MB Result | MB Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|-----------|--------------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND        |              | 0.100  | 0.0573  | mg/L |   | 04/21/23 10:17 | 04/26/23 22:57 | 1       |
| Strontium | ND        |              | 0.0500 | 0.00927 | mg/L |   | 04/21/23 10:17 | 04/26/23 22:57 | 1       |
| Lithium   | ND        |              | 0.0500 | 0.0172  | mg/L |   | 04/21/23 10:17 | 04/26/23 22:57 | 1       |

Lab Sample ID: LCS 240-570336/2-A  
Matrix: Water  
Analysis Batch: 570976

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 570336

| Analyte   | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|-------------|------------|---------------|------|---|------|-------------|
| Boron     | 1.00        | 1.061      |               | mg/L |   | 106  | 80 - 120    |
| Strontium | 1.00        | 0.9283     |               | mg/L |   | 93   | 80 - 120    |
| Lithium   | 1.00        | 0.9594     |               | mg/L |   | 96   | 80 - 120    |

Lab Sample ID: 240-183867-H-5-B MS  
Matrix: Water  
Analysis Batch: 570976

Client Sample ID: Matrix Spike  
Prep Type: Total Recoverable  
Prep Batch: 570336

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Boron     | ND            |                  | 1.00        | 1.100     |              | mg/L |   | 110  | 75 - 125    |
| Strontium | 0.122         |                  | 1.00        | 1.035     |              | mg/L |   | 91   | 75 - 125    |
| Lithium   | ND            |                  | 1.00        | 0.9694    |              | mg/L |   | 97   | 75 - 125    |

Lab Sample ID: 240-183867-H-5-C MSD  
Matrix: Water  
Analysis Batch: 570976

Client Sample ID: Matrix Spike Duplicate  
Prep Type: Total Recoverable  
Prep Batch: 570336

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Boron     | ND            |                  | 1.00        | 1.088      |               | mg/L |   | 109  | 75 - 125    | 1   | 20        |
| Strontium | 0.122         |                  | 1.00        | 1.022      |               | mg/L |   | 90   | 75 - 125    | 1   | 20        |
| Lithium   | ND            |                  | 1.00        | 0.9529     |               | mg/L |   | 95   | 75 - 125    | 2   | 20        |

## Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 240-570336/1-A  
Matrix: Water  
Analysis Batch: 570703

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 570336

| Analyte   | MB Result | MB Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|-----------|--------------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND        |              | 0.00500 | 0.00353 | mg/L |   | 04/21/23 10:17 | 04/24/23 20:52 | 1       |
| Sodium    | ND        |              | 1.00    | 0.329   | mg/L |   | 04/21/23 10:17 | 04/24/23 20:52 | 1       |
| Iron      | ND        |              | 0.100   | 0.0470  | mg/L |   | 04/21/23 10:17 | 04/24/23 20:52 | 1       |

Lab Sample ID: LCS 240-570336/3-A  
Matrix: Water  
Analysis Batch: 570703

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 570336

| Analyte   | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|-------------|------------|---------------|------|---|------|-------------|
| Manganese | 0.500       | 0.5085     |               | mg/L |   | 102  | 80 - 120    |
| Sodium    | 25.0        | 24.69      |               | mg/L |   | 99   | 80 - 120    |
| Iron      | 5.00        | 4.844      |               | mg/L |   | 97   | 80 - 120    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Method: 6020A - Metals (ICP/MS)

Lab Sample ID: 240-183867-N-6-B MS

Matrix: Water

Analysis Batch: 570703

Client Sample ID: Matrix Spike

Prep Type: Total Recoverable

Prep Batch: 570336

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Manganese | 0.0199        |                  | 0.500       | 0.5178    |              | mg/L |   | 100  | 75 - 125    |
| Sodium    | 6.65          |                  | 25.0        | 30.79     |              | mg/L |   | 97   | 75 - 125    |
| Iron      | 0.371         |                  | 5.00        | 5.251     |              | mg/L |   | 98   | 75 - 125    |

Lab Sample ID: 240-183867-N-6-C MSD

Matrix: Water

Analysis Batch: 570703

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total Recoverable

Prep Batch: 570336

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Manganese | 0.0199        |                  | 0.500       | 0.5113     |               | mg/L |   | 98   | 75 - 125    | 1   | 20        |
| Sodium    | 6.65          |                  | 25.0        | 30.56      |               | mg/L |   | 96   | 75 - 125    | 1   | 20        |
| Iron      | 0.371         |                  | 5.00        | 5.212      |               | mg/L |   | 97   | 75 - 125    | 1   | 20        |

Lab Sample ID: MB 240-570342/1-A

Matrix: Water

Analysis Batch: 570703

Client Sample ID: Method Blank

Prep Type: Total Recoverable

Prep Batch: 570342

| Analyte | MB Result | MB Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|-----------|--------------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND        |              | 0.100 | 0.0470 | mg/L |   | 04/21/23 14:00 | 04/24/23 22:49 | 1       |

Lab Sample ID: LCS 240-570342/2-A

Matrix: Water

Analysis Batch: 570703

Client Sample ID: Lab Control Sample

Prep Type: Total Recoverable

Prep Batch: 570342

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|-------------|------------|---------------|------|---|------|-------------|
| Iron    | 5.00        | 4.526      |               | mg/L |   | 91   | 80 - 120    |

## Method: 4500 NH3 H-2011 - Ammonia

Lab Sample ID: MB 240-571657/14

Matrix: Water

Analysis Batch: 571657

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL    | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|---------|-----------|--------------|-------|--------|------|---|----------|----------------|---------|
| Ammonia | ND        |              | 0.200 | 0.0760 | mg/L |   |          | 05/01/23 17:09 | 1       |

Lab Sample ID: MB 240-571657/47

Matrix: Water

Analysis Batch: 571657

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL    | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|---------|-----------|--------------|-------|--------|------|---|----------|----------------|---------|
| Ammonia | ND        |              | 0.200 | 0.0760 | mg/L |   |          | 05/01/23 18:49 | 1       |

Lab Sample ID: LCS 240-571657/15

Matrix: Water

Analysis Batch: 571657

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|-------------|------------|---------------|------|---|------|-------------|
| Ammonia | 6.37        | 5.993      |               | mg/L |   | 94   | 90 - 110    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Method: 4500 NH3 H-2011 - Ammonia (Continued)

Lab Sample ID: LCS 240-571657/48

Matrix: Water

Analysis Batch: 571657

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|-------------|------------|---------------|------|---|------|-------------|
| Ammonia | 6.37        | 6.050      |               | mg/L |   | 95   | 90 - 110    |

Lab Sample ID: 240-183868-4 MS

Matrix: Water

Analysis Batch: 571657

Client Sample ID: MW-7-041823-1656

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Ammonia | ND            |                  | 5.00        | 4.800     |              | mg/L |   | 96   | 90 - 110    |

Lab Sample ID: 240-183868-4 MSD

Matrix: Water

Analysis Batch: 571657

Client Sample ID: MW-7-041823-1656

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Ammonia | ND            |                  | 5.00        | 4.814      |               | mg/L |   | 96   | 90 - 110    | 0   | 20        |

Lab Sample ID: 240-183868-14 MS

Matrix: Water

Analysis Batch: 571657

Client Sample ID: MW-26-041923-1255

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Ammonia | 1.26          |                  | 5.00        | 5.910     |              | mg/L |   | 93   | 90 - 110    |

Lab Sample ID: 240-183868-14 MSD

Matrix: Water

Analysis Batch: 571657

Client Sample ID: MW-26-041923-1255

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Ammonia | 1.26          |                  | 5.00        | 5.883      |               | mg/L |   | 93   | 90 - 110    | 0   | 20        |

## Method: 5220D-2011 - Chemical Oxygen Demand

Lab Sample ID: MB 240-571627/9

Matrix: Water

Analysis Batch: 571627

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte                | MB Result | MB Qualifier | RL   | MDL  | Unit | D | Prepared | Analyzed       | Dil Fac |
|------------------------|-----------|--------------|------|------|------|---|----------|----------------|---------|
| Chemical Oxygen Demand | ND        |              | 10.0 | 1.80 | mg/L |   |          | 05/01/23 14:00 | 1       |

Lab Sample ID: LCS 240-571627/10

Matrix: Water

Analysis Batch: 571627

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte                | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|------------------------|-------------|------------|---------------|------|---|------|-------------|
| Chemical Oxygen Demand | 46.4        | 42.02      |               | mg/L |   | 91   | 90 - 110    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Method: 5220D-2011 - Chemical Oxygen Demand (Continued)

Lab Sample ID: 240-183868-10 MS

Matrix: Water

Analysis Batch: 571627

Client Sample ID: MW-20-041923-0930

Prep Type: Total/NA

| Analyte                | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|------------------------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|--|--|
| Chemical Oxygen Demand | 5.42          | J F1             | 50.0        | 44.23     | F1           | mg/L |   | 78   | 90 - 110    |  |  |

Lab Sample ID: 240-183868-10 MSD

Matrix: Water

Analysis Batch: 571627

Client Sample ID: MW-20-041923-0930

Prep Type: Total/NA

| Analyte                | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|------------------------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chemical Oxygen Demand | 5.42          | J F1             | 50.0        | 39.18      | F1            | mg/L |   | 68   | 90 - 110    | 12  | 20        |

## Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-571650/3

Matrix: Water

Analysis Batch: 571650

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte  | MB Result | MB Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------|-----------|--------------|--------|--------|------|---|----------|----------------|---------|
| Chloride | 0.1707    | J            | 1.00   | 0.128  | mg/L |   |          | 05/02/23 21:50 | 1       |
| Fluoride | ND        |              | 0.0500 | 0.0240 | mg/L |   |          | 05/02/23 21:50 | 1       |
| Sulfate  | ND        |              | 1.00   | 0.348  | mg/L |   |          | 05/02/23 21:50 | 1       |

Lab Sample ID: LCS 240-571650/4

Matrix: Water

Analysis Batch: 571650

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte  | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|----------|-------------|------------|---------------|------|---|------|-------------|--|--|
| Chloride | 50.0        | 51.93      |               | mg/L |   | 104  | 90 - 110    |  |  |
| Fluoride | 2.50        | 2.647      |               | mg/L |   | 106  | 90 - 110    |  |  |
| Sulfate  | 50.0        | 53.02      |               | mg/L |   | 106  | 90 - 110    |  |  |

Lab Sample ID: 240-183868-6 MS

Matrix: Water

Analysis Batch: 571650

Client Sample ID: MW-6-041823-1751

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|--|--|
| Chloride | 13.9          | B                | 50.0        | 66.73     |              | mg/L |   | 106  | 80 - 120    |  |  |
| Fluoride | 0.344         |                  | 2.50        | 3.093     |              | mg/L |   | 110  | 80 - 120    |  |  |
| Sulfate  | 15.7          |                  | 50.0        | 70.29     |              | mg/L |   | 109  | 80 - 120    |  |  |

Lab Sample ID: 240-183868-6 MSD

Matrix: Water

Analysis Batch: 571650

Client Sample ID: MW-6-041823-1751

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chloride | 13.9          | B                | 50.0        | 66.95      |               | mg/L |   | 106  | 80 - 120    | 0   | 15        |
| Fluoride | 0.344         |                  | 2.50        | 3.108      |               | mg/L |   | 111  | 80 - 120    | 0   | 15        |
| Sulfate  | 15.7          |                  | 50.0        | 70.45      |               | mg/L |   | 110  | 80 - 120    | 0   | 15        |

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# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Metals

### Prep Batch: 570336

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-183868-1         | SW-2-041823-1035       | Total Recoverable | Water  | 3005A  |            |
| 240-183868-2         | SW-1-041823-1135       | Total Recoverable | Water  | 3005A  |            |
| 240-183868-3         | MW-21-041823-1517      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-4         | MW-7-041823-1656       | Total Recoverable | Water  | 3005A  |            |
| 240-183868-5         | MW-12-041823-1520      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-6         | MW-6-041823-1751       | Total Recoverable | Water  | 3005A  |            |
| 240-183868-7         | MW-16-041823-1800      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-8         | MW-27-041923-0856      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-9         | 20609-041923-0001      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-10        | MW-20-041923-0930      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-11        | 20760-041923-0001      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-12        | MW-25-041923-1120      | Total Recoverable | Water  | 3005A  |            |
| 240-183868-13        | MW-5-041923-1023       | Total Recoverable | Water  | 3005A  |            |
| 240-183868-14        | MW-26-041923-1255      | Total Recoverable | Water  | 3005A  |            |
| MB 240-570336/1-A    | Method Blank           | Total Recoverable | Water  | 3005A  |            |
| LCS 240-570336/2-A   | Lab Control Sample     | Total Recoverable | Water  | 3005A  |            |
| LCS 240-570336/3-A   | Lab Control Sample     | Total Recoverable | Water  | 3005A  |            |
| 240-183867-H-5-B MS  | Matrix Spike           | Total Recoverable | Water  | 3005A  |            |
| 240-183867-H-5-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 3005A  |            |
| 240-183867-N-6-B MS  | Matrix Spike           | Total Recoverable | Water  | 3005A  |            |
| 240-183867-N-6-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 3005A  |            |

### Prep Batch: 570342

| Lab Sample ID      | Client Sample ID   | Prep Type         | Matrix | Method | Prep Batch |
|--------------------|--------------------|-------------------|--------|--------|------------|
| 240-183868-3       | MW-21-041823-1517  | Dissolved         | Water  | 3005A  |            |
| 240-183868-4       | MW-7-041823-1656   | Dissolved         | Water  | 3005A  |            |
| 240-183868-5       | MW-12-041823-1520  | Dissolved         | Water  | 3005A  |            |
| 240-183868-6       | MW-6-041823-1751   | Dissolved         | Water  | 3005A  |            |
| 240-183868-7       | MW-16-041823-1800  | Dissolved         | Water  | 3005A  |            |
| 240-183868-8       | MW-27-041923-0856  | Dissolved         | Water  | 3005A  |            |
| 240-183868-9       | 20609-041923-0001  | Dissolved         | Water  | 3005A  |            |
| 240-183868-10      | MW-20-041923-0930  | Dissolved         | Water  | 3005A  |            |
| 240-183868-12      | MW-25-041923-1120  | Dissolved         | Water  | 3005A  |            |
| 240-183868-13      | MW-5-041923-1023   | Dissolved         | Water  | 3005A  |            |
| 240-183868-14      | MW-26-041923-1255  | Dissolved         | Water  | 3005A  |            |
| MB 240-570342/1-A  | Method Blank       | Total Recoverable | Water  | 3005A  |            |
| LCS 240-570342/2-A | Lab Control Sample | Total Recoverable | Water  | 3005A  |            |

### Analysis Batch: 570703

| Lab Sample ID | Client Sample ID  | Prep Type         | Matrix | Method | Prep Batch |
|---------------|-------------------|-------------------|--------|--------|------------|
| 240-183868-1  | SW-2-041823-1035  | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-2  | SW-1-041823-1135  | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-3  | MW-21-041823-1517 | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-3  | MW-21-041823-1517 | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-4  | MW-7-041823-1656  | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-4  | MW-7-041823-1656  | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-5  | MW-12-041823-1520 | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-5  | MW-12-041823-1520 | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-6  | MW-6-041823-1751  | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-6  | MW-6-041823-1751  | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-7  | MW-16-041823-1800 | Dissolved         | Water  | 6020A  | 570342     |

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# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Metals (Continued)

### Analysis Batch: 570703 (Continued)

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-183868-7         | MW-16-041823-1800      | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-8         | MW-27-041923-0856      | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-8         | MW-27-041923-0856      | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-9         | 20609-041923-0001      | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-9         | 20609-041923-0001      | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-10        | MW-20-041923-0930      | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-10        | MW-20-041923-0930      | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-11        | 20760-041923-0001      | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-12        | MW-25-041923-1120      | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-12        | MW-25-041923-1120      | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-13        | MW-5-041923-1023       | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-13        | MW-5-041923-1023       | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183868-14        | MW-26-041923-1255      | Dissolved         | Water  | 6020A  | 570342     |
| 240-183868-14        | MW-26-041923-1255      | Total Recoverable | Water  | 6020A  | 570336     |
| MB 240-570336/1-A    | Method Blank           | Total Recoverable | Water  | 6020A  | 570336     |
| MB 240-570342/1-A    | Method Blank           | Total Recoverable | Water  | 6020A  | 570342     |
| LCS 240-570336/3-A   | Lab Control Sample     | Total Recoverable | Water  | 6020A  | 570336     |
| LCS 240-570342/2-A   | Lab Control Sample     | Total Recoverable | Water  | 6020A  | 570342     |
| 240-183867-N-6-B MS  | Matrix Spike           | Total Recoverable | Water  | 6020A  | 570336     |
| 240-183867-N-6-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 6020A  | 570336     |

### Analysis Batch: 570976

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| MB 240-570336/1-A    | Method Blank           | Total Recoverable | Water  | 6010C  | 570336     |
| LCS 240-570336/2-A   | Lab Control Sample     | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183867-H-5-B MS  | Matrix Spike           | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183867-H-5-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 6010C  | 570336     |

### Analysis Batch: 571232

| Lab Sample ID | Client Sample ID  | Prep Type         | Matrix | Method | Prep Batch |
|---------------|-------------------|-------------------|--------|--------|------------|
| 240-183868-1  | SW-2-041823-1035  | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-2  | SW-1-041823-1135  | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-3  | MW-21-041823-1517 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-4  | MW-7-041823-1656  | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-5  | MW-12-041823-1520 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-6  | MW-6-041823-1751  | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-7  | MW-16-041823-1800 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-8  | MW-27-041923-0856 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-9  | 20609-041923-0001 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-10 | MW-20-041923-0930 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-11 | 20760-041923-0001 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-12 | MW-25-041923-1120 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-13 | MW-5-041923-1023  | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-14 | MW-26-041923-1255 | Total Recoverable | Water  | 6010C  | 570336     |

### Analysis Batch: 571327

| Lab Sample ID | Client Sample ID  | Prep Type         | Matrix | Method | Prep Batch |
|---------------|-------------------|-------------------|--------|--------|------------|
| 240-183868-8  | MW-27-041923-0856 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-9  | 20609-041923-0001 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-10 | MW-20-041923-0930 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-11 | 20760-041923-0001 | Total Recoverable | Water  | 6010C  | 570336     |

Eurofins Cleveland

# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Metals (Continued)

### Analysis Batch: 571327 (Continued)

| Lab Sample ID | Client Sample ID  | Prep Type         | Matrix | Method | Prep Batch |
|---------------|-------------------|-------------------|--------|--------|------------|
| 240-183868-12 | MW-25-041923-1120 | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-13 | MW-5-041923-1023  | Total Recoverable | Water  | 6010C  | 570336     |
| 240-183868-14 | MW-26-041923-1255 | Total Recoverable | Water  | 6010C  | 570336     |

## General Chemistry

### Analysis Batch: 571627

| Lab Sample ID     | Client Sample ID   | Prep Type | Matrix | Method     | Prep Batch |
|-------------------|--------------------|-----------|--------|------------|------------|
| 240-183868-1      | SW-2-041823-1035   | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-2      | SW-1-041823-1135   | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-3      | MW-21-041823-1517  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-4      | MW-7-041823-1656   | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-5      | MW-12-041823-1520  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-6      | MW-6-041823-1751   | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-7      | MW-16-041823-1800  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-8      | MW-27-041923-0856  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-9      | 20609-041923-0001  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-10     | MW-20-041923-0930  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-11     | 20760-041923-0001  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-12     | MW-25-041923-1120  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-13     | MW-5-041923-1023   | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-14     | MW-26-041923-1255  | Total/NA  | Water  | 5220D-2011 |            |
| MB 240-571627/9   | Method Blank       | Total/NA  | Water  | 5220D-2011 |            |
| LCS 240-571627/10 | Lab Control Sample | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-10 MS  | MW-20-041923-0930  | Total/NA  | Water  | 5220D-2011 |            |
| 240-183868-10 MSD | MW-20-041923-0930  | Total/NA  | Water  | 5220D-2011 |            |

### Analysis Batch: 571650

| Lab Sample ID    | Client Sample ID   | Prep Type | Matrix | Method | Prep Batch |
|------------------|--------------------|-----------|--------|--------|------------|
| 240-183868-1     | SW-2-041823-1035   | Total/NA  | Water  | 9056A  |            |
| 240-183868-2     | SW-1-041823-1135   | Total/NA  | Water  | 9056A  |            |
| 240-183868-3     | MW-21-041823-1517  | Total/NA  | Water  | 9056A  |            |
| 240-183868-4     | MW-7-041823-1656   | Total/NA  | Water  | 9056A  |            |
| 240-183868-4     | MW-7-041823-1656   | Total/NA  | Water  | 9056A  |            |
| 240-183868-5     | MW-12-041823-1520  | Total/NA  | Water  | 9056A  |            |
| 240-183868-6     | MW-6-041823-1751   | Total/NA  | Water  | 9056A  |            |
| 240-183868-7     | MW-16-041823-1800  | Total/NA  | Water  | 9056A  |            |
| 240-183868-8     | MW-27-041923-0856  | Total/NA  | Water  | 9056A  |            |
| 240-183868-8     | MW-27-041923-0856  | Total/NA  | Water  | 9056A  |            |
| 240-183868-9     | 20609-041923-0001  | Total/NA  | Water  | 9056A  |            |
| 240-183868-9     | 20609-041923-0001  | Total/NA  | Water  | 9056A  |            |
| 240-183868-10    | MW-20-041923-0930  | Total/NA  | Water  | 9056A  |            |
| 240-183868-11    | 20760-041923-0001  | Total/NA  | Water  | 9056A  |            |
| 240-183868-12    | MW-25-041923-1120  | Total/NA  | Water  | 9056A  |            |
| 240-183868-13    | MW-5-041923-1023   | Total/NA  | Water  | 9056A  |            |
| 240-183868-14    | MW-26-041923-1255  | Total/NA  | Water  | 9056A  |            |
| 240-183868-14    | MW-26-041923-1255  | Total/NA  | Water  | 9056A  |            |
| MB 240-571650/3  | Method Blank       | Total/NA  | Water  | 9056A  |            |
| LCS 240-571650/4 | Lab Control Sample | Total/NA  | Water  | 9056A  |            |
| 240-183868-6 MS  | MW-6-041823-1751   | Total/NA  | Water  | 9056A  |            |
| 240-183868-6 MSD | MW-6-041823-1751   | Total/NA  | Water  | 9056A  |            |

Eurofins Cleveland

# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## General Chemistry

### Analysis Batch: 571657

| Lab Sample ID     | Client Sample ID   | Prep Type | Matrix | Method             | Prep Batch |
|-------------------|--------------------|-----------|--------|--------------------|------------|
| 240-183868-1      | SW-2-041823-1035   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-2      | SW-1-041823-1135   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-3      | MW-21-041823-1517  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-4      | MW-7-041823-1656   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-5      | MW-12-041823-1520  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-6      | MW-6-041823-1751   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-7      | MW-16-041823-1800  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-8      | MW-27-041923-0856  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-9      | 20609-041923-0001  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-10     | MW-20-041923-0930  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-11     | 20760-041923-0001  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-12     | MW-25-041923-1120  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-13     | MW-5-041923-1023   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-14     | MW-26-041923-1255  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| MB 240-571657/14  | Method Blank       | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| MB 240-571657/47  | Method Blank       | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| LCS 240-571657/15 | Lab Control Sample | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| LCS 240-571657/48 | Lab Control Sample | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-4 MS   | MW-7-041823-1656   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-4 MSD  | MW-7-041823-1656   | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-14 MS  | MW-26-041923-1255  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |
| 240-183868-14 MSD | MW-26-041923-1255  | Total/NA  | Water  | 4500 NH3<br>H-2011 |            |

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: SW-2-041823-1035**

**Lab Sample ID: 240-183868-1**

**Date Collected: 04/18/23 10:35**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 14:35       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:27       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 17:52       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:00       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/02/23 23:31       |

**Client Sample ID: SW-1-041823-1135**

**Lab Sample ID: 240-183868-2**

**Date Collected: 04/18/23 11:35**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 14:39       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:29       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 17:55       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:00       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/02/23 23:51       |

**Client Sample ID: MW-21-041823-1517**

**Lab Sample ID: 240-183868-3**

**Date Collected: 04/18/23 15:17**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 14:44       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:15       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:32       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 17:58       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:00       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 00:11       |

**Client Sample ID: MW-7-041823-1656**

**Lab Sample ID: 240-183868-4**

**Date Collected: 04/18/23 16:56**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C        |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 14:48       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: MW-7-041823-1656**

**Lab Sample ID: 240-183868-4**

**Date Collected: 04/18/23 16:56**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:17       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:35       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:01       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:00       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 00:52       |
| Total/NA          | Analysis   | 9056A           |     | 10              | 571650       | JMB     | EET CLE | 05/03/23 01:52       |

**Client Sample ID: MW-12-041823-1520**

**Lab Sample ID: 240-183868-5**

**Date Collected: 04/18/23 15:20**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 14:52       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:20       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:37       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:10       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:00       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 02:12       |

**Client Sample ID: MW-6-041823-1751**

**Lab Sample ID: 240-183868-6**

**Date Collected: 04/18/23 17:51**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 14:57       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:28       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:40       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:13       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 02:53       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: MW-16-041823-1800**

**Lab Sample ID: 240-183868-7**

**Date Collected: 04/18/23 18:00**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:01       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:31       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:43       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:22       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 03:53       |

**Client Sample ID: MW-27-041923-0856**

**Lab Sample ID: 240-183868-8**

**Date Collected: 04/19/23 08:56**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:13       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 16:48       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:33       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:45       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:25       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 04:33       |
| Total/NA          | Analysis   | 9056A           |     | 5               | 571650       | JMB     | EET CLE | 05/03/23 04:53       |

**Client Sample ID: 20609-041923-0001**

**Lab Sample ID: 240-183868-9**

**Date Collected: 04/19/23 09:00**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:18       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 16:52       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:36       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:53       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:28       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 05:54       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: 20609-041923-0001**

**Lab Sample ID: 240-183868-9**

**Date Collected: 04/19/23 09:00**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | 9056A        |     | 5               | 571650       | JMB     | EET CLE | 05/03/23 06:14       |

**Client Sample ID: MW-20-041923-0930**

**Lab Sample ID: 240-183868-10**

**Date Collected: 04/19/23 09:30**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:22       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 16:57       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:39       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 21:56       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:31       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 06:34       |

**Client Sample ID: 20760-041923-0001**

**Lab Sample ID: 240-183868-11**

**Date Collected: 04/19/23 10:00**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:31       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 17:13       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:17       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 22:01       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:34       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 07:14       |

**Client Sample ID: MW-25-041923-1120**

**Lab Sample ID: 240-183868-12**

**Date Collected: 04/19/23 11:20**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6010C        |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:35       |
| Total Recoverable | Prep       | 3005A        |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6010C        |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 17:18       |
| Dissolved         | Prep       | 3005A        |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A        |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:44       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

**Client Sample ID: MW-25-041923-1120**

**Lab Sample ID: 240-183868-12**

**Date Collected: 04/19/23 11:20**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 22:04       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:37       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 07:34       |

**Client Sample ID: MW-5-041923-1023**

**Lab Sample ID: 240-183868-13**

**Date Collected: 04/19/23 10:30**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:39       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 17:22       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:47       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 22:07       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:40       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 08:15       |

**Client Sample ID: MW-26-041923-1255**

**Lab Sample ID: 240-183868-14**

**Date Collected: 04/19/23 12:55**

**Matrix: Water**

**Date Received: 04/20/23 10:00**

| Prep Type         | Batch Type | Batch Method    | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|-----------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571232       | KLC     | EET CLE | 04/27/23 15:44       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6010C           |     | 1               | 571327       | KLC     | EET CLE | 04/28/23 17:26       |
| Dissolved         | Prep       | 3005A           |     |                 | 570342       | AJC     | EET CLE | 04/21/23 14:00       |
| Dissolved         | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 23:49       |
| Total Recoverable | Prep       | 3005A           |     |                 | 570336       | AJC     | EET CLE | 04/21/23 10:18       |
| Total Recoverable | Analysis   | 6020A           |     | 1               | 570703       | RKT     | EET CLE | 04/24/23 22:09       |
| Total/NA          | Analysis   | 4500 NH3 H-2011 |     | 1               | 571657       | JWW     | EET CLE | 05/01/23 18:55       |
| Total/NA          | Analysis   | 5220D-2011      |     | 1               | 571627       | GH      | EET CLE | 05/01/23 14:06       |
| Total/NA          | Analysis   | 9056A           |     | 1               | 571650       | JMB     | EET CLE | 05/03/23 08:35       |
| Total/NA          | Analysis   | 9056A           |     | 10              | 571650       | JMB     | EET CLE | 05/03/23 08:55       |

## Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

Eurofins Cleveland

# Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-183868-1

## Laboratory: Eurofins Cleveland

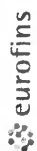
Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

| Authority | Program | Identification Number | Expiration Date |
|-----------|---------|-----------------------|-----------------|
| Iowa      | State   | 421                   | 06-01-23        |

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

| Analysis Method | Prep Method | Matrix | Analyte   |
|-----------------|-------------|--------|-----------|
| 4500 NH3 H-2011 |             | Water  | Ammonia   |
| 6010C           | 3005A       | Water  | Boron     |
| 6010C           | 3005A       | Water  | Lithium   |
| 6010C           | 3005A       | Water  | Strontium |
| 6020A           | 3005A       | Water  | Iron      |
| 6020A           | 3005A       | Water  | Manganese |
| 6020A           | 3005A       | Water  | Sodium    |

## Chain of Custody Record



Environment Testing

| Client Information                                                                                                                                                                                                                                       |         | Lab PM:                                                                                                                                                                                                      |             | Carrier Tracking No(s):         |                                                            | COC No:                           |                         |                                        |                                     |                                 |                               |                            |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------|------------------------------------------------------------|-----------------------------------|-------------------------|----------------------------------------|-------------------------------------|---------------------------------|-------------------------------|----------------------------|----------------------------|
| Client Contact:<br>Thomas Vanage                                                                                                                                                                                                                         |         | Heckler, Denise D                                                                                                                                                                                            |             |                                 |                                                            | 240-106889-38217.1                |                         |                                        |                                     |                                 |                               |                            |                            |
| Company:<br>Haley & Aldrich, Inc.                                                                                                                                                                                                                        |         | E-Mail:<br>Denise.Heckler@et.eurofins.com                                                                                                                                                                    |             | State of Origin:<br>Iowa        |                                                            | Page: 1 of 2                      |                         |                                        |                                     |                                 |                               |                            |                            |
| Address:<br>8899 Gander Creek Drive<br>City:<br>Miamisburg<br>State, Zip:<br>OH, 45342-4418<br>Phone:<br>937-530-1412(Tel)<br>Email:<br>TVanage@haleyaldrich.com<br>Project Name:<br>Amsted - Keokuk, Iowa April 2023<br>Site:                           |         | Due Date Requested:<br>TAT Requested (days):<br>590<br>Compliance Project: <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Purchase Order Requested<br>WO #:<br>Project #:<br>24024753<br>SSOW#: |             | Analysis Requested              |                                                            | Job #:                            |                         |                                        |                                     |                                 |                               |                            |                            |
| Sample Identification                                                                                                                                                                                                                                    |         | Sample Date                                                                                                                                                                                                  | Sample Time | Sample Type<br>(C=Comp, G=grab) | Matrix<br>(W=water, S=solid, O=waste/oli, B1=issue, A=air) | Field Filtered Sample (Yes or No) | Form MS/MSD (Yes or No) | 9056_28D - Chloride, Fluoride, Sulfate | 5220D, SM4500, NH3, H-COD & Ammonia | 6010C, 6020A--Sr, Li, B, Mn, Na | 6020A - Iron - Field Filtered | Total Number of Containers | Special Instructions/Note: |
| SW-2-041823-1035                                                                                                                                                                                                                                         | 4-18-23 | 1035                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| SW-1-041823-1135                                                                                                                                                                                                                                         | 4-18-23 | 1135                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| MW-21-041823-1517                                                                                                                                                                                                                                        | 4-18-23 | 1517                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| MW-7-041823-1656                                                                                                                                                                                                                                         | 4-18-23 | 1656                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| MW-12-041823-1520                                                                                                                                                                                                                                        | 4-18-23 | 1520                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| MW-6-041823-1751                                                                                                                                                                                                                                         | 4-18-23 | 1751                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| MW-16-041823-1800                                                                                                                                                                                                                                        | 4-18-23 | 1800                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| MW-27-041923-0856                                                                                                                                                                                                                                        | 4-19-23 | 0856                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| 20609-041923-0001                                                                                                                                                                                                                                        | 4-19-23 | 0900                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          | Field Dup                  |
| MW-20-041923-0930                                                                                                                                                                                                                                        | 4-19-23 | 0930                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          |                            |
| 20760-041923-0001                                                                                                                                                                                                                                        | 4-19-23 | 1000                                                                                                                                                                                                         | G           | Water                           | N                                                          | N                                 | N                       | X                                      | X                                   | X                               | X                             | 4                          | Egyp Blank                 |
| Possible Hazard Identification<br><input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Deliverable Requested: I, II, III, IV, Other (specify)                                                                                                                                                                                                   |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)<br><input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For Months                                    |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Special Instructions/OC Requirements:                                                                                                                                                                                                                    |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Empty Kit Relinquished by:                                                                                                                                                                                                                               |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Relinquished by: [Signature] Date/Time: 4-13-23, 1745 Company: HDA                                                                                                                                                                                       |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Relinquished by: [Signature] Date/Time: Company:                                                                                                                                                                                                         |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Relinquished by: [Signature] Date/Time: Company:                                                                                                                                                                                                         |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No                                                                                                                                                                           |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |
| Cooler Temperature(s) °C and Other Remarks                                                                                                                                                                                                               |         |                                                                                                                                                                                                              |             |                                 |                                                            |                                   |                         |                                        |                                     |                                 |                               |                            |                            |

2.7/2.6

## Chain of Custody Record

Phone (330) 497-9396 Phone (330) 497-0772

183 868

Eurofins - Canton Sample Receipt Form/Narrative  
Barberton Facility

Client Haley + Aldrich Site Name \_\_\_\_\_ Login # \_\_\_\_\_  
Cooler Received on 4-20-23 Opened on 4-20-23 Cooler unpacked by: Nancy Doyle  
FedEx: 1" Grd (Exp) UPS FAS Clipper Client Drop Off Eurofins Courier Other \_\_\_\_\_  
Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_  
Eurofins Cooler # \_\_\_\_\_ Foam Box \_\_\_\_\_ Client Cooler \_\_\_\_\_ Box \_\_\_\_\_ Other \_\_\_\_\_  
Packing material used: Bubble Wrap \_\_\_\_\_ Foam \_\_\_\_\_ Plastic Bag \_\_\_\_\_ None \_\_\_\_\_ Other \_\_\_\_\_  
COOLANT: Wet Ice \_\_\_\_\_ Blue Ice \_\_\_\_\_ Dry Ice \_\_\_\_\_ Water \_\_\_\_\_ None \_\_\_\_\_  
1. Cooler temperature upon receipt \_\_\_\_\_  
IR GUN # 16 (CF -0.1 °C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C  
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity each Yes No  
-Were the seals on the outside of the cooler(s) signed & dated? Yes No NA  
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No NA  
-Were tamper/custody seals intact and uncompromised? Yes No NA  
3. Shippers' packing slip attached to the cooler(s)? Yes No  
4. Did custody papers accompany the sample(s)? Yes No  
5. Were the custody papers relinquished & signed in the appropriate place? Yes No  
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes No  
7. Did all bottles arrive in good condition (Unbroken)? Yes No  
8. Could all bottle labels (ID/Date/Time) be reconciled with the COC? Yes No  
9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)? Yes No  
10. Were correct bottle(s) used for the test(s) indicated? Yes No  
11. Sufficient quantity received to perform indicated analyses? Yes No  
12. Are these work share samples and all listed on the COC? Yes No  
If yes, Questions 13-17 have been checked at the originating laboratory.  
13. Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# HC203064  
14. Were VOAs on the COC? Yes No  
15. Were air bubbles >6 mm in any VOA vials? ● Larger than this. Yes No NA  
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_ Yes No  
17. Was a LL Hg or Me Hg trip blank present? \_\_\_\_\_ Yes No  
Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other \_\_\_\_\_  
Concerning \_\_\_\_\_

18. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES ☐ additional next page Samples processed by: \_\_\_\_\_  
MW-26-041923 - Time 1255 not on COC  
All same samples.  
19. SAMPLE CONDITION  
Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.  
Sample(s) \_\_\_\_\_ were received in a broken container.  
Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)  
20. SAMPLE PRESERVATION  
Sample(s) \_\_\_\_\_ were further preserved in the laboratory.  
Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_  
VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_



Temperature readings: \_\_\_\_\_

| Client Sample ID  | Lab ID          | Container Type                     | Container |      | Preservative |       |
|-------------------|-----------------|------------------------------------|-----------|------|--------------|-------|
|                   |                 |                                    | pH        | Temp | Added (mls)  | Lot # |
| SW-2-041823-1035  | 240-183868-B-1  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| SW-2-041823-1035  | 240-183868-C-1  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| SW-2-041823-1035  | 240-183868-D-1  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| SW-1-041823-1135  | 240-183868-B-2  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| SW-1-041823-1135  | 240-183868-C-2  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| SW-1-041823-1135  | 240-183868-D-2  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-21-041823-1517 | 240-183868-B-3  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-21-041823-1517 | 240-183868-C-3  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-21-041823-1517 | 240-183868-D-3  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-7-041823-1656  | 240-183868-B-4  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-7-041823-1656  | 240-183868-C-4  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-7-041823-1656  | 240-183868-D-4  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-12-041823-1520 | 240-183868-B-5  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-12-041823-1520 | 240-183868-C-5  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-12-041823-1520 | 240-183868-D-5  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-6-041823-1751  | 240-183868-B-6  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-6-041823-1751  | 240-183868-C-6  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-6-041823-1751  | 240-183868-D-6  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-16-041823-1800 | 240-183868-B-7  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-16-041823-1800 | 240-183868-C-7  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-16-041823-1800 | 240-183868-D-7  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-27-041923-0856 | 240-183868-B-8  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-27-041923-0856 | 240-183868-C-8  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-27-041923-0856 | 240-183868-D-8  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| 20609-041923-0001 | 240-183868-B-9  | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| 20609-041923-0001 | 240-183868-C-9  | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| 20609-041923-0001 | 240-183868-D-9  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-20-041923-0930 | 240-183868-B-10 | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-20-041923-0930 | 240-183868-C-10 | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| MW-20-041923-0930 | 240-183868-D-10 | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| 20760-041923-0001 | 240-183868-B-11 | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| 20760-041923-0001 | 240-183868-C-11 | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |
| 20760-041923-0001 | 240-183868-D-11 | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-25-041923-1120 | 240-183868-B-12 | Plastic 250ml - with Sulfuric Acid |           |      |              |       |
| MW-25-041923-1120 | 240-183868-C-12 | Plastic 250ml - w/nitric - dis     | <2        |      |              |       |

| <u>Client Sample ID</u> | <u>Lab ID</u>   | <u>Container Type</u>              | <u>Container</u><br><u>pH</u> | <u>Temp</u> | <u>Preservative</u><br><u>Added (mls)</u> | <u>Lot #</u> |
|-------------------------|-----------------|------------------------------------|-------------------------------|-------------|-------------------------------------------|--------------|
| MW-25-041923-1120       | 240-183868-D-12 | Plastic 500ml - with Nitric Acid   | <2                            |             |                                           |              |
| MW-5-041923-1023        | 240-183868-B-13 | Plastic 250ml - with Sulfuric Acid |                               |             |                                           |              |
| MW-5-041923-1023        | 240-183868-C-13 | Plastic 250ml - w/nitric - dis     | <2                            |             |                                           |              |
| MW-5-041923-1023        | 240-183868-D-13 | Plastic 500ml - with Nitric Acid   | <2                            |             |                                           |              |
| MW-26-041923-1255       | 240-183868-B-14 | Plastic 250ml - with Sulfuric Acid |                               |             |                                           |              |
| MW-26-041923-1255       | 240-183868-C-14 | Plastic 250ml - w/nitric - dis     | <2                            |             |                                           |              |
| MW-26-041923-1255       | 240-183868-D-14 | Plastic 500ml - with Nitric Acid   | <2                            |             |                                           |              |

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# ANALYTICAL REPORT

## PREPARED FOR

Attn: Thomas Vanage  
Haley & Aldrich, Inc.  
8899 Gander Creek Drive  
Miamisburg, Ohio 45342-4418

Generated 9/12/2023 10:09:23 AM

## JOB DESCRIPTION

Amsted - Keokuk, Iowa GW

## JOB NUMBER

240-190795-1

# Eurofins Cleveland

## Job Notes

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

## Authorization



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# Definitions/Glossary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Qualifiers

### Metals

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

### General Chemistry

| Qualifier | Qualifier Description                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------------|
| F1        | MS and/or MSD recovery exceeds control limits.                                                                 |
| F2        | MS/MSD RPD exceeds control limits                                                                              |
| J         | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## Glossary

| Abbreviation   | These commonly used abbreviations may or may not be present in this report.                                 |
|----------------|-------------------------------------------------------------------------------------------------------------|
| α              | 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                                                                                       |

## Case Narrative

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Job ID: 240-190795-1**

**Laboratory: Eurofins Cleveland**

### Narrative

#### Job Narrative 240-190795-1

#### Comments

Total Iron was analyzed on the equipment blank.

For the SW samples, the lab filtered the samples using a 0.45 micron filter.

#### Receipt

The samples were received on 8/26/2023 10:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 2.1° C, 3.2° C and 5.0° C.

#### Metals

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

#### General Chemistry

Method 9020B: Breakthrough exceeded 10% for the following samples: MW-21-082323-1325 (240-190795-1), MW-20-082323-1515 (240-190795-2), MW-7-082323-1750 (240-190795-3) and MW-6-082323-1915 (240-190795-4).

Method 9020B: Breakthrough exceeded 10% for the following sample: MW-5-082423-1850 (240-190795-12).

Method 9020B: Breakthrough exceeded 10% for the following samples: MW-12-082423-1705 (240-190795-11), 20760-082423-0001 (240-190795-13) and MW-27-082423-2015 (240-190795-14).

Method 9020B: Sample duplicate results are outside 20% RPD requirement. Reanalysis was performed with concurring results. The data has been reported: MW-12-082423-1705 (240-190795-11)

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

## Method Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

| Method      | Method Description                                 | Protocol | Laboratory |
|-------------|----------------------------------------------------|----------|------------|
| 6010D       | Metals (ICP)                                       | SW846    | EET CLE    |
| 6020B       | Metals (ICP/MS)                                    | SW846    | EET CLE    |
| 350.1       | Nitrogen, Ammonia                                  | EPA      | EET CLE    |
| 420.4       | Phenolics, Total Recoverable                       | EPA      | EET CLE    |
| 5220D-2011  | Chemical Oxygen Demand                             | SM       | EET CLE    |
| 9020B       | Organic Halides, Total (TOX)                       | SW846    | EET SAV    |
| 9056A       | Anions, Ion Chromatography                         | SW846    | EET CLE    |
| 3005A       | Preparation, Total Recoverable or Dissolved Metals | SW846    | EET CLE    |
| Carbon Trap | Carbon Trap Preparation                            | EPA-17   | EET SAV    |
| FILTRATION  | Sample Filtration                                  | None     | EET CLE    |

### Protocol References:

EPA = US Environmental Protection Agency

EPA-17 = "Method 1650, Revision A, Adsorbable Organic Halides By Adsorption And Colormetric Titration," EPA, February 1992

None = None

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.

### Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

# Sample Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

| Lab Sample ID | Client Sample ID  | Matrix | Collected      | Received       |
|---------------|-------------------|--------|----------------|----------------|
| 240-190795-1  | MW-21-082323-1325 | Water  | 08/23/23 13:25 | 08/26/23 10:00 |
| 240-190795-2  | MW-20-082323-1515 | Water  | 08/23/23 15:15 | 08/26/23 10:00 |
| 240-190795-3  | MW-7-082323-1750  | Water  | 08/23/23 17:50 | 08/26/23 10:00 |
| 240-190795-4  | MW-6-082323-1915  | Water  | 08/23/23 19:15 | 08/26/23 10:00 |
| 240-190795-5  | 20760-082323-0001 | Water  | 08/23/23 00:00 | 08/26/23 10:00 |
| 240-190795-6  | SW-1-082223-1620  | Water  | 08/22/23 16:20 | 08/26/23 10:00 |
| 240-190795-7  | SW-2-082223-1730  | Water  | 08/22/23 17:30 | 08/26/23 10:00 |
| 240-190795-8  | MW-26-082423-1200 | Water  | 08/24/23 12:00 | 08/26/23 10:00 |
| 240-190795-9  | MW-25-082423-1315 | Water  | 08/24/23 13:15 | 08/26/23 10:00 |
| 240-190795-10 | MW-16-082423-1540 | Water  | 08/24/23 15:40 | 08/26/23 10:00 |
| 240-190795-11 | MW-12-082423-1705 | Water  | 08/24/23 17:05 | 08/26/23 10:00 |
| 240-190795-12 | MW-5-082423-1850  | Water  | 08/24/23 18:50 | 08/26/23 10:00 |
| 240-190795-13 | 20760-082423-0001 | Water  | 08/24/23 19:45 | 08/26/23 10:00 |
| 240-190795-14 | MW-27-082423-2015 | Water  | 08/24/23 20:15 | 08/26/23 10:00 |

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Client Sample ID: MW-21-082323-1325

## Lab Sample ID: 240-190795-1

| Analyte                | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method     | Prep Type   |
|------------------------|--------|-----------|---------|---------|------|---------|---|------------|-------------|
| Boron                  | 0.0652 | J         | 0.100   | 0.0573  | mg/L | 1       |   | 6010D      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Lithium                | 0.0352 | J         | 0.0500  | 0.0172  | mg/L | 1       |   | 6010D      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Strontium              | 0.458  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Manganese              | 0.0216 |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Sodium                 | 52.7   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Chemical Oxygen Demand | 3.03   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA    |
| TOX Result 2           | 14.1   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| Chloride               | 4.18   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A      | Total/NA    |
| Fluoride               | 0.297  |           | 0.250   | 0.120   | mg/L | 5       |   | 9056A      | Total/NA    |
| Sulfate                | 14.9   |           | 5.00    | 1.74    | mg/L | 5       |   | 9056A      | Total/NA    |

## Client Sample ID: MW-20-082323-1515

## Lab Sample ID: 240-190795-2

| Analyte                 | Result | Qualifier | RL     | MDL     | Unit | Dil Fac | D | Method     | Prep Type   |
|-------------------------|--------|-----------|--------|---------|------|---------|---|------------|-------------|
| Lithium                 | 0.0287 | J         | 0.0500 | 0.0172  | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |        |         |      |         |   |            | Recoverable |
| Strontium               | 0.367  |           | 0.0500 | 0.00927 | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |        |         |      |         |   |            | Recoverable |
| Sodium                  | 66.7   |           | 1.00   | 0.329   | mg/L | 1       |   | 6020B      | Total       |
|                         |        |           |        |         |      |         |   |            | Recoverable |
| Chemical Oxygen Demand  | 5.62   | J         | 10.0   | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA    |
| Halogens, Total Organic | 18.3   | J         | 40.0   | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Result 1            | 30.4   | J         | 40.0   | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Dup                 | 18.3   | J         | 40.0   | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| Chloride                | 48.3   |           | 1.00   | 0.128   | mg/L | 1       |   | 9056A      | Total/NA    |
| Fluoride                | 0.503  |           | 0.0500 | 0.0240  | mg/L | 1       |   | 9056A      | Total/NA    |
| Sulfate                 | 23.3   |           | 1.00   | 0.348   | mg/L | 1       |   | 9056A      | Total/NA    |

## Client Sample ID: MW-7-082323-1750

## Lab Sample ID: 240-190795-3

| Analyte                | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method     | Prep Type   |
|------------------------|--------|-----------|---------|---------|------|---------|---|------------|-------------|
| Boron                  | 0.248  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010D      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Lithium                | 0.0711 |           | 0.0500  | 0.0172  | mg/L | 1       |   | 6010D      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Strontium              | 1.80   |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Manganese              | 1.41   |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Sodium                 | 59.4   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B      | Total       |
|                        |        |           |         |         |      |         |   |            | Recoverable |
| Iron                   | 2.51   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020B      | Dissolved   |
| Ammonia                | 0.703  |           | 0.200   | 0.0760  | mg/L | 1       |   | 350.1      | Total/NA    |
| Chemical Oxygen Demand | 5.62   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA    |
| Chloride               | 1.34   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A      | Total/NA    |
| Fluoride               | 0.331  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A      | Total/NA    |
| Sulfate                | 1350   |           | 10.0    | 3.48    | mg/L | 10      |   | 9056A      | Total/NA    |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-6-082323-1915**

**Lab Sample ID: 240-190795-4**

| Analyte                 | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method     | Prep Type   |
|-------------------------|--------|-----------|---------|---------|------|---------|---|------------|-------------|
| Strontium               | 0.386  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Manganese               | 0.575  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Sodium                  | 44.7   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Chemical Oxygen Demand  | 4.65   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA    |
| Halogens, Total Organic | 64.3   |           | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Result 1            | 67.0   |           | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Result 2            | 61.5   |           | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Dup                 | 64.3   |           | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| Chloride                | 13.4   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A      | Total/NA    |
| Fluoride                | 0.318  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A      | Total/NA    |
| Sulfate                 | 9.62   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A      | Total/NA    |

**Client Sample ID: 20760-082323-0001**

**Lab Sample ID: 240-190795-5**

| Analyte                 | Result | Qualifier | RL     | MDL     | Unit | Dil Fac | D | Method     | Prep Type   |
|-------------------------|--------|-----------|--------|---------|------|---------|---|------------|-------------|
| Lithium                 | 0.0296 | J         | 0.0500 | 0.0172  | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |        |         |      |         |   |            | Recoverable |
| Strontium               | 0.365  |           | 0.0500 | 0.00927 | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |        |         |      |         |   |            | Recoverable |
| Sodium                  | 69.2   |           | 1.00   | 0.329   | mg/L | 1       |   | 6020B      | Total       |
|                         |        |           |        |         |      |         |   |            | Recoverable |
| Chemical Oxygen Demand  | 2.38   | J         | 10.0   | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA    |
| Halogens, Total Organic | 19.3   | J         | 40.0   | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Result 1            | 31.7   | J         | 40.0   | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Dup                 | 19.3   | J         | 40.0   | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| Chloride                | 48.1   |           | 1.00   | 0.128   | mg/L | 1       |   | 9056A      | Total/NA    |
| Fluoride                | 0.498  |           | 0.0500 | 0.0240  | mg/L | 1       |   | 9056A      | Total/NA    |
| Sulfate                 | 23.4   |           | 1.00   | 0.348   | mg/L | 1       |   | 9056A      | Total/NA    |

**Client Sample ID: SW-1-082223-1620**

**Lab Sample ID: 240-190795-6**

| Analyte                 | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method     | Prep Type   |
|-------------------------|--------|-----------|---------|---------|------|---------|---|------------|-------------|
| Boron                   | 0.528  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Strontium               | 0.165  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Manganese               | 0.710  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Sodium                  | 25.2   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B      | Total       |
|                         |        |           |         |         |      |         |   |            | Recoverable |
| Iron                    | 0.276  |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020B      | Dissolved   |
| Ammonia                 | 7.68   |           | 0.200   | 0.0760  | mg/L | 1       |   | 350.1      | Total/NA    |
| Chemical Oxygen Demand  | 5.07   | J         | 10.0    | 1.80    | mg/L | 1       |   | 5220D-2011 | Total/NA    |
| Halogens, Total Organic | 20.8   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Result 1            | 26.5   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Result 2            | 15.0   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| TOX Dup                 | 20.8   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B      | Total/NA    |
| Chloride                | 26.1   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A      | Total/NA    |
| Fluoride                | 0.887  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A      | Total/NA    |
| Sulfate                 | 69.2   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A      | Total/NA    |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Client Sample ID: SW-2-082223-1730

## Lab Sample ID: 240-190795-7

| Analyte                 | Result | Qualifier | RL      | MDL     | Unit | Dil | Fac | D | Method | Prep Type   |
|-------------------------|--------|-----------|---------|---------|------|-----|-----|---|--------|-------------|
| Boron                   | 0.267  |           | 0.100   | 0.0573  | mg/L | 1   |     |   | 6010D  | Total       |
|                         |        |           |         |         |      |     |     |   |        | Recoverable |
| Strontium               | 0.223  |           | 0.0500  | 0.00927 | mg/L | 1   |     |   | 6010D  | Total       |
|                         |        |           |         |         |      |     |     |   |        | Recoverable |
| Manganese               | 0.229  |           | 0.00500 | 0.00353 | mg/L | 1   |     |   | 6020B  | Total       |
|                         |        |           |         |         |      |     |     |   |        | Recoverable |
| Sodium                  | 35.2   |           | 1.00    | 0.329   | mg/L | 1   |     |   | 6020B  | Total       |
|                         |        |           |         |         |      |     |     |   |        | Recoverable |
| Ammonia                 | 0.134  | J         | 0.200   | 0.0760  | mg/L | 1   |     |   | 350.1  | Total/NA    |
| Halogens, Total Organic | 25.7   | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| TOX Result 1            | 32.9   | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| TOX Result 2            | 18.4   | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| TOX Dup                 | 25.7   | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| Chloride                | 49.7   |           | 1.00    | 0.128   | mg/L | 1   |     |   | 9056A  | Total/NA    |
| Fluoride                | 0.561  |           | 0.0500  | 0.0240  | mg/L | 1   |     |   | 9056A  | Total/NA    |
| Sulfate                 | 30.6   |           | 1.00    | 0.348   | mg/L | 1   |     |   | 9056A  | Total/NA    |

## Client Sample ID: MW-26-082423-1200

## Lab Sample ID: 240-190795-8

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil | Fac | D | Method | Prep Type   |
|-----------|--------|-----------|---------|---------|------|-----|-----|---|--------|-------------|
| Boron     | 0.275  |           | 0.100   | 0.0573  | mg/L | 1   |     |   | 6010D  | Total       |
|           |        |           |         |         |      |     |     |   |        | Recoverable |
| Strontium | 1.97   |           | 0.0500  | 0.00927 | mg/L | 1   |     |   | 6010D  | Total       |
|           |        |           |         |         |      |     |     |   |        | Recoverable |
| Manganese | 2.83   |           | 0.00500 | 0.00353 | mg/L | 1   |     |   | 6020B  | Total       |
|           |        |           |         |         |      |     |     |   |        | Recoverable |
| Sodium    | 83.1   |           | 1.00    | 0.329   | mg/L | 1   |     |   | 6020B  | Total       |
|           |        |           |         |         |      |     |     |   |        | Recoverable |
| Iron      | 1.94   |           | 0.100   | 0.0470  | mg/L | 1   |     |   | 6020B  | Dissolved   |
| Ammonia   | 1.19   |           | 0.200   | 0.0760  | mg/L | 1   |     |   | 350.1  | Total/NA    |
| Chloride  | 2.85   |           | 1.00    | 0.128   | mg/L | 1   |     |   | 9056A  | Total/NA    |
| Fluoride  | 0.200  |           | 0.0500  | 0.0240  | mg/L | 1   |     |   | 9056A  | Total/NA    |
| Sulfate   | 1500   |           | 10.0    | 3.48    | mg/L | 10  |     |   | 9056A  | Total/NA    |

## Client Sample ID: MW-25-082423-1315

## Lab Sample ID: 240-190795-9

| Analyte                 | Result  | Qualifier | RL      | MDL     | Unit | Dil | Fac | D | Method | Prep Type   |
|-------------------------|---------|-----------|---------|---------|------|-----|-----|---|--------|-------------|
| Boron                   | 0.222   |           | 0.100   | 0.0573  | mg/L | 1   |     |   | 6010D  | Total       |
|                         |         |           |         |         |      |     |     |   |        | Recoverable |
| Lithium                 | 0.0440  | J         | 0.0500  | 0.0172  | mg/L | 1   |     |   | 6010D  | Total       |
|                         |         |           |         |         |      |     |     |   |        | Recoverable |
| Strontium               | 0.571   |           | 0.0500  | 0.00927 | mg/L | 1   |     |   | 6010D  | Total       |
|                         |         |           |         |         |      |     |     |   |        | Recoverable |
| Manganese               | 0.00912 |           | 0.00500 | 0.00353 | mg/L | 1   |     |   | 6020B  | Total       |
|                         |         |           |         |         |      |     |     |   |        | Recoverable |
| Sodium                  | 61.1    |           | 1.00    | 0.329   | mg/L | 1   |     |   | 6020B  | Total       |
|                         |         |           |         |         |      |     |     |   |        | Recoverable |
| Halogens, Total Organic | 34.1    | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| TOX Result 1            | 30.2    | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| TOX Result 2            | 38.0    | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| TOX Dup                 | 34.1    | J         | 40.0    | 14.0    | ug/L | 1   |     |   | 9020B  | Total/NA    |
| Chloride                | 34.4    |           | 1.00    | 0.128   | mg/L | 1   |     |   | 9056A  | Total/NA    |
| Fluoride                | 1.83    |           | 0.0500  | 0.0240  | mg/L | 1   |     |   | 9056A  | Total/NA    |
| Sulfate                 | 55.8    |           | 1.00    | 0.348   | mg/L | 1   |     |   | 9056A  | Total/NA    |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Client Sample ID: MW-16-082423-1540

## Lab Sample ID: 240-190795-10

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method | Prep Type   |
|-----------|--------|-----------|---------|---------|------|---------|---|--------|-------------|
| Boron     | 0.0769 | J         | 0.100   | 0.0573  | mg/L | 1       |   | 6010D  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Lithium   | 0.0556 |           | 0.0500  | 0.0172  | mg/L | 1       |   | 6010D  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Strontium | 0.497  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Manganese | 0.110  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Sodium    | 47.7   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Iron      | 0.204  |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020B  | Dissolved   |
| Chloride  | 4.22   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A  | Total/NA    |
| Fluoride  | 0.464  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA    |
| Sulfate   | 70.0   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A  | Total/NA    |

## Client Sample ID: MW-12-082423-1705

## Lab Sample ID: 240-190795-11

| Analyte                 | Result | Qualifier | RL     | MDL     | Unit | Dil Fac | D | Method | Prep Type   |
|-------------------------|--------|-----------|--------|---------|------|---------|---|--------|-------------|
| Strontium               | 0.513  |           | 0.0500 | 0.00927 | mg/L | 1       |   | 6010D  | Total       |
|                         |        |           |        |         |      |         |   |        | Recoverable |
| Sodium                  | 23.9   |           | 1.00   | 0.329   | mg/L | 1       |   | 6020B  | Total       |
|                         |        |           |        |         |      |         |   |        | Recoverable |
| Halogens, Total Organic | 99.0   |           | 40.0   | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| TOX Result 1            | 113    |           | 40.0   | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| TOX Result 2            | 84.8   |           | 40.0   | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| TOX Dup                 | 99.0   |           | 40.0   | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| Chloride                | 9.04   |           | 1.00   | 0.128   | mg/L | 1       |   | 9056A  | Total/NA    |
| Fluoride                | 0.358  |           | 0.0500 | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA    |
| Sulfate                 | 37.0   |           | 1.00   | 0.348   | mg/L | 1       |   | 9056A  | Total/NA    |

## Client Sample ID: MW-5-082423-1850

## Lab Sample ID: 240-190795-12

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method | Prep Type   |
|-----------|--------|-----------|---------|---------|------|---------|---|--------|-------------|
| Lithium   | 0.0221 | J         | 0.0500  | 0.0172  | mg/L | 1       |   | 6010D  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Strontium | 0.296  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Manganese | 0.0196 |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Sodium    | 43.4   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B  | Total       |
|           |        |           |         |         |      |         |   |        | Recoverable |
| Iron      | 0.104  |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020B  | Dissolved   |
| Chloride  | 3.69   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A  | Total/NA    |
| Fluoride  | 0.471  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA    |
| Sulfate   | 33.9   |           | 1.00    | 0.348   | mg/L | 1       |   | 9056A  | Total/NA    |

## Client Sample ID: 20760-082423-0001

## Lab Sample ID: 240-190795-13

| Analyte                 | Result | Qualifier | RL   | MDL  | Unit | Dil Fac | D | Method | Prep Type |
|-------------------------|--------|-----------|------|------|------|---------|---|--------|-----------|
| Halogens, Total Organic | 78.7   |           | 40.0 | 14.0 | ug/L | 1       |   | 9020B  | Total/NA  |
| TOX Result 1            | 86.5   |           | 40.0 | 14.0 | ug/L | 1       |   | 9020B  | Total/NA  |
| TOX Result 2            | 70.8   |           | 40.0 | 14.0 | ug/L | 1       |   | 9020B  | Total/NA  |
| TOX Dup                 | 78.7   |           | 40.0 | 14.0 | ug/L | 1       |   | 9020B  | Total/NA  |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Detection Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-27-082423-2015

Lab Sample ID: 240-190795-14

| Analyte                 | Result | Qualifier | RL      | MDL     | Unit | Dil Fac | D | Method | Prep Type   |
|-------------------------|--------|-----------|---------|---------|------|---------|---|--------|-------------|
| Boron                   | 0.165  |           | 0.100   | 0.0573  | mg/L | 1       |   | 6010D  | Total       |
| Lithium                 | 0.0447 | J         | 0.0500  | 0.0172  | mg/L | 1       |   | 6010D  | Recoverable |
| Strontium               | 0.764  |           | 0.0500  | 0.00927 | mg/L | 1       |   | 6010D  | Total       |
| Manganese               | 0.162  |           | 0.00500 | 0.00353 | mg/L | 1       |   | 6020B  | Recoverable |
| Sodium                  | 43.6   |           | 1.00    | 0.329   | mg/L | 1       |   | 6020B  | Total       |
| Iron                    | 2.34   |           | 0.100   | 0.0470  | mg/L | 1       |   | 6020B  | Recoverable |
| Ammonia                 | 1.37   |           | 0.200   | 0.0760  | mg/L | 1       |   | 350.1  | Dissolved   |
| Halogens, Total Organic | 22.2   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| TOX Result 1            | 18.0   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| TOX Result 2            | 26.4   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| TOX Dup                 | 22.2   | J         | 40.0    | 14.0    | ug/L | 1       |   | 9020B  | Total/NA    |
| Chloride                | 1.66   |           | 1.00    | 0.128   | mg/L | 1       |   | 9056A  | Total/NA    |
| Fluoride                | 0.303  |           | 0.0500  | 0.0240  | mg/L | 1       |   | 9056A  | Total/NA    |
| Sulfate                 | 254    |           | 5.00    | 1.74    | mg/L | 5       |   | 9056A  | Total/NA    |

This Detection Summary does not include radiochemical test results.

Eurofins Cleveland

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-21-082323-1325**

**Lab Sample ID: 240-190795-1**

**Date Collected: 08/23/23 13:25**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.0652 | J         | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:26 | 1       |
| Lithium   | 0.0352 | J         | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:26 | 1       |
| Strontium | 0.458  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 04:26 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.0216 |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:09 | 1       |
| Sodium    | 52.7   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:09 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:32 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/05/23 11:37 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:05 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | 3.03   | J         | 10.0   | 1.80    | mg/L |   |                | 08/28/23 10:33 | 1       |
| Halogens, Total Organic (SW846 9020B)    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 13:32 | 1       |
| TOX Result 1 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 13:32 | 1       |
| TOX Result 2 (SW846 9020B)               | 14.1   | J         | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 13:32 | 1       |
| TOX Dup (SW846 9020B)                    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 13:32 | 1       |
| Chloride (SW846 9056A)                   | 4.18   |           | 1.00   | 0.128   | mg/L |   |                | 09/05/23 18:40 | 1       |
| Fluoride (SW846 9056A)                   | 0.297  |           | 0.250  | 0.120   | mg/L |   |                | 08/30/23 10:05 | 5       |
| Sulfate (SW846 9056A)                    | 14.9   |           | 5.00   | 1.74    | mg/L |   |                | 08/30/23 10:05 | 5       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-20-082323-1515

Lab Sample ID: 240-190795-2

Date Collected: 08/23/23 15:15

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:30 | 1       |
| Lithium   | 0.0287 | J         | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:30 | 1       |
| Strontium | 0.367  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 04:30 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:11 | 1       |
| Sodium    | 66.7   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:11 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:35 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/05/23 11:40 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:09 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | 5.62   | J         | 10.0   | 1.80    | mg/L |   |                | 08/28/23 10:33 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 18.3   | J         | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 15:27 | 1       |
| TOX Result 1 (SW846 9020B)               | 30.4   | J         | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 15:27 | 1       |
| TOX Result 2 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 15:27 | 1       |
| TOX Dup (SW846 9020B)                    | 18.3   | J         | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 15:27 | 1       |
| Chloride (SW846 9056A)                   | 48.3   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 12:37 | 1       |
| Fluoride (SW846 9056A)                   | 0.503  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 12:37 | 1       |
| Sulfate (SW846 9056A)                    | 23.3   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 12:37 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-7-082323-1750

Lab Sample ID: 240-190795-3

Date Collected: 08/23/23 17:50

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.248  |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:43 | 1       |
| Lithium   | 0.0711 |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:43 | 1       |
| Strontium | 1.80   |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 04:43 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 1.41   |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:14 | 1       |
| Sodium    | 59.4   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:14 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 2.51   |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:38 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | 0.703  |           | 0.200  | 0.0760  | mg/L |   |                | 09/05/23 11:43 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:12 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | 5.62 J |           | 10.0   | 1.80    | mg/L |   |                | 08/28/23 10:33 | 1       |
| Halogens, Total Organic (SW846 9020B)    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 16:14 | 1       |
| TOX Result 1 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 16:14 | 1       |
| TOX Result 2 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 16:14 | 1       |
| TOX Dup (SW846 9020B)                    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/07/23 16:14 | 1       |
| Chloride (SW846 9056A)                   | 1.34   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 13:42 | 1       |
| Fluoride (SW846 9056A)                   | 0.331  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 13:42 | 1       |
| Sulfate (SW846 9056A)                    | 1350   |           | 10.0   | 3.48    | mg/L |   |                | 09/05/23 19:41 | 10      |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-6-082323-1915

Lab Sample ID: 240-190795-4

Date Collected: 08/23/23 19:15

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:47 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:47 | 1       |
| Strontium | 0.386  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 04:47 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.575  |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:17 | 1       |
| Sodium    | 44.7   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:17 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:40 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/05/23 11:46 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:15 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | 4.65   | J         | 10.0   | 1.80    | mg/L |   |                | 08/28/23 10:33 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 64.3   |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/08/23 09:22 | 1       |
| TOX Result 1 (SW846 9020B)               | 67.0   |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/08/23 09:22 | 1       |
| TOX Result 2 (SW846 9020B)               | 61.5   |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/08/23 09:22 | 1       |
| TOX Dup (SW846 9020B)                    | 64.3   |           | 40.0   | 14.0    | ug/L |   | 09/07/23 07:34 | 09/08/23 09:22 | 1       |
| Chloride (SW846 9056A)                   | 13.4   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 14:26 | 1       |
| Fluoride (SW846 9056A)                   | 0.318  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 14:26 | 1       |
| Sulfate (SW846 9056A)                    | 9.62   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 14:26 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: 20760-082323-0001

Lab Sample ID: 240-190795-5

Date Collected: 08/23/23 00:00

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:52 | 1       |
| Lithium   | 0.0296 | J         | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:52 | 1       |
| Strontium | 0.365  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 04:52 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:19 | 1       |
| Sodium    | 69.2   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:19 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:43 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/05/23 11:49 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     | F1        | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:19 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | 2.38   | J         | 10.0   | 1.80    | mg/L |   |                | 08/28/23 10:33 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 19.3   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 13:35 | 1       |
| TOX Result 1 (SW846 9020B)               | 31.7   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 13:35 | 1       |
| TOX Result 2 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 13:35 | 1       |
| TOX Dup (SW846 9020B)                    | 19.3   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 13:35 | 1       |
| Chloride (SW846 9056A)                   | 48.1   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 14:47 | 1       |
| Fluoride (SW846 9056A)                   | 0.498  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 14:47 | 1       |
| Sulfate (SW846 9056A)                    | 23.4   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 14:47 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: SW-1-082223-1620

Lab Sample ID: 240-190795-6

Date Collected: 08/22/23 16:20

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.528  |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:56 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 04:56 | 1       |
| Strontium | 0.165  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 04:56 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.710  |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:22 | 1       |
| Sodium    | 25.2   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:22 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 0.276  |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 17:12 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | 7.68   |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:00 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:42 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | 5.07   | J         | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 20.8   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 15:22 | 1       |
| TOX Result 1 (SW846 9020B)               | 26.5   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 15:22 | 1       |
| TOX Result 2 (SW846 9020B)               | 15.0   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 15:22 | 1       |
| TOX Dup (SW846 9020B)                    | 20.8   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 15:22 | 1       |
| Chloride (SW846 9056A)                   | 26.1   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 16:14 | 1       |
| Fluoride (SW846 9056A)                   | 0.887  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 16:14 | 1       |
| Sulfate (SW846 9056A)                    | 69.2   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 16:14 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: SW-2-082223-1730

Lab Sample ID: 240-190795-7

Date Collected: 08/22/23 17:30

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.267  |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:00 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:00 | 1       |
| Strontium | 0.223  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:00 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.229  |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:30 | 1       |
| Sodium    | 35.2   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:30 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 17:15 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | 0.134  | J         | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:03 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:45 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 25.7   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:01 | 1       |
| TOX Result 1 (SW846 9020B)               | 32.9   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:01 | 1       |
| TOX Result 2 (SW846 9020B)               | 18.4   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:01 | 1       |
| TOX Dup (SW846 9020B)                    | 25.7   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:01 | 1       |
| Chloride (SW846 9056A)                   | 49.7   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 16:36 | 1       |
| Fluoride (SW846 9056A)                   | 0.561  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 16:36 | 1       |
| Sulfate (SW846 9056A)                    | 30.6   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 16:36 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-26-082423-1200**

**Lab Sample ID: 240-190795-8**

**Date Collected: 08/24/23 12:00**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.275  |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:05 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:05 | 1       |
| Strontium | 1.97   |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:05 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 2.83   |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:32 | 1       |
| Sodium    | 83.1   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:32 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 1.94   |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:46 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | 1.19   |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:06 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:49 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:58 | 1       |
| TOX Result 1 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:58 | 1       |
| TOX Result 2 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:58 | 1       |
| TOX Dup (SW846 9020B)                    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 16:58 | 1       |
| Chloride (SW846 9056A)                   | 2.85   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 16:57 | 1       |
| Fluoride (SW846 9056A)                   | 0.200  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 16:57 | 1       |
| Sulfate (SW846 9056A)                    | 1500   |           | 10.0   | 3.48    | mg/L |   |                | 08/30/23 17:19 | 10      |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-25-082423-1315

Lab Sample ID: 240-190795-9

Date Collected: 08/24/23 13:15

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.222  |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:09 | 1       |
| Lithium   | 0.0440 | J         | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:09 | 1       |
| Strontium | 0.571  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:09 | 1       |

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

| Analyte   | Result  | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|---------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.00912 |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:35 | 1       |
| Sodium    | 61.1    |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:35 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:54 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:09 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:52 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 34.1   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 19:20 | 1       |
| TOX Result 1 (SW846 9020B)               | 30.2   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 19:20 | 1       |
| TOX Result 2 (SW846 9020B)               | 38.0   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 19:20 | 1       |
| TOX Dup (SW846 9020B)                    | 34.1   | J         | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 19:20 | 1       |
| Chloride (SW846 9056A)                   | 34.4   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 17:41 | 1       |
| Fluoride (SW846 9056A)                   | 1.83   |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 17:41 | 1       |
| Sulfate (SW846 9056A)                    | 55.8   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 17:41 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-16-082423-1540

Lab Sample ID: 240-190795-10

Date Collected: 08/24/23 15:40

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.0769 | J         | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:14 | 1       |
| Lithium   | 0.0556 |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:14 | 1       |
| Strontium | 0.497  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:14 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.110  |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:38 | 1       |
| Sodium    | 47.7   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:38 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 0.204  |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:56 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:18 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:55 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 20:04 | 1       |
| TOX Result 1 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 20:04 | 1       |
| TOX Result 2 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 20:04 | 1       |
| TOX Dup (SW846 9020B)                    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/08/23 20:04 | 1       |
| Chloride (SW846 9056A)                   | 4.22   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 18:24 | 1       |
| Fluoride (SW846 9056A)                   | 0.464  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 18:24 | 1       |
| Sulfate (SW846 9056A)                    | 70.0   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 18:24 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-12-082423-1705

Lab Sample ID: 240-190795-11

Date Collected: 08/24/23 17:05

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte          | Result       | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------|--------------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron            | ND           |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:23 | 1       |
| Lithium          | ND           |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:23 | 1       |
| <b>Strontium</b> | <b>0.513</b> |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:23 | 1       |

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

| Analyte       | Result      | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------------|-------------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese     | ND          |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:41 | 1       |
| <b>Sodium</b> | <b>23.9</b> |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:41 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND     |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 16:59 | 1       |

## General Chemistry

| Analyte                                      | Result       | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|----------------------------------------------|--------------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                          | ND           |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:21 | 1       |
| Phenolics, Total Recoverable (EPA 420.4)     | ND           |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 18:59 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)       | ND           |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| <b>Halogens, Total Organic (SW846 9020B)</b> | <b>99.0</b>  |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 12:39 | 1       |
| <b>TOX Result 1 (SW846 9020B)</b>            | <b>113</b>   |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 12:39 | 1       |
| <b>TOX Result 2 (SW846 9020B)</b>            | <b>84.8</b>  |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 12:39 | 1       |
| <b>TOX Dup (SW846 9020B)</b>                 | <b>99.0</b>  |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 12:39 | 1       |
| <b>Chloride (SW846 9056A)</b>                | <b>9.04</b>  |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 19:07 | 1       |
| <b>Fluoride (SW846 9056A)</b>                | <b>0.358</b> |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 19:07 | 1       |
| <b>Sulfate (SW846 9056A)</b>                 | <b>37.0</b>  |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 19:07 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-5-082423-1850

Lab Sample ID: 240-190795-12

Date Collected: 08/24/23 18:50

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:35 | 1       |
| Lithium   | 0.0221 | J         | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:35 | 1       |
| Strontium | 0.296  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:35 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.0196 |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:43 | 1       |
| Sodium    | 43.4   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:43 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 0.104  |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 17:02 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:24 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 19:02 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/09/23 09:05 | 1       |
| TOX Result 1 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/09/23 09:05 | 1       |
| TOX Result 2 (SW846 9020B)               | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/09/23 09:05 | 1       |
| TOX Dup (SW846 9020B)                    | ND     |           | 40.0   | 14.0    | ug/L |   | 09/08/23 07:28 | 09/09/23 09:05 | 1       |
| Chloride (SW846 9056A)                   | 3.69   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 19:29 | 1       |
| Fluoride (SW846 9056A)                   | 0.471  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 19:29 | 1       |
| Sulfate (SW846 9056A)                    | 33.9   |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 19:29 | 1       |

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: 20760-082423-0001

Lab Sample ID: 240-190795-13

Date Collected: 08/24/23 19:45

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND     |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:40 | 1       |
| Lithium   | ND     |           | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:40 | 1       |
| Strontium | ND     |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:40 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND     |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:46 | 1       |
| Sodium    | ND     |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:46 | 1       |
| Iron      | ND     |           | 0.100   | 0.0470  | mg/L |   | 08/28/23 14:00 | 08/29/23 20:46 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | ND     |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:27 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 19:05 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 78.7   |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 10:13 | 1       |
| TOX Result 1 (SW846 9020B)               | 86.5   |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 10:13 | 1       |
| TOX Result 2 (SW846 9020B)               | 70.8   |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 10:13 | 1       |
| TOX Dup (SW846 9020B)                    | 78.7   |           | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 10:13 | 1       |
| Chloride (SW846 9056A)                   | ND     |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 21:17 | 1       |
| Fluoride (SW846 9056A)                   | ND     |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 21:17 | 1       |
| Sulfate (SW846 9056A)                    | ND     |           | 1.00   | 0.348   | mg/L |   |                | 08/30/23 21:17 | 1       |

Eurofins Cleveland

# Client Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

Client Sample ID: MW-27-082423-2015

Lab Sample ID: 240-190795-14

Date Collected: 08/24/23 20:15

Matrix: Water

Date Received: 08/26/23 10:00

## Method: SW846 6010D - Metals (ICP) - Total Recoverable

| Analyte   | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | 0.165  |           | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:44 | 1       |
| Lithium   | 0.0447 | J         | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 05:44 | 1       |
| Strontium | 0.764  |           | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 05:44 | 1       |

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

| Analyte   | Result | Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|--------|-----------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | 0.162  |           | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 20:49 | 1       |
| Sodium    | 43.6   |           | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 20:49 | 1       |

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

| Analyte | Result | Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | 2.34   |           | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 17:04 | 1       |

## General Chemistry

| Analyte                                  | Result | Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|------------------------------------------|--------|-----------|--------|---------|------|---|----------------|----------------|---------|
| Ammonia (EPA 350.1)                      | 1.37   |           | 0.200  | 0.0760  | mg/L |   |                | 09/07/23 11:39 | 1       |
| Phenolics, Total Recoverable (EPA 420.4) | ND     |           | 0.0100 | 0.00300 | mg/L |   |                | 08/27/23 19:09 | 1       |
| Chemical Oxygen Demand (SM 5220D-2011)   | ND     |           | 10.0   | 1.80    | mg/L |   |                | 09/01/23 10:14 | 1       |
| Halogens, Total Organic (SW846 9020B)    | 22.2   | J         | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 11:58 | 1       |
| TOX Result 1 (SW846 9020B)               | 18.0   | J         | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 11:58 | 1       |
| TOX Result 2 (SW846 9020B)               | 26.4   | J         | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 11:58 | 1       |
| TOX Dup (SW846 9020B)                    | 22.2   | J         | 40.0   | 14.0    | ug/L |   | 09/11/23 06:30 | 09/11/23 11:58 | 1       |
| Chloride (SW846 9056A)                   | 1.66   |           | 1.00   | 0.128   | mg/L |   |                | 08/30/23 21:39 | 1       |
| Fluoride (SW846 9056A)                   | 0.303  |           | 0.0500 | 0.0240  | mg/L |   |                | 08/30/23 21:39 | 1       |
| Sulfate (SW846 9056A)                    | 254    |           | 5.00   | 1.74    | mg/L |   |                | 08/30/23 22:01 | 5       |

# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 6010D - Metals (ICP)

Lab Sample ID: MB 240-585350/1-A  
Matrix: Water  
Analysis Batch: 585529

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 585350

| Analyte   | MB Result | MB Qualifier | RL     | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|-----------|--------------|--------|---------|------|---|----------------|----------------|---------|
| Boron     | ND        |              | 0.100  | 0.0573  | mg/L |   | 08/28/23 14:00 | 08/30/23 03:55 | 1       |
| Lithium   | ND        |              | 0.0500 | 0.0172  | mg/L |   | 08/28/23 14:00 | 08/30/23 03:55 | 1       |
| Strontium | ND        |              | 0.0500 | 0.00927 | mg/L |   | 08/28/23 14:00 | 08/30/23 03:55 | 1       |

Lab Sample ID: LCS 240-585350/3-A  
Matrix: Water  
Analysis Batch: 585529

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 585350

| Analyte   | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|-------------|------------|---------------|------|---|------|-------------|
| Boron     | 1.00        | 1.005      |               | mg/L |   | 100  | 80 - 120    |
| Lithium   | 1.00        | 0.9242     |               | mg/L |   | 92   | 80 - 120    |
| Strontium | 1.00        | 0.9492     |               | mg/L |   | 95   | 80 - 120    |

Lab Sample ID: 240-190780-C-1-B MS  
Matrix: Water  
Analysis Batch: 585529

Client Sample ID: Matrix Spike  
Prep Type: Total Recoverable  
Prep Batch: 585350

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Boron     | 4.28          |                  | 1.00        | 6.008     | 4            | mg/L |   | 173  | 75 - 125    |
| Lithium   | 0.847         |                  | 1.00        | 2.003     |              | mg/L |   | 116  | 75 - 125    |
| Strontium | 2.59          | F1               | 1.00        | 3.905     | F1           | mg/L |   | 131  | 75 - 125    |

Lab Sample ID: 240-190780-C-1-C MSD  
Matrix: Water  
Analysis Batch: 585529

Client Sample ID: Matrix Spike Duplicate  
Prep Type: Total Recoverable  
Prep Batch: 585350

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Boron     | 4.28          |                  | 1.00        | 5.520      | 4             | mg/L |   | 124  | 75 - 125    | 8   | 20        |
| Lithium   | 0.847         |                  | 1.00        | 1.855      |               | mg/L |   | 101  | 75 - 125    | 8   | 20        |
| Strontium | 2.59          | F1               | 1.00        | 3.587      |               | mg/L |   | 99   | 75 - 125    | 8   | 20        |

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

Lab Sample ID: MB 240-585350/1-A  
Matrix: Water  
Analysis Batch: 585593

Client Sample ID: Method Blank  
Prep Type: Total Recoverable  
Prep Batch: 585350

| Analyte   | MB Result | MB Qualifier | RL      | MDL     | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-----------|-----------|--------------|---------|---------|------|---|----------------|----------------|---------|
| Manganese | ND        |              | 0.00500 | 0.00353 | mg/L |   | 08/28/23 14:00 | 08/29/23 19:32 | 1       |
| Sodium    | ND        |              | 1.00    | 0.329   | mg/L |   | 08/28/23 14:00 | 08/29/23 19:32 | 1       |
| Iron      | ND        |              | 0.100   | 0.0470  | mg/L |   | 08/28/23 14:00 | 08/29/23 19:32 | 1       |

Lab Sample ID: LCS 240-585350/2-A  
Matrix: Water  
Analysis Batch: 585593

Client Sample ID: Lab Control Sample  
Prep Type: Total Recoverable  
Prep Batch: 585350

| Analyte   | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|-------------|------------|---------------|------|---|------|-------------|
| Manganese | 0.500       | 0.4810     |               | mg/L |   | 96   | 80 - 120    |
| Sodium    | 25.0        | 24.17      |               | mg/L |   | 97   | 80 - 120    |
| Iron      | 5.00        | 4.840      |               | mg/L |   | 97   | 80 - 120    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

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

Lab Sample ID: 240-190680-D-1-B MS

Matrix: Water

Analysis Batch: 585593

Client Sample ID: Matrix Spike

Prep Type: Total Recoverable

Prep Batch: 585350

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|-----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Manganese | 0.0595        |                  | 0.500       | 0.4576    |              | mg/L |   | 80   | 80 - 120    |
| Sodium    | 3.70          |                  | 25.0        | 26.85     |              | mg/L |   | 93   | 80 - 120    |
| Iron      | 1.79          |                  | 5.00        | 6.453     |              | mg/L |   | 93   | 80 - 120    |

Lab Sample ID: 240-190680-D-1-C MSD

Matrix: Water

Analysis Batch: 585593

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total Recoverable

Prep Batch: 585350

| Analyte   | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | Limit |
|-----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-------|
| Manganese | 0.0595        |                  | 0.500       | 0.5347     |               | mg/L |   | 95   | 80 - 120    | 16  | 20    |
| Sodium    | 3.70          |                  | 25.0        | 27.22      |               | mg/L |   | 94   | 80 - 120    | 1   | 20    |
| Iron      | 1.79          |                  | 5.00        | 6.207      |               | mg/L |   | 88   | 80 - 120    | 4   | 20    |

Lab Sample ID: MB 240-585512/1-A

Matrix: Water

Analysis Batch: 585742

Client Sample ID: Method Blank

Prep Type: Total Recoverable

Prep Batch: 585512

| Analyte | MB Result | MB Qualifier | RL    | MDL    | Unit | D | Prepared       | Analyzed       | Dil Fac |
|---------|-----------|--------------|-------|--------|------|---|----------------|----------------|---------|
| Iron    | ND        |              | 0.100 | 0.0470 | mg/L |   | 08/29/23 14:00 | 08/30/23 15:59 | 1       |

Lab Sample ID: LCS 240-585512/2-A

Matrix: Water

Analysis Batch: 585742

Client Sample ID: Lab Control Sample

Prep Type: Total Recoverable

Prep Batch: 585512

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|-------------|------------|---------------|------|---|------|-------------|
| Iron    | 5.00        | 4.970      |               | mg/L |   | 99   | 80 - 120    |

Lab Sample ID: 240-190716-H-6-B MS

Matrix: Water

Analysis Batch: 585742

Client Sample ID: Matrix Spike

Prep Type: Total Recoverable

Prep Batch: 585512

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|---------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Iron    | ND            |                  | 5.00        | 4.754     |              | mg/L |   | 95   | 80 - 120    |

Lab Sample ID: 240-190716-H-6-C MSD

Matrix: Water

Analysis Batch: 585742

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total Recoverable

Prep Batch: 585512

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | Limit |
|---------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-------|
| Iron    | ND            |                  | 5.00        | 4.930      |               | mg/L |   | 99   | 80 - 120    | 4   | 20    |

## Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 240-586177/44

Matrix: Water

Analysis Batch: 586177

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL    | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|---------|-----------|--------------|-------|--------|------|---|----------|----------------|---------|
| Ammonia | ND        |              | 0.200 | 0.0760 | mg/L |   |          | 09/05/23 11:16 | 1       |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: 240-190980-A-2 MS

Matrix: Water

Analysis Batch: 586177

Client Sample ID: Matrix Spike

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|---------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|--|--|
| Ammonia | 0.895         |                  | 2.50        | 3.269     |              | mg/L |   | 95   | 90 - 110    |  |  |

Lab Sample ID: 240-190980-A-2 MSD

Matrix: Water

Analysis Batch: 586177

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Ammonia | 0.895         |                  | 2.50        | 3.280      |               | mg/L |   | 95   | 90 - 110    | 0   | 20        |

Lab Sample ID: MB 240-586466/14

Matrix: Water

Analysis Batch: 586466

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL    | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|---------|-----------|--------------|-------|--------|------|---|----------|----------------|---------|
| Ammonia | ND        |              | 0.200 | 0.0760 | mg/L |   |          | 09/07/23 10:42 | 1       |

Lab Sample ID: LCS 240-586466/15

Matrix: Water

Analysis Batch: 586466

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|---------|-------------|------------|---------------|------|---|------|-------------|--|--|
| Ammonia | 6.37        | 6.346      |               | mg/L |   | 100  | 90 - 110    |  |  |

Lab Sample ID: 240-190794-A-1 MS

Matrix: Water

Analysis Batch: 586466

Client Sample ID: Matrix Spike

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|---------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|--|--|
| Ammonia | ND            |                  | 2.50        | 2.424     |              | mg/L |   | 97   | 90 - 110    |  |  |

Lab Sample ID: 240-190794-A-1 MSD

Matrix: Water

Analysis Batch: 586466

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Ammonia | ND            |                  | 2.50        | 2.424      |               | mg/L |   | 97   | 90 - 110    | 0   | 20        |

Lab Sample ID: 240-190799-A-1 MS

Matrix: Water

Analysis Batch: 586466

Client Sample ID: Matrix Spike

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|---------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|--|--|
| Ammonia | ND            |                  | 2.50        | 2.660     |              | mg/L |   | 106  | 90 - 110    |  |  |

Lab Sample ID: 240-190799-A-1 MSD

Matrix: Water

Analysis Batch: 586466

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|---------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Ammonia | ND            |                  | 2.50        | 2.458      |               | mg/L |   | 98   | 90 - 110    | 8   | 20        |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 420.4 - Phenolics, Total Recoverable

Lab Sample ID: MB 240-585285/55

Matrix: Water

Analysis Batch: 585285

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte                      | MB<br>Result | MB<br>Qualifier | RL     | MDL     | Unit | D | Prepared | Analyzed       | Dil Fac |
|------------------------------|--------------|-----------------|--------|---------|------|---|----------|----------------|---------|
| Phenolics, Total Recoverable | ND           |                 | 0.0100 | 0.00300 | mg/L |   |          | 08/27/23 17:19 | 1       |

Lab Sample ID: LCS 240-585285/56

Matrix: Water

Analysis Batch: 585285

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte                      | Spike<br>Added | LCS<br>Result | LCS<br>Qualifier | Unit | D | %Rec | %Rec<br>Limits |
|------------------------------|----------------|---------------|------------------|------|---|------|----------------|
| Phenolics, Total Recoverable | 1.00           | 1.023         |                  | mg/L |   | 102  | 90 - 110       |

Lab Sample ID: 240-190795-5 MS

Matrix: Water

Analysis Batch: 585285

Client Sample ID: 20760-082323-0001

Prep Type: Total/NA

| Analyte                      | Sample<br>Result | Sample<br>Qualifier | Spike<br>Added | MS<br>Result | MS<br>Qualifier | Unit | D | %Rec | %Rec<br>Limits |
|------------------------------|------------------|---------------------|----------------|--------------|-----------------|------|---|------|----------------|
| Phenolics, Total Recoverable | ND               | F1                  | 0.0500         | 0.04053      | F1              | mg/L |   | 81   | 90 - 110       |

Lab Sample ID: 240-190795-5 MSD

Matrix: Water

Analysis Batch: 585285

Client Sample ID: 20760-082323-0001

Prep Type: Total/NA

| Analyte                      | Sample<br>Result | Sample<br>Qualifier | Spike<br>Added | MSD<br>Result | MSD<br>Qualifier | Unit | D | %Rec | %Rec<br>Limits | RPD | RPD<br>Limit |
|------------------------------|------------------|---------------------|----------------|---------------|------------------|------|---|------|----------------|-----|--------------|
| Phenolics, Total Recoverable | ND               | F1                  | 0.0500         | 0.04131       | F1               | mg/L |   | 83   | 90 - 110       | 2   | 20           |

## Method: 5220D-2011 - Chemical Oxygen Demand

Lab Sample ID: MB 240-585343/9

Matrix: Water

Analysis Batch: 585343

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte                | MB<br>Result | MB<br>Qualifier | RL   | MDL  | Unit | D | Prepared | Analyzed       | Dil Fac |
|------------------------|--------------|-----------------|------|------|------|---|----------|----------------|---------|
| Chemical Oxygen Demand | ND           |                 | 10.0 | 1.80 | mg/L |   |          | 08/28/23 10:33 | 1       |

Lab Sample ID: LCS 240-585343/13

Matrix: Water

Analysis Batch: 585343

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte                | Spike<br>Added | LCS<br>Result | LCS<br>Qualifier | Unit | D | %Rec | %Rec<br>Limits |
|------------------------|----------------|---------------|------------------|------|---|------|----------------|
| Chemical Oxygen Demand | 46.4           | 46.38         |                  | mg/L |   | 100  | 90 - 110       |

Lab Sample ID: 240-190795-2 MS

Matrix: Water

Analysis Batch: 585343

Client Sample ID: MW-20-082323-1515

Prep Type: Total/NA

| Analyte                | Sample<br>Result | Sample<br>Qualifier | Spike<br>Added | MS<br>Result | MS<br>Qualifier | Unit | D | %Rec | %Rec<br>Limits |
|------------------------|------------------|---------------------|----------------|--------------|-----------------|------|---|------|----------------|
| Chemical Oxygen Demand | 5.62             | J                   | 50.0           | 51.56        |                 | mg/L |   | 92   | 90 - 110       |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 5220D-2011 - Chemical Oxygen Demand (Continued)

Lab Sample ID: 240-190795-2 MSD

Matrix: Water

Analysis Batch: 585343

Client Sample ID: MW-20-082323-1515

Prep Type: Total/NA

| Analyte                | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|------------------------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chemical Oxygen Demand | 5.62          | J                | 50.0        | 54.47      |               | mg/L |   | 98   | 90 - 110    | 5   | 20        |

Lab Sample ID: MB 240-585943/9

Matrix: Water

Analysis Batch: 585943

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte                | MB Result | MB Qualifier | RL   | MDL  | Unit | D | Prepared | Analyzed       | Dil Fac |
|------------------------|-----------|--------------|------|------|------|---|----------|----------------|---------|
| Chemical Oxygen Demand | ND        |              | 10.0 | 1.80 | mg/L |   |          | 09/01/23 10:14 | 1       |

Lab Sample ID: LCS 240-585943/10

Matrix: Water

Analysis Batch: 585943

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte                | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|------------------------|-------------|------------|---------------|------|---|------|-------------|
| Chemical Oxygen Demand | 46.4        | 43.57      |               | mg/L |   | 94   | 90 - 110    |

Lab Sample ID: 240-190794-A-1 MS

Matrix: Water

Analysis Batch: 585943

Client Sample ID: Matrix Spike

Prep Type: Total/NA

| Analyte                | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|------------------------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Chemical Oxygen Demand | ND            | F1 F2            | 50.0        | 60.54     | F1           | mg/L |   | 121  | 90 - 110    |

Lab Sample ID: 240-190794-A-1 MSD

Matrix: Water

Analysis Batch: 585943

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

| Analyte                | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|------------------------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chemical Oxygen Demand | ND            | F1 F2            | 50.0        | 45.53      | F2            | mg/L |   | 91   | 90 - 110    | 28  | 20        |

## Method: 9020B - Organic Halides, Total (TOX)

Lab Sample ID: MB 680-796987/1-A

Matrix: Water

Analysis Batch: 797041

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 796987

| Analyte                 | MB Result | MB Qualifier | RL   | MDL  | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-------------------------|-----------|--------------|------|------|------|---|----------------|----------------|---------|
| Halogens, Total Organic | ND        |              | 40.0 | 14.0 | ug/L |   | 09/07/23 07:34 | 09/07/23 11:43 | 1       |
| TOX Result 1            | ND        |              | 40.0 | 14.0 | ug/L |   | 09/07/23 07:34 | 09/07/23 11:43 | 1       |
| TOX Result 2            | ND        |              | 40.0 | 14.0 | ug/L |   | 09/07/23 07:34 | 09/07/23 11:43 | 1       |
| TOX Dup                 | ND        |              | 40.0 | 14.0 | ug/L |   | 09/07/23 07:34 | 09/07/23 11:43 | 1       |

Lab Sample ID: LCS 680-796987/2-A

Matrix: Water

Analysis Batch: 797041

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 796987

| Analyte                 | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|-------------------------|-------------|------------|---------------|------|---|------|-------------|
| Halogens, Total Organic | 400         | 430.8      |               | ug/L |   | 108  | 60 - 140    |
| TOX Dup                 | 400         | 430.8      |               | ug/L |   | 108  | 60 - 140    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 9020B - Organic Halides, Total (TOX) (Continued)

Lab Sample ID: LCSD 680-796987/14-A

Matrix: Water

Analysis Batch: 797041

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 796987

| Analyte                 | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|-------------|-------------|----------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | 400         | 404.1       |                | ug/L |   | 101  | 60 - 140    | 6   | 40        |
| TOX Dup                 | 400         | 404.1       |                | ug/L |   | 101  | 60 - 140    | 6   | 40        |

Lab Sample ID: 240-190795-1 MS

Matrix: Water

Analysis Batch: 797041

Client Sample ID: MW-21-082323-1325

Prep Type: Total/NA

Prep Batch: 796987

| Analyte                 | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | ND            |                  | 400         | 401.0     |              | ug/L |   | 100  | 60 - 140    |     |           |
| TOX Dup                 | ND            |                  | 400         | 401.0     |              | ug/L |   | 100  | 60 - 140    |     |           |

Lab Sample ID: 240-190795-1 MSD

Matrix: Water

Analysis Batch: 797041

Client Sample ID: MW-21-082323-1325

Prep Type: Total/NA

Prep Batch: 796987

| Analyte                 | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | ND            |                  | 400         | 394.4      |               | ug/L |   | 99   | 60 - 140    | 2   | 40        |
| TOX Dup                 | ND            |                  | 400         | 394.4      |               | ug/L |   | 99   | 60 - 140    | 2   | 40        |

Lab Sample ID: MB 680-797347/1-A

Matrix: Water

Analysis Batch: 797365

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 797347

| Analyte                 | MB Result | MB Qualifier | RL   | MDL  | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-------------------------|-----------|--------------|------|------|------|---|----------------|----------------|---------|
| Halogens, Total Organic | ND        |              | 40.0 | 14.0 | ug/L |   | 09/08/23 07:28 | 09/08/23 12:21 | 1       |
| TOX Result 1            | ND        |              | 40.0 | 14.0 | ug/L |   | 09/08/23 07:28 | 09/08/23 12:21 | 1       |
| TOX Result 2            | ND        |              | 40.0 | 14.0 | ug/L |   | 09/08/23 07:28 | 09/08/23 12:21 | 1       |
| TOX Dup                 | ND        |              | 40.0 | 14.0 | ug/L |   | 09/08/23 07:28 | 09/08/23 12:21 | 1       |

Lab Sample ID: LCS 680-797347/2-A

Matrix: Water

Analysis Batch: 797365

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 797347

| Analyte                 | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | 400         | 364.4      |               | ug/L |   | 91   | 60 - 140    |     |           |
| TOX Dup                 | 400         | 364.4      |               | ug/L |   | 91   | 60 - 140    |     |           |

Lab Sample ID: LCSD 680-797347/14-A

Matrix: Water

Analysis Batch: 797365

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 797347

| Analyte                 | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|-------------|-------------|----------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | 400         | 326.4       |                | ug/L |   | 82   | 60 - 140    | 11  | 40        |
| TOX Dup                 | 400         | 326.4       |                | ug/L |   | 82   | 60 - 140    | 11  | 40        |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 9020B - Organic Halides, Total (TOX) (Continued)

Lab Sample ID: 240-190795-5 MS

Matrix: Water

Analysis Batch: 797365

Client Sample ID: 20760-082323-0001

Prep Type: Total/NA

Prep Batch: 797347

| Analyte                 | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|-------------------------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Halogens, Total Organic | 19.3          | J                | 400         | 499.2     |              | ug/L |   | 120  | 60 - 140    |
| TOX Dup                 | 19.3          | J                | 400         | 499.2     |              | ug/L |   | 120  | 60 - 140    |

Lab Sample ID: 240-190795-5 MSD

Matrix: Water

Analysis Batch: 797365

Client Sample ID: 20760-082323-0001

Prep Type: Total/NA

Prep Batch: 797347

| Analyte                 | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | 19.3          | J                | 400         | 442.6      |               | ug/L |   | 106  | 60 - 140    | 12  | 40        |
| TOX Dup                 | 19.3          | J                | 400         | 442.6      |               | ug/L |   | 106  | 60 - 140    | 12  | 40        |

Lab Sample ID: MB 680-797472/1-A

Matrix: Water

Analysis Batch: 797475

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 797472

| Analyte                 | MB Result | MB Qualifier | RL   | MDL  | Unit | D | Prepared       | Analyzed       | Dil Fac |
|-------------------------|-----------|--------------|------|------|------|---|----------------|----------------|---------|
| Halogens, Total Organic | ND        |              | 40.0 | 14.0 | ug/L |   | 09/11/23 06:30 | 09/11/23 08:39 | 1       |
| TOX Result 1            | ND        |              | 40.0 | 14.0 | ug/L |   | 09/11/23 06:30 | 09/11/23 08:39 | 1       |
| TOX Result 2            | ND        |              | 40.0 | 14.0 | ug/L |   | 09/11/23 06:30 | 09/11/23 08:39 | 1       |
| TOX Dup                 | ND        |              | 40.0 | 14.0 | ug/L |   | 09/11/23 06:30 | 09/11/23 08:39 | 1       |

Lab Sample ID: LCS 680-797472/2-A

Matrix: Water

Analysis Batch: 797475

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 797472

| Analyte                 | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|-------------------------|-------------|------------|---------------|------|---|------|-------------|
| Halogens, Total Organic | 400         | 380.0      |               | ug/L |   | 95   | 60 - 140    |
| TOX Dup                 | 400         | 380.0      |               | ug/L |   | 95   | 60 - 140    |

Lab Sample ID: 240-190795-13 MS

Matrix: Water

Analysis Batch: 797475

Client Sample ID: 20760-082423-0001

Prep Type: Total/NA

Prep Batch: 797472

| Analyte                 | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|-------------------------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Halogens, Total Organic | 78.7          |                  | 400         | 402.6     |              | ug/L |   | 81   | 60 - 140    |
| TOX Dup                 | 78.7          |                  | 400         | 402.6     |              | ug/L |   | 81   | 60 - 140    |

Lab Sample ID: 240-190795-13 MSD

Matrix: Water

Analysis Batch: 797475

Client Sample ID: 20760-082423-0001

Prep Type: Total/NA

Prep Batch: 797472

| Analyte                 | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|-------------------------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Halogens, Total Organic | 78.7          |                  | 400         | 393.8      |               | ug/L |   | 79   | 60 - 140    | 2   | 40        |
| TOX Dup                 | 78.7          |                  | 400         | 393.8      |               | ug/L |   | 79   | 60 - 140    | 2   | 40        |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 240-585387/3

Matrix: Water

Analysis Batch: 585387

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte  | MB Result | MB Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------|-----------|--------------|--------|--------|------|---|----------|----------------|---------|
| Chloride | ND        |              | 1.00   | 0.128  | mg/L |   |          | 08/29/23 22:10 | 1       |
| Fluoride | ND        |              | 0.0500 | 0.0240 | mg/L |   |          | 08/29/23 22:10 | 1       |
| Sulfate  | ND        |              | 1.00   | 0.348  | mg/L |   |          | 08/29/23 22:10 | 1       |

Lab Sample ID: LCS 240-585387/4

Matrix: Water

Analysis Batch: 585387

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte  | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|----------|-------------|------------|---------------|------|---|------|-------------|
| Chloride | 50.0        | 50.99      |               | mg/L |   | 102  | 90 - 110    |
| Fluoride | 2.50        | 2.690      |               | mg/L |   | 108  | 90 - 110    |
| Sulfate  | 50.0        | 52.66      |               | mg/L |   | 105  | 90 - 110    |

Lab Sample ID: 240-190372-A-1 MS

Matrix: Water

Analysis Batch: 585387

Client Sample ID: Matrix Spike

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Fluoride | 1.09          |                  | 12.5        | 15.16     |              | mg/L |   | 113  | 80 - 120    |

Lab Sample ID: 240-190372-A-1 MSD

Matrix: Water

Analysis Batch: 585387

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Fluoride | 1.09          |                  | 12.5        | 15.20      |               | mg/L |   | 113  | 80 - 120    | 0   | 15        |

Lab Sample ID: MB 240-585402/3

Matrix: Water

Analysis Batch: 585402

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte  | MB Result | MB Qualifier | RL     | MDL    | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------|-----------|--------------|--------|--------|------|---|----------|----------------|---------|
| Chloride | ND        |              | 1.00   | 0.128  | mg/L |   |          | 08/30/23 11:54 | 1       |
| Fluoride | ND        |              | 0.0500 | 0.0240 | mg/L |   |          | 08/30/23 11:54 | 1       |
| Sulfate  | ND        |              | 1.00   | 0.348  | mg/L |   |          | 08/30/23 11:54 | 1       |

Lab Sample ID: LCS 240-585402/4

Matrix: Water

Analysis Batch: 585402

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte  | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|----------|-------------|------------|---------------|------|---|------|-------------|
| Chloride | 50.0        | 51.02      |               | mg/L |   | 102  | 90 - 110    |
| Fluoride | 2.50        | 2.700      |               | mg/L |   | 108  | 90 - 110    |
| Sulfate  | 50.0        | 52.75      |               | mg/L |   | 105  | 90 - 110    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

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

Lab Sample ID: 240-190795-2 MS

Matrix: Water

Analysis Batch: 585402

Client Sample ID: MW-20-082323-1515

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Chloride | 48.3          |                  | 50.0        | 98.03     |              | mg/L |   | 100  | 80 - 120    |
| Fluoride | 0.503         |                  | 2.50        | 3.260     |              | mg/L |   | 110  | 80 - 120    |
| Sulfate  | 23.3          |                  | 50.0        | 75.67     |              | mg/L |   | 105  | 80 - 120    |

Lab Sample ID: 240-190795-2 MSD

Matrix: Water

Analysis Batch: 585402

Client Sample ID: MW-20-082323-1515

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chloride | 48.3          |                  | 50.0        | 98.62      |               | mg/L |   | 101  | 80 - 120    | 1   | 15        |
| Fluoride | 0.503         |                  | 2.50        | 3.274      |               | mg/L |   | 111  | 80 - 120    | 0   | 15        |
| Sulfate  | 23.3          |                  | 50.0        | 76.03      |               | mg/L |   | 105  | 80 - 120    | 0   | 15        |

Lab Sample ID: 240-190795-12 MS

Matrix: Water

Analysis Batch: 585402

Client Sample ID: MW-5-082423-1850

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |
|----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|
| Chloride | 3.69          |                  | 50.0        | 55.31     |              | mg/L |   | 103  | 80 - 120    |
| Fluoride | 0.471         |                  | 2.50        | 3.215     |              | mg/L |   | 110  | 80 - 120    |
| Sulfate  | 33.9          |                  | 50.0        | 85.88     |              | mg/L |   | 104  | 80 - 120    |

Lab Sample ID: 240-190795-12 MSD

Matrix: Water

Analysis Batch: 585402

Client Sample ID: MW-5-082423-1850

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chloride | 3.69          |                  | 50.0        | 55.51      |               | mg/L |   | 104  | 80 - 120    | 0   | 15        |
| Fluoride | 0.471         |                  | 2.50        | 3.253      |               | mg/L |   | 111  | 80 - 120    | 1   | 15        |
| Sulfate  | 33.9          |                  | 50.0        | 85.91      |               | mg/L |   | 104  | 80 - 120    | 0   | 15        |

Lab Sample ID: MB 240-586182/3

Matrix: Water

Analysis Batch: 586182

Client Sample ID: Method Blank

Prep Type: Total/NA

| Analyte  | MB Result | MB Qualifier | RL   | MDL   | Unit | D | Prepared | Analyzed       | Dil Fac |
|----------|-----------|--------------|------|-------|------|---|----------|----------------|---------|
| Chloride | ND        |              | 1.00 | 0.128 | mg/L |   |          | 09/05/23 17:06 | 1       |
| Sulfate  | ND        |              | 1.00 | 0.348 | mg/L |   |          | 09/05/23 17:06 | 1       |

Lab Sample ID: LCS 240-586182/4

Matrix: Water

Analysis Batch: 586182

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

| Analyte  | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec Limits |
|----------|-------------|------------|---------------|------|---|------|-------------|
| Chloride | 50.0        | 50.73      |               | mg/L |   | 101  | 90 - 110    |
| Sulfate  | 50.0        | 52.24      |               | mg/L |   | 104  | 90 - 110    |

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# QC Sample Results

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

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

Lab Sample ID: 240-190795-1 MS

Matrix: Water

Analysis Batch: 586182

Client Sample ID: MW-21-082323-1325

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec Limits |  |  |
|----------|---------------|------------------|-------------|-----------|--------------|------|---|------|-------------|--|--|
| Chloride | 4.18          |                  | 50.0        | 60.06     |              | mg/L |   | 112  | 80 - 120    |  |  |
| Sulfate  | 16.9          |                  | 50.0        | 73.66     |              | mg/L |   | 113  | 80 - 120    |  |  |

Lab Sample ID: 240-190795-1 MSD

Matrix: Water

Analysis Batch: 586182

Client Sample ID: MW-21-082323-1325

Prep Type: Total/NA

| Analyte  | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec Limits | RPD | RPD Limit |
|----------|---------------|------------------|-------------|------------|---------------|------|---|------|-------------|-----|-----------|
| Chloride | 4.18          |                  | 50.0        | 60.15      |               | mg/L |   | 112  | 80 - 120    | 0   | 15        |
| Sulfate  | 16.9          |                  | 50.0        | 73.87      |               | mg/L |   | 114  | 80 - 120    | 0   | 15        |

# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Metals

### Prep Batch: 585350

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-190795-1         | MW-21-082323-1325      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-2         | MW-20-082323-1515      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-3         | MW-7-082323-1750       | Total Recoverable | Water  | 3005A  |            |
| 240-190795-4         | MW-6-082323-1915       | Total Recoverable | Water  | 3005A  |            |
| 240-190795-5         | 20760-082323-0001      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-6         | SW-1-082223-1620       | Total Recoverable | Water  | 3005A  |            |
| 240-190795-7         | SW-2-082223-1730       | Total Recoverable | Water  | 3005A  |            |
| 240-190795-8         | MW-26-082423-1200      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-9         | MW-25-082423-1315      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-10        | MW-16-082423-1540      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-11        | MW-12-082423-1705      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-12        | MW-5-082423-1850       | Total Recoverable | Water  | 3005A  |            |
| 240-190795-13        | 20760-082423-0001      | Total Recoverable | Water  | 3005A  |            |
| 240-190795-14        | MW-27-082423-2015      | Total Recoverable | Water  | 3005A  |            |
| MB 240-585350/1-A    | Method Blank           | Total Recoverable | Water  | 3005A  |            |
| LCS 240-585350/2-A   | Lab Control Sample     | Total Recoverable | Water  | 3005A  |            |
| LCS 240-585350/3-A   | Lab Control Sample     | Total Recoverable | Water  | 3005A  |            |
| 240-190680-D-1-B MS  | Matrix Spike           | Total Recoverable | Water  | 3005A  |            |
| 240-190680-D-1-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 3005A  |            |
| 240-190780-C-1-B MS  | Matrix Spike           | Total Recoverable | Water  | 3005A  |            |
| 240-190780-C-1-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 3005A  |            |

### Filtration Batch: 585511

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method     | Prep Batch |
|---------------|------------------|-----------|--------|------------|------------|
| 240-190795-6  | SW-1-082223-1620 | Dissolved | Water  | FILTRATION |            |
| 240-190795-7  | SW-2-082223-1730 | Dissolved | Water  | FILTRATION |            |

### Prep Batch: 585512

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-190795-1         | MW-21-082323-1325      | Dissolved         | Water  | 3005A  |            |
| 240-190795-2         | MW-20-082323-1515      | Dissolved         | Water  | 3005A  |            |
| 240-190795-3         | MW-7-082323-1750       | Dissolved         | Water  | 3005A  |            |
| 240-190795-4         | MW-6-082323-1915       | Dissolved         | Water  | 3005A  |            |
| 240-190795-5         | 20760-082323-0001      | Dissolved         | Water  | 3005A  |            |
| 240-190795-6         | SW-1-082223-1620       | Dissolved         | Water  | 3005A  | 585511     |
| 240-190795-7         | SW-2-082223-1730       | Dissolved         | Water  | 3005A  | 585511     |
| 240-190795-8         | MW-26-082423-1200      | Dissolved         | Water  | 3005A  |            |
| 240-190795-9         | MW-25-082423-1315      | Dissolved         | Water  | 3005A  |            |
| 240-190795-10        | MW-16-082423-1540      | Dissolved         | Water  | 3005A  |            |
| 240-190795-11        | MW-12-082423-1705      | Dissolved         | Water  | 3005A  |            |
| 240-190795-12        | MW-5-082423-1850       | Dissolved         | Water  | 3005A  |            |
| 240-190795-14        | MW-27-082423-2015      | Dissolved         | Water  | 3005A  |            |
| MB 240-585512/1-A    | Method Blank           | Total Recoverable | Water  | 3005A  |            |
| LCS 240-585512/2-A   | Lab Control Sample     | Total Recoverable | Water  | 3005A  |            |
| 240-190716-H-6-B MS  | Matrix Spike           | Total Recoverable | Water  | 3005A  |            |
| 240-190716-H-6-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 3005A  |            |

### Analysis Batch: 585529

| Lab Sample ID | Client Sample ID  | Prep Type         | Matrix | Method | Prep Batch |
|---------------|-------------------|-------------------|--------|--------|------------|
| 240-190795-1  | MW-21-082323-1325 | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-2  | MW-20-082323-1515 | Total Recoverable | Water  | 6010D  | 585350     |

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# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Metals (Continued)

### Analysis Batch: 585529 (Continued)

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-190795-3         | MW-7-082323-1750       | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-4         | MW-6-082323-1915       | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-5         | 20760-082323-0001      | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-6         | SW-1-082223-1620       | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-7         | SW-2-082223-1730       | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-8         | MW-26-082423-1200      | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-9         | MW-25-082423-1315      | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-10        | MW-16-082423-1540      | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-11        | MW-12-082423-1705      | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-12        | MW-5-082423-1850       | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-13        | 20760-082423-0001      | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190795-14        | MW-27-082423-2015      | Total Recoverable | Water  | 6010D  | 585350     |
| MB 240-585350/1-A    | Method Blank           | Total Recoverable | Water  | 6010D  | 585350     |
| LCS 240-585350/3-A   | Lab Control Sample     | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190780-C-1-B MS  | Matrix Spike           | Total Recoverable | Water  | 6010D  | 585350     |
| 240-190780-C-1-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 6010D  | 585350     |

### Analysis Batch: 585593

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-190795-1         | MW-21-082323-1325      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-2         | MW-20-082323-1515      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-3         | MW-7-082323-1750       | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-4         | MW-6-082323-1915       | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-5         | 20760-082323-0001      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-6         | SW-1-082223-1620       | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-7         | SW-2-082223-1730       | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-8         | MW-26-082423-1200      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-9         | MW-25-082423-1315      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-10        | MW-16-082423-1540      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-11        | MW-12-082423-1705      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-12        | MW-5-082423-1850       | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-13        | 20760-082423-0001      | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190795-14        | MW-27-082423-2015      | Total Recoverable | Water  | 6020B  | 585350     |
| MB 240-585350/1-A    | Method Blank           | Total Recoverable | Water  | 6020B  | 585350     |
| LCS 240-585350/2-A   | Lab Control Sample     | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190680-D-1-B MS  | Matrix Spike           | Total Recoverable | Water  | 6020B  | 585350     |
| 240-190680-D-1-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 6020B  | 585350     |

### Analysis Batch: 585742

| Lab Sample ID | Client Sample ID  | Prep Type | Matrix | Method | Prep Batch |
|---------------|-------------------|-----------|--------|--------|------------|
| 240-190795-1  | MW-21-082323-1325 | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-2  | MW-20-082323-1515 | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-3  | MW-7-082323-1750  | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-4  | MW-6-082323-1915  | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-5  | 20760-082323-0001 | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-6  | SW-1-082223-1620  | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-7  | SW-2-082223-1730  | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-8  | MW-26-082423-1200 | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-9  | MW-25-082423-1315 | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-10 | MW-16-082423-1540 | Dissolved | Water  | 6020B  | 585512     |
| 240-190795-11 | MW-12-082423-1705 | Dissolved | Water  | 6020B  | 585512     |

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# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Metals (Continued)

### Analysis Batch: 585742 (Continued)

| Lab Sample ID        | Client Sample ID       | Prep Type         | Matrix | Method | Prep Batch |
|----------------------|------------------------|-------------------|--------|--------|------------|
| 240-190795-12        | MW-5-082423-1850       | Dissolved         | Water  | 6020B  | 585512     |
| 240-190795-14        | MW-27-082423-2015      | Dissolved         | Water  | 6020B  | 585512     |
| MB 240-585512/1-A    | Method Blank           | Total Recoverable | Water  | 6020B  | 585512     |
| LCS 240-585512/2-A   | Lab Control Sample     | Total Recoverable | Water  | 6020B  | 585512     |
| 240-190716-H-6-B MS  | Matrix Spike           | Total Recoverable | Water  | 6020B  | 585512     |
| 240-190716-H-6-C MSD | Matrix Spike Duplicate | Total Recoverable | Water  | 6020B  | 585512     |

## General Chemistry

### Analysis Batch: 585285

| Lab Sample ID     | Client Sample ID   | Prep Type | Matrix | Method | Prep Batch |
|-------------------|--------------------|-----------|--------|--------|------------|
| 240-190795-1      | MW-21-082323-1325  | Total/NA  | Water  | 420.4  |            |
| 240-190795-2      | MW-20-082323-1515  | Total/NA  | Water  | 420.4  |            |
| 240-190795-3      | MW-7-082323-1750   | Total/NA  | Water  | 420.4  |            |
| 240-190795-4      | MW-6-082323-1915   | Total/NA  | Water  | 420.4  |            |
| 240-190795-5      | 20760-082323-0001  | Total/NA  | Water  | 420.4  |            |
| 240-190795-6      | SW-1-082223-1620   | Total/NA  | Water  | 420.4  |            |
| 240-190795-7      | SW-2-082223-1730   | Total/NA  | Water  | 420.4  |            |
| 240-190795-8      | MW-26-082423-1200  | Total/NA  | Water  | 420.4  |            |
| 240-190795-9      | MW-25-082423-1315  | Total/NA  | Water  | 420.4  |            |
| 240-190795-10     | MW-16-082423-1540  | Total/NA  | Water  | 420.4  |            |
| 240-190795-11     | MW-12-082423-1705  | Total/NA  | Water  | 420.4  |            |
| 240-190795-12     | MW-5-082423-1850   | Total/NA  | Water  | 420.4  |            |
| 240-190795-13     | 20760-082423-0001  | Total/NA  | Water  | 420.4  |            |
| 240-190795-14     | MW-27-082423-2015  | Total/NA  | Water  | 420.4  |            |
| MB 240-585285/55  | Method Blank       | Total/NA  | Water  | 420.4  |            |
| LCS 240-585285/56 | Lab Control Sample | Total/NA  | Water  | 420.4  |            |
| 240-190795-5 MS   | 20760-082323-0001  | Total/NA  | Water  | 420.4  |            |
| 240-190795-5 MSD  | 20760-082323-0001  | Total/NA  | Water  | 420.4  |            |

### Analysis Batch: 585343

| Lab Sample ID     | Client Sample ID   | Prep Type | Matrix | Method     | Prep Batch |
|-------------------|--------------------|-----------|--------|------------|------------|
| 240-190795-1      | MW-21-082323-1325  | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-2      | MW-20-082323-1515  | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-3      | MW-7-082323-1750   | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-4      | MW-6-082323-1915   | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-5      | 20760-082323-0001  | Total/NA  | Water  | 5220D-2011 |            |
| MB 240-585343/9   | Method Blank       | Total/NA  | Water  | 5220D-2011 |            |
| LCS 240-585343/13 | Lab Control Sample | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-2 MS   | MW-20-082323-1515  | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-2 MSD  | MW-20-082323-1515  | Total/NA  | Water  | 5220D-2011 |            |

### Analysis Batch: 585387

| Lab Sample ID      | Client Sample ID       | Prep Type | Matrix | Method | Prep Batch |
|--------------------|------------------------|-----------|--------|--------|------------|
| 240-190795-1       | MW-21-082323-1325      | Total/NA  | Water  | 9056A  |            |
| MB 240-585387/3    | Method Blank           | Total/NA  | Water  | 9056A  |            |
| LCS 240-585387/4   | Lab Control Sample     | Total/NA  | Water  | 9056A  |            |
| 240-190372-A-1 MS  | Matrix Spike           | Total/NA  | Water  | 9056A  |            |
| 240-190372-A-1 MSD | Matrix Spike Duplicate | Total/NA  | Water  | 9056A  |            |

Eurofins Cleveland

# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## General Chemistry

### Analysis Batch: 585402

| Lab Sample ID     | Client Sample ID   | Prep Type | Matrix | Method | Prep Batch |
|-------------------|--------------------|-----------|--------|--------|------------|
| 240-190795-2      | MW-20-082323-1515  | Total/NA  | Water  | 9056A  |            |
| 240-190795-3      | MW-7-082323-1750   | Total/NA  | Water  | 9056A  |            |
| 240-190795-4      | MW-6-082323-1915   | Total/NA  | Water  | 9056A  |            |
| 240-190795-5      | 20760-082323-0001  | Total/NA  | Water  | 9056A  |            |
| 240-190795-6      | SW-1-082223-1620   | Total/NA  | Water  | 9056A  |            |
| 240-190795-7      | SW-2-082223-1730   | Total/NA  | Water  | 9056A  |            |
| 240-190795-8      | MW-26-082423-1200  | Total/NA  | Water  | 9056A  |            |
| 240-190795-8      | MW-26-082423-1200  | Total/NA  | Water  | 9056A  |            |
| 240-190795-9      | MW-25-082423-1315  | Total/NA  | Water  | 9056A  |            |
| 240-190795-10     | MW-16-082423-1540  | Total/NA  | Water  | 9056A  |            |
| 240-190795-11     | MW-12-082423-1705  | Total/NA  | Water  | 9056A  |            |
| 240-190795-12     | MW-5-082423-1850   | Total/NA  | Water  | 9056A  |            |
| 240-190795-13     | 20760-082423-0001  | Total/NA  | Water  | 9056A  |            |
| 240-190795-14     | MW-27-082423-2015  | Total/NA  | Water  | 9056A  |            |
| 240-190795-14     | MW-27-082423-2015  | Total/NA  | Water  | 9056A  |            |
| MB 240-585402/3   | Method Blank       | Total/NA  | Water  | 9056A  |            |
| LCS 240-585402/4  | Lab Control Sample | Total/NA  | Water  | 9056A  |            |
| 240-190795-2 MS   | MW-20-082323-1515  | Total/NA  | Water  | 9056A  |            |
| 240-190795-2 MSD  | MW-20-082323-1515  | Total/NA  | Water  | 9056A  |            |
| 240-190795-12 MS  | MW-5-082423-1850   | Total/NA  | Water  | 9056A  |            |
| 240-190795-12 MSD | MW-5-082423-1850   | Total/NA  | Water  | 9056A  |            |

### Analysis Batch: 585943

| Lab Sample ID      | Client Sample ID       | Prep Type | Matrix | Method     | Prep Batch |
|--------------------|------------------------|-----------|--------|------------|------------|
| 240-190795-6       | SW-1-082223-1620       | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-7       | SW-2-082223-1730       | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-8       | MW-26-082423-1200      | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-9       | MW-25-082423-1315      | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-10      | MW-16-082423-1540      | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-11      | MW-12-082423-1705      | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-12      | MW-5-082423-1850       | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-13      | 20760-082423-0001      | Total/NA  | Water  | 5220D-2011 |            |
| 240-190795-14      | MW-27-082423-2015      | Total/NA  | Water  | 5220D-2011 |            |
| MB 240-585943/9    | Method Blank           | Total/NA  | Water  | 5220D-2011 |            |
| LCS 240-585943/10  | Lab Control Sample     | Total/NA  | Water  | 5220D-2011 |            |
| 240-190794-A-1 MS  | Matrix Spike           | Total/NA  | Water  | 5220D-2011 |            |
| 240-190794-A-1 MSD | Matrix Spike Duplicate | Total/NA  | Water  | 5220D-2011 |            |

### Analysis Batch: 586177

| Lab Sample ID      | Client Sample ID       | Prep Type | Matrix | Method | Prep Batch |
|--------------------|------------------------|-----------|--------|--------|------------|
| 240-190795-1       | MW-21-082323-1325      | Total/NA  | Water  | 350.1  |            |
| 240-190795-2       | MW-20-082323-1515      | Total/NA  | Water  | 350.1  |            |
| 240-190795-3       | MW-7-082323-1750       | Total/NA  | Water  | 350.1  |            |
| 240-190795-4       | MW-6-082323-1915       | Total/NA  | Water  | 350.1  |            |
| 240-190795-5       | 20760-082323-0001      | Total/NA  | Water  | 350.1  |            |
| MB 240-586177/44   | Method Blank           | Total/NA  | Water  | 350.1  |            |
| LCS 240-586177/45  | Lab Control Sample     | Total/NA  | Water  | 350.1  |            |
| 240-190980-A-2 MS  | Matrix Spike           | Total/NA  | Water  | 350.1  |            |
| 240-190980-A-2 MSD | Matrix Spike Duplicate | Total/NA  | Water  | 350.1  |            |

Eurofins Cleveland

# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## General Chemistry

### Analysis Batch: 586182

| Lab Sample ID    | Client Sample ID   | Prep Type | Matrix | Method | Prep Batch |
|------------------|--------------------|-----------|--------|--------|------------|
| 240-190795-1     | MW-21-082323-1325  | Total/NA  | Water  | 9056A  |            |
| 240-190795-3     | MW-7-082323-1750   | Total/NA  | Water  | 9056A  |            |
| MB 240-586182/3  | Method Blank       | Total/NA  | Water  | 9056A  |            |
| LCS 240-586182/4 | Lab Control Sample | Total/NA  | Water  | 9056A  |            |
| 240-190795-1 MS  | MW-21-082323-1325  | Total/NA  | Water  | 9056A  |            |
| 240-190795-1 MSD | MW-21-082323-1325  | Total/NA  | Water  | 9056A  |            |

### Analysis Batch: 586466

| Lab Sample ID      | Client Sample ID       | Prep Type | Matrix | Method | Prep Batch |
|--------------------|------------------------|-----------|--------|--------|------------|
| 240-190795-6       | SW-1-082223-1620       | Total/NA  | Water  | 350.1  |            |
| 240-190795-7       | SW-2-082223-1730       | Total/NA  | Water  | 350.1  |            |
| 240-190795-8       | MW-26-082423-1200      | Total/NA  | Water  | 350.1  |            |
| 240-190795-9       | MW-25-082423-1315      | Total/NA  | Water  | 350.1  |            |
| 240-190795-10      | MW-16-082423-1540      | Total/NA  | Water  | 350.1  |            |
| 240-190795-11      | MW-12-082423-1705      | Total/NA  | Water  | 350.1  |            |
| 240-190795-12      | MW-5-082423-1850       | Total/NA  | Water  | 350.1  |            |
| 240-190795-13      | 20760-082423-0001      | Total/NA  | Water  | 350.1  |            |
| 240-190795-14      | MW-27-082423-2015      | Total/NA  | Water  | 350.1  |            |
| MB 240-586466/14   | Method Blank           | Total/NA  | Water  | 350.1  |            |
| LCS 240-586466/15  | Lab Control Sample     | Total/NA  | Water  | 350.1  |            |
| 240-190794-A-1 MS  | Matrix Spike           | Total/NA  | Water  | 350.1  |            |
| 240-190794-A-1 MSD | Matrix Spike Duplicate | Total/NA  | Water  | 350.1  |            |
| 240-190799-A-1 MS  | Matrix Spike           | Total/NA  | Water  | 350.1  |            |
| 240-190799-A-1 MSD | Matrix Spike Duplicate | Total/NA  | Water  | 350.1  |            |

### Prep Batch: 796987

| Lab Sample ID        | Client Sample ID       | Prep Type | Matrix | Method      | Prep Batch |
|----------------------|------------------------|-----------|--------|-------------|------------|
| 240-190795-1         | MW-21-082323-1325      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-2         | MW-20-082323-1515      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-3         | MW-7-082323-1750       | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-4         | MW-6-082323-1915       | Total/NA  | Water  | Carbon Trap |            |
| MB 680-796987/1-A    | Method Blank           | Total/NA  | Water  | Carbon Trap |            |
| LCS 680-796987/2-A   | Lab Control Sample     | Total/NA  | Water  | Carbon Trap |            |
| LCSD 680-796987/14-A | Lab Control Sample Dup | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-1 MS      | MW-21-082323-1325      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-1 MSD     | MW-21-082323-1325      | Total/NA  | Water  | Carbon Trap |            |

### Analysis Batch: 797041

| Lab Sample ID        | Client Sample ID       | Prep Type | Matrix | Method | Prep Batch |
|----------------------|------------------------|-----------|--------|--------|------------|
| 240-190795-1         | MW-21-082323-1325      | Total/NA  | Water  | 9020B  | 796987     |
| 240-190795-2         | MW-20-082323-1515      | Total/NA  | Water  | 9020B  | 796987     |
| 240-190795-3         | MW-7-082323-1750       | Total/NA  | Water  | 9020B  | 796987     |
| 240-190795-4         | MW-6-082323-1915       | Total/NA  | Water  | 9020B  | 796987     |
| MB 680-796987/1-A    | Method Blank           | Total/NA  | Water  | 9020B  | 796987     |
| LCS 680-796987/2-A   | Lab Control Sample     | Total/NA  | Water  | 9020B  | 796987     |
| LCSD 680-796987/14-A | Lab Control Sample Dup | Total/NA  | Water  | 9020B  | 796987     |
| 240-190795-1 MS      | MW-21-082323-1325      | Total/NA  | Water  | 9020B  | 796987     |
| 240-190795-1 MSD     | MW-21-082323-1325      | Total/NA  | Water  | 9020B  | 796987     |

Eurofins Cleveland

# QC Association Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## General Chemistry

### Prep Batch: 797347

| Lab Sample ID        | Client Sample ID       | Prep Type | Matrix | Method      | Prep Batch |
|----------------------|------------------------|-----------|--------|-------------|------------|
| 240-190795-5         | 20760-082323-0001      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-6         | SW-1-082223-1620       | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-7         | SW-2-082223-1730       | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-8         | MW-26-082423-1200      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-9         | MW-25-082423-1315      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-10        | MW-16-082423-1540      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-12        | MW-5-082423-1850       | Total/NA  | Water  | Carbon Trap |            |
| MB 680-797347/1-A    | Method Blank           | Total/NA  | Water  | Carbon Trap |            |
| LCS 680-797347/2-A   | Lab Control Sample     | Total/NA  | Water  | Carbon Trap |            |
| LCSD 680-797347/14-A | Lab Control Sample Dup | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-5 MS      | 20760-082323-0001      | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-5 MSD     | 20760-082323-0001      | Total/NA  | Water  | Carbon Trap |            |

### Analysis Batch: 797365

| Lab Sample ID        | Client Sample ID       | Prep Type | Matrix | Method | Prep Batch |
|----------------------|------------------------|-----------|--------|--------|------------|
| 240-190795-5         | 20760-082323-0001      | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-6         | SW-1-082223-1620       | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-7         | SW-2-082223-1730       | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-8         | MW-26-082423-1200      | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-9         | MW-25-082423-1315      | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-10        | MW-16-082423-1540      | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-12        | MW-5-082423-1850       | Total/NA  | Water  | 9020B  | 797347     |
| MB 680-797347/1-A    | Method Blank           | Total/NA  | Water  | 9020B  | 797347     |
| LCS 680-797347/2-A   | Lab Control Sample     | Total/NA  | Water  | 9020B  | 797347     |
| LCSD 680-797347/14-A | Lab Control Sample Dup | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-5 MS      | 20760-082323-0001      | Total/NA  | Water  | 9020B  | 797347     |
| 240-190795-5 MSD     | 20760-082323-0001      | Total/NA  | Water  | 9020B  | 797347     |

### Prep Batch: 797472

| Lab Sample ID      | Client Sample ID   | Prep Type | Matrix | Method      | Prep Batch |
|--------------------|--------------------|-----------|--------|-------------|------------|
| 240-190795-11      | MW-12-082423-1705  | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-13      | 20760-082423-0001  | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-14      | MW-27-082423-2015  | Total/NA  | Water  | Carbon Trap |            |
| MB 680-797472/1-A  | Method Blank       | Total/NA  | Water  | Carbon Trap |            |
| LCS 680-797472/2-A | Lab Control Sample | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-13 MS   | 20760-082423-0001  | Total/NA  | Water  | Carbon Trap |            |
| 240-190795-13 MSD  | 20760-082423-0001  | Total/NA  | Water  | Carbon Trap |            |

### Analysis Batch: 797475

| Lab Sample ID      | Client Sample ID   | Prep Type | Matrix | Method | Prep Batch |
|--------------------|--------------------|-----------|--------|--------|------------|
| 240-190795-11      | MW-12-082423-1705  | Total/NA  | Water  | 9020B  | 797472     |
| 240-190795-13      | 20760-082423-0001  | Total/NA  | Water  | 9020B  | 797472     |
| 240-190795-14      | MW-27-082423-2015  | Total/NA  | Water  | 9020B  | 797472     |
| MB 680-797472/1-A  | Method Blank       | Total/NA  | Water  | 9020B  | 797472     |
| LCS 680-797472/2-A | Lab Control Sample | Total/NA  | Water  | 9020B  | 797472     |
| 240-190795-13 MS   | 20760-082423-0001  | Total/NA  | Water  | 9020B  | 797472     |
| 240-190795-13 MSD  | 20760-082423-0001  | Total/NA  | Water  | 9020B  | 797472     |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-21-082323-1325**

**Lab Sample ID: 240-190795-1**

**Date Collected: 08/23/23 13:25**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 04:26       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:32       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:09       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586177       | JWW     | EET CLE | 09/05/23 11:37       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:05       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585343       | MS      | EET CLE | 08/28/23 10:33       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 796987       | CLJ     | EET SAV | 09/07/23 07:34       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797041       | CLJ     | EET SAV | 09/07/23 13:32       |
| Total/NA          | Analysis   | 9056A        |     | 5               | 585387       | ALT     | EET CLE | 08/30/23 10:05       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 586182       | JWW     | EET CLE | 09/05/23 18:40       |

**Client Sample ID: MW-20-082323-1515**

**Lab Sample ID: 240-190795-2**

**Date Collected: 08/23/23 15:15**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 04:30       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:35       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:11       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586177       | JWW     | EET CLE | 09/05/23 11:40       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:09       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585343       | MS      | EET CLE | 08/28/23 10:33       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 796987       | CLJ     | EET SAV | 09/07/23 07:34       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797041       | CLJ     | EET SAV | 09/07/23 15:27       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 12:37       |

**Client Sample ID: MW-7-082323-1750**

**Lab Sample ID: 240-190795-3**

**Date Collected: 08/23/23 17:50**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 04:43       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:38       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:14       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586177       | JWW     | EET CLE | 09/05/23 11:43       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-7-082323-1750**

**Lab Sample ID: 240-190795-3**

**Date Collected: 08/23/23 17:50**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:12       |
| Total/NA  | Analysis   | 5220D-2011   |     | 1               | 585343       | MS      | EET CLE | 08/28/23 10:33       |
| Total/NA  | Prep       | Carbon Trap  |     |                 | 796987       | CLJ     | EET SAV | 09/07/23 07:34       |
| Total/NA  | Analysis   | 9020B        |     | 1               | 797041       | CLJ     | EET SAV | 09/07/23 16:14       |
| Total/NA  | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 13:42       |
| Total/NA  | Analysis   | 9056A        |     | 10              | 586182       | JWW     | EET CLE | 09/05/23 19:41       |

**Client Sample ID: MW-6-082323-1915**

**Lab Sample ID: 240-190795-4**

**Date Collected: 08/23/23 19:15**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 04:47       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:40       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:17       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586177       | JWW     | EET CLE | 09/05/23 11:46       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:15       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585343       | MS      | EET CLE | 08/28/23 10:33       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 796987       | CLJ     | EET SAV | 09/07/23 07:34       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797041       | CLJ     | EET SAV | 09/08/23 09:22       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 14:26       |

**Client Sample ID: 20760-082323-0001**

**Lab Sample ID: 240-190795-5**

**Date Collected: 08/23/23 00:00**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 04:52       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:43       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:19       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586177       | JWW     | EET CLE | 09/05/23 11:49       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:19       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585343       | MS      | EET CLE | 08/28/23 10:33       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/08/23 13:35       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 14:47       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: SW-1-082223-1620**

**Lab Sample ID: 240-190795-6**

**Date Collected: 08/22/23 16:20**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 04:56       |
| Dissolved         | Filtration | FILTRATION   |     |                 | 585511       | BN      | EET CLE | 08/29/23 12:00       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 17:12       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:22       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:00       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:42       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/08/23 15:22       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 16:14       |

**Client Sample ID: SW-2-082223-1730**

**Lab Sample ID: 240-190795-7**

**Date Collected: 08/22/23 17:30**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:00       |
| Dissolved         | Filtration | FILTRATION   |     |                 | 585511       | BN      | EET CLE | 08/29/23 12:00       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 17:15       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:30       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:03       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:45       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/08/23 16:01       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 16:36       |

**Client Sample ID: MW-26-082423-1200**

**Lab Sample ID: 240-190795-8**

**Date Collected: 08/24/23 12:00**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:05       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:46       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:32       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-26-082423-1200**

**Lab Sample ID: 240-190795-8**

**Date Collected: 08/24/23 12:00**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:06       |
| Total/NA  | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:49       |
| Total/NA  | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA  | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA  | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/08/23 16:58       |
| Total/NA  | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 16:57       |
| Total/NA  | Analysis   | 9056A        |     | 10              | 585402       | ALT     | EET CLE | 08/30/23 17:19       |

**Client Sample ID: MW-25-082423-1315**

**Lab Sample ID: 240-190795-9**

**Date Collected: 08/24/23 13:15**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:09       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:54       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:35       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:09       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:52       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/08/23 19:20       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 17:41       |

**Client Sample ID: MW-16-082423-1540**

**Lab Sample ID: 240-190795-10**

**Date Collected: 08/24/23 15:40**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:14       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:56       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:38       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:18       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:55       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/08/23 20:04       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 18:24       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: MW-12-082423-1705**

**Lab Sample ID: 240-190795-11**

**Date Collected: 08/24/23 17:05**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:23       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 16:59       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:41       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:21       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 18:59       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797472       | CLJ     | EET SAV | 09/11/23 06:30       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797475       | CLJ     | EET SAV | 09/11/23 12:39       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 19:07       |

**Client Sample ID: MW-5-082423-1850**

**Lab Sample ID: 240-190795-12**

**Date Collected: 08/24/23 18:50**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:35       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 17:02       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:43       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:24       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 19:02       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797347       | CLJ     | EET SAV | 09/08/23 07:28       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797365       | CLJ     | EET SAV | 09/09/23 09:05       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 19:29       |

**Client Sample ID: 20760-082423-0001**

**Lab Sample ID: 240-190795-13**

**Date Collected: 08/24/23 19:45**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:40       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:46       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:27       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 19:05       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |

Eurofins Cleveland

# Lab Chronicle

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

**Client Sample ID: 20760-082423-0001**

**Lab Sample ID: 240-190795-13**

**Date Collected: 08/24/23 19:45**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | Carbon Trap  |     |                 | 797472       | CLJ     | EET SAV | 09/11/23 06:30       |
| Total/NA  | Analysis   | 9020B        |     | 1               | 797475       | CLJ     | EET SAV | 09/11/23 10:13       |
| Total/NA  | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 21:17       |

**Client Sample ID: MW-27-082423-2015**

**Lab Sample ID: 240-190795-14**

**Date Collected: 08/24/23 20:15**

**Matrix: Water**

**Date Received: 08/26/23 10:00**

| Prep Type         | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-------------------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6010D        |     | 1               | 585529       | AJC     | EET CLE | 08/30/23 05:44       |
| Dissolved         | Prep       | 3005A        |     |                 | 585512       | BN      | EET CLE | 08/29/23 14:00       |
| Dissolved         | Analysis   | 6020B        |     | 1               | 585742       | RKT     | EET CLE | 08/30/23 17:04       |
| Total Recoverable | Prep       | 3005A        |     |                 | 585350       | BN      | EET CLE | 08/28/23 14:00       |
| Total Recoverable | Analysis   | 6020B        |     | 1               | 585593       | RKT     | EET CLE | 08/29/23 20:49       |
| Total/NA          | Analysis   | 350.1        |     | 1               | 586466       | MED     | EET CLE | 09/07/23 11:39       |
| Total/NA          | Analysis   | 420.4        |     | 1               | 585285       | JMR     | EET CLE | 08/27/23 19:09       |
| Total/NA          | Analysis   | 5220D-2011   |     | 1               | 585943       | ALT     | EET CLE | 09/01/23 10:14       |
| Total/NA          | Prep       | Carbon Trap  |     |                 | 797472       | CLJ     | EET SAV | 09/11/23 06:30       |
| Total/NA          | Analysis   | 9020B        |     | 1               | 797475       | CLJ     | EET SAV | 09/11/23 11:58       |
| Total/NA          | Analysis   | 9056A        |     | 1               | 585402       | ALT     | EET CLE | 08/30/23 21:39       |
| Total/NA          | Analysis   | 9056A        |     | 5               | 585402       | ALT     | EET CLE | 08/30/23 22:01       |

## Laboratory References:

EET CLE = Eurofins Cleveland, 180 S. Van Buren Avenue, Barberton, OH 44203, TEL (330)497-9396

EET SAV = Eurofins Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

# Accreditation/Certification Summary

Client: Haley & Aldrich, Inc.  
Project/Site: Amsted - Keokuk, Iowa GW

Job ID: 240-190795-1

## Laboratory: Eurofins Cleveland

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

| Authority | Program | Identification Number | Expiration Date |
|-----------|---------|-----------------------|-----------------|
| Iowa      | State   | 421                   | 06-01-25        |

## Laboratory: Eurofins Savannah

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

| Authority              | Program               | Identification Number | Expiration Date |
|------------------------|-----------------------|-----------------------|-----------------|
|                        | AFCEE                 | SAVLAB                |                 |
| Alabama                | State                 | 41450                 | 06-30-24        |
| ANAB                   | Dept. of Defense ELAP | L2463                 | 09-22-24        |
| Arkansas DEQ           | State                 | 19-015-0              | 02-01-24        |
| California             | State                 | 2939                  | 06-30-23 *      |
| Florida                | NELAP                 | E87052                | 06-30-24        |
| Georgia                | State                 | E87052                | 06-30-24        |
| Georgia (DW)           | State                 | 803                   | 06-30-24        |
| Guam                   | State                 | 19-007R               | 04-17-24        |
| Hawaii                 | State                 | <cert No.>            | 06-30-24        |
| Illinois               | NELAP                 | 200022                | 11-30-23        |
| Indiana                | State                 | C-GA-02               | 06-30-24        |
| Iowa                   | State                 | 353                   | 07-01-25        |
| Kentucky (UST)         | State                 | NA                    | 06-30-24        |
| Louisiana              | NELAP                 | 30690                 | 06-30-24        |
| Louisiana (All)        | NELAP                 | 30690                 | 06-30-24        |
| Louisiana (DW)         | State                 | LA009                 | 12-31-23        |
| Maine                  | State                 | GA00006               | 09-25-24        |
| Maryland               | State                 | 250                   | 12-31-23        |
| Massachusetts          | State                 | M-GA006               | 06-30-24        |
| Michigan               | State                 | 9925                  | 06-30-24        |
| Mississippi            | State                 | <cert No.>            | 06-30-24        |
| Nebraska               | State                 | NE-OS-7-04            | 06-30-24        |
| New Jersey             | NELAP                 | GA769                 | 06-30-24        |
| New Mexico             | State                 | GA00006               | 06-30-24        |
| North Carolina (DW)    | State                 | 13701                 | 07-31-24        |
| North Carolina (WW/SW) | State                 | 269                   | 12-31-23        |
| Pennsylvania           | NELAP                 | 68-00474              | 06-30-24        |
| Puerto Rico            | State                 | GA00006               | 01-01-24        |
| South Carolina         | State                 | 98001                 | 06-30-23 *      |
| Tennessee              | State                 | TN02961               | 06-30-24        |
| Texas                  | NELAP                 | T1047004185           | 11-30-23        |
| Texas                  | TCEQ Water Supply     | T104704185            | 06-30-24        |
| USDA                   | US Federal Programs   | P330-18-00313         | 09-03-24        |
| Virginia               | NELAP                 | 460161                | 06-14-24        |
| Wyoming                | State                 | 8TMS-L                | 06-30-23 *      |

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Cleveland

# Jfins Cleveland

J S. Van Buren Avenue  
 darberton, OH 44203  
 Phone: 330-497-9396 Fax: 330-497-0772

## Chain of Custody Record



Environment Testing

|                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client Information</b><br>Client Contact: Francis Reed<br>Phone: 614-288-8619<br>E-Mail: Denise.Hackler@eurofins.com<br>Company: PWSID                                                                                                                                                                                                                                                              |                                                                                                  | Lab PM: Heckler, Denise D<br>State of Origin: IOWA<br>Carrier Tracking No(s): 240-111097-39596.1<br>Page: Page 1 of 2<br>Job #: 0129848-035                           |                                                                                                                                               |
| Address: 8899 Gander Creek Drive<br>City: Miamisburg<br>State, Zip: OH, 45342-4418<br>Phone: 937-530-1412(Tel)<br>Email: TVanage@haleyaldrich.com<br>Project Name: Amsted - Keokuk, Iowa Fall 2023<br>Site:                                                                                                                                                                                            |                                                                                                  | Due Date Requested:<br>TAT Requested (days): STD<br>Compliance Project: Yes No<br>PO #: 0129848-034<br>WO #: 24024753<br>Project #: 24024753<br>SSOW#:                |                                                                                                                                               |
| <b>Sample Identification</b>                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                  | <b>Analysis Requested</b>                                                                                                                                             |                                                                                                                                               |
| Sample Date<br>MW-21-082323-1325<br>MW-20-082323-1515<br>MW-7-082323-1750<br>MW-6-082323-1915<br>20760-082323-0001<br>SW-1-082223-1620<br>SW-2-082223-1730<br>MW-26-082423-1200<br>MW-25-082423-1315<br>MW-16-082423-1540<br>MW-12-082423-1705                                                                                                                                                         | Sample Time<br>1325<br>1515<br>1750<br>1915<br>-<br>1620<br>1730<br>1200<br>1315<br>1540<br>1705 | Sample Type (C=comp, G=grab)<br>G<br>G<br>G<br>G<br>G<br>G<br>G<br>G<br>G<br>G<br>G                                                                                   | Matrix (Water, Solid, O-waste, Soil, etc.)<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water |
| Field Filtered Sample (Yes or No)<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No                                                                                                                                                                                                                                                        |                                                                                                  | Field Filtered Sample (Yes or No)<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No<br>Yes No                       |                                                                                                                                               |
| Preservation Codes:<br>A - HCL<br>B - NaOH<br>C - Zn Acetate<br>D - Nitric Acid<br>E - NaHSO4<br>F - MeOH<br>G - Amchlor<br>H - Ascorbic Acid<br>I - Ice<br>J - DI Water<br>K - EDTA<br>L - EDA<br>M - Hexane<br>N - None<br>O - AsNaO2<br>P - Na2O4S<br>Q - Na2SO3<br>R - Na2S2O3<br>S - H2SO4<br>T - TSP Dodecahydrate<br>U - Acetone<br>V - MCAA<br>W - pH 4-5<br>Y - Trizma<br>Z - other (specify) |                                                                                                  | Total Number of containers<br>Special Instructions/Note:<br>240-190795 Chain of Custody<br>Field Dup.<br>Hold "Field Filtered" sample<br>Hold "Field Filtered" sample |                                                                                                                                               |
| Possible Hazard Identification<br><input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological<br>Deliverable Requested: I, II, III, IV, Other (specify)                                                                                     |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)<br><input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For Months                                                                                                                                                                                  |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Special Instructions/QC Requirements:                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Empty Kit Relinquished by:                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Relinquished by: Francis Reed<br>Date/Time: 8/25/23 1800<br>Company: HSA                                                                                                                                                                                                                                                                                                                               |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Relinquished by:                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Relinquished by:                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Relinquished by:                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Custody Seals Intact: Yes No<br>Custody Seal No:                                                                                                                                                                                                                                                                                                                                                       |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |
| Cooler Temperature(s) C and Other Remarks:                                                                                                                                                                                                                                                                                                                                                             |                                                                                                  |                                                                                                                                                                       |                                                                                                                                               |



## Barderton Facility

|                                                                                                                          |  |                  |  |                                                                                                               |  |
|--------------------------------------------------------------------------------------------------------------------------|--|------------------|--|---------------------------------------------------------------------------------------------------------------|--|
| Client <u>Hailey &amp; Adrich Inc</u>                                                                                    |  | Site Name _____  |  | Cooler unpacked by: <u>L Osborne</u>                                                                          |  |
| Cooler Received on _____                                                                                                 |  | Opened on _____  |  |                                                                                                               |  |
| FedEx: 1 <sup>st</sup> Grd Exp                                                                                           |  | UPS FAS Waypoint |  | Client Drop Off Eurofins Courier Other                                                                        |  |
| Receipt After-hours: Drop-off Date/Time _____                                                                            |  |                  |  | Storage Location _____                                                                                        |  |
| Eurofins Cooler # <u>EC</u>                                                                                              |  | Foam Box         |  | Client Cooler Box Other _____                                                                                 |  |
| Packing material used: <u>Bubble Wrap</u>                                                                                |  | Foam Plastic Bag |  | None Other _____                                                                                              |  |
| COOLANT: <u>Wet Ice</u>                                                                                                  |  | Blue Ice         |  | Dry Ice Water None                                                                                            |  |
| 1. Cooler temperature upon receipt <input checked="" type="checkbox"/> See Multiple Cooler Form                          |  |                  |  |                                                                                                               |  |
| IR GUN # <u>18</u>                                                                                                       |  | (CF -0.7 °C)     |  | Observed Cooler Temp. <u>5.7</u> °C Corrected Cooler Temp. _____ °C                                           |  |
| 2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity _____                                      |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| -Were the seals on the outside of the cooler(s) signed & dated?                                                          |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> NA                        |  |
| -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?                                                  |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> NA                        |  |
| -Were tamper/custody seals intact and uncompromised?                                                                     |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> NA                        |  |
| 3. Shippers' packing slip attached to the cooler(s)?                                                                     |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 4. Did custody papers accompany the sample(s)?                                                                           |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 5. Were the custody papers relinquished & signed in the appropriate place?                                               |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 6. Was/were the person(s) who collected the samples clearly identified on the COC?                                       |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 7. Did all bottles arrive in good condition (Unbroken)?                                                                  |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 8. Could all bottle labels (ID/Date/Time) be reconciled with the COC?                                                    |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 9. For each sample, does the COC specify preservatives (Y/N), # of containers (Y/N), and sample type of grab/comp (Y/N)? |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 10. Were correct bottle(s) used for the test(s) indicated?                                                               |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 11. Sufficient quantity received to perform indicated analyses?                                                          |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 12. Are these work share samples and all listed on the COC?                                                              |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| If yes, Questions 13-17 have been checked at the originating laboratory.                                                 |  |                  |  |                                                                                                               |  |
| 13. Were all preserved sample(s) at the correct pH upon receipt?                                                         |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> NA pH Strip Lot# HC312502 |  |
| 14. Were VOAs on the COC?                                                                                                |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 15. Were air bubbles >6 mm in any VOA vials?  Larger than this.                                                          |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> NA                        |  |
| 16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____                                                |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| 17. Was a LL Hg or Me Hg trip blank present? _____                                                                       |  |                  |  | <input checked="" type="radio"/> Yes <input type="radio"/> No                                                 |  |
| Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other _____                                                 |  |                  |  |                                                                                                               |  |
| Concerning _____                                                                                                         |  |                  |  |                                                                                                               |  |

## 18. CHAIN OF CUSTODY &amp; SAMPLE DISCREPANCIES

☐ additional next page

Samples processed by: \_\_\_\_\_

## 19. SAMPLE CONDITION

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.

Sample(s) \_\_\_\_\_ were received in a broken container.

Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

## 20. SAMPLE PRESERVATION

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.

Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_

VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_

Temperature readings: \_\_\_\_\_

| Client Sample ID  | Lab ID          | Container Type                     | Container |      | Preservative |       |
|-------------------|-----------------|------------------------------------|-----------|------|--------------|-------|
|                   |                 |                                    | pH        | Temp | Added (mls)  | Lot # |
| MW-21-082323-1325 | 240-190795-D-1  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-21-082323-1325 | 240-190795-E-1  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-21-082323-1325 | 240-190795-F-1  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-20-082323-1515 | 240-190795-D-2  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-20-082323-1515 | 240-190795-E-2  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-20-082323-1515 | 240-190795-F-2  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-7-082323-1750  | 240-190795-D-3  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-7-082323-1750  | 240-190795-E-3  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-7-082323-1750  | 240-190795-F-3  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-6-082323-1915  | 240-190795-D-4  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-6-082323-1915  | 240-190795-E-4  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-6-082323-1915  | 240-190795-F-4  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| 20760-082323-0001 | 240-190795-D-5  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| 20760-082323-0001 | 240-190795-E-5  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| 20760-082323-0001 | 240-190795-F-5  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| SW-1-082223-1620  | 240-190795-D-6  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| SW-1-082223-1620  | 240-190795-F-6  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| SW-1-082223-1620  | 240-190795-G-6  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| SW-2-082223-1730  | 240-190795-D-7  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| SW-2-082223-1730  | 240-190795-F-7  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| SW-2-082223-1730  | 240-190795-G-7  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-26-082423-1200 | 240-190795-D-8  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-26-082423-1200 | 240-190795-E-8  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-26-082423-1200 | 240-190795-F-8  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-25-082423-1315 | 240-190795-D-9  | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-25-082423-1315 | 240-190795-E-9  | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-25-082423-1315 | 240-190795-F-9  | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-16-082423-1540 | 240-190795-D-10 | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-16-082423-1540 | 240-190795-E-10 | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-16-082423-1540 | 240-190795-F-10 | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-12-082423-1705 | 240-190795-D-11 | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-12-082423-1705 | 240-190795-E-11 | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |
| MW-12-082423-1705 | 240-190795-F-11 | Plastic 500ml - w/ Nitric - Dis.   | <2        |      |              |       |
| MW-5-082423-1850  | 240-190795-D-12 | Plastic 250ml - with Sulfuric Acid | <2        |      |              |       |
| MW-5-082423-1850  | 240-190795-E-12 | Plastic 500ml - with Nitric Acid   | <2        |      |              |       |

Client Sample IDLab IDContainer TypeContainerPreservativepHTempAdded (mls)Lot #

MW-5-082423-1850

240-190795-F-12

Plastic 500ml - w/ Nitric - Dis.

&lt;2

20760-082423-0001

240-190795-D-13

Plastic 250ml - with Sulfuric Acid

&lt;2

20760-082423-0001

240-190795-E-13

Plastic 500ml - with Nitric Acid

&lt;2

20760-082423-0001

240-190795-F-13

Plastic 500ml - w/ Nitric - Dis.

&lt;2

MW-27-082423-2015

240-190795-D-14

Plastic 250ml - with Sulfuric Acid

&lt;2

MW-27-082423-2015

240-190795-E-14

Plastic 500ml - with Nitric Acid

&lt;2

MW-27-082423-2015

240-190795-F-14

Plastic 500ml - w/ Nitric - Dis.

&lt;2

## Eurofins Cleveland

180 S. Van Buren Avenue  
Barberton, OH 44203  
Phone: 330-497-9396 Fax: 330-497-0772

## Chain of Custody Record



Environment Testing

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                  |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------|---|--|--------------------------------------------------------------|--|--|----------|--|-----------|--|--|--|--|
| <b>Client Information (Sub Contract Lab)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | Sampler:                         |                    | Lab PM:<br>Heckler, Denise D                                                                                       |                                                                     | Carrier Tracking No(s):                                                                                                              |   | COC No:<br>240-172919.1 |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Client Contact:<br>Shipping/Receiving                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | Phone:                           |                    | E-Mail:<br>Denise.Heckler@et.eurofinsus.com                                                                        |                                                                     | State of Origin:<br>Iowa                                                                                                             |   | Page:<br>Page 1 of 2    |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Company:<br>Eurofins Environment Testing Southeast,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                  |                    | Accreditations Required (See note):<br>State - Iowa                                                                |                                                                     |                                                                                                                                      |   | Job #:<br>240-190795-1  |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Address:<br>5102 LaRoche Avenue,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | Due Date Requested:<br>9/11/2023 |                    | <b>Analysis Requested</b>                                                                                          |                                                                     |                                                                                                                                      |   |                         |          | <b>Preservation Codes:</b><br>A - HCL M - Hexane<br>B - NaOH N - None<br>C - Zn Acetate O - AsNaO2<br>D - Nitric Acid P - Na2O4S<br>E - NaHSO4 Q - Na2SO3<br>F - MeOH R - Na2S2O3<br>G - Amchlor S - H2SO4<br>H - Ascorbic Acid T - TSP Dodecahydrate<br>I - Ice U - Acetone<br>J - DI Water V - MCAA<br>K - EDTA W - pH 4-5<br>L - EDA Y - Trizma<br>Z - other (specify)<br><br>Other: |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| City:<br>Savannah                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | TAT Requested (days):            |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| State, Zip:<br>GA, 31404                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | PO #:                            |                    | Field Filtered Sample (Yes or No)<br>Perform MS/MSD (Yes or No)<br>9020B/Carbon, Trap Organic Halides, Total (TOX) |                                                                     | Total Number of containers                                                                                                           |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Phone:<br>912-354-7858(Tel) 912-352-0165(Fax)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | WO #:                            |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Email:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | Project #:<br>24024753           |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Project Name:<br>Amsted - Keokuk, Iowa GW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | SSOW#:                           |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Site:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |                                  |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| <b>Sample Identification - Client ID (Lab ID)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | <b>Sample Date</b>               | <b>Sample Time</b> | <b>Sample Type<br/>(C=comp, G=grab)</b>                                                                            | <b>Matrix<br/>(W=water, S=solid, O=waste/oil, ST=Tissue, A=Air)</b> |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  | <b>Special Instructions/Note:</b>     |   |  |                                                              |  |  |          |  |           |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                  |                    | Preservation Code:                                                                                                 |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| MW-21-082323-1325 (240-190795-1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | 8/23/23                          | 13:25<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| MW-20-082323-1515 (240-190795-2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | 8/23/23                          | 15:15<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| MW-7-082323-1750 (240-190795-3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 8/23/23                          | 17:50<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| MW-6-082323-1915 (240-190795-4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 8/23/23                          | 19:15<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| 20760-082323-0001 (240-190795-5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | 8/23/23                          | Central            |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| SW-1-082223-1620 (240-190795-6)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 8/22/23                          | 16:20<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| SW-2-082223-1730 (240-190795-7)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 8/22/23                          | 17:30<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| MW-26-082423-1200 (240-190795-8)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | 8/24/23                          | 12:00<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| MW-25-082423-1315 (240-190795-9)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | 8/24/23                          | 13:15<br>Central   |                                                                                                                    | Water                                                               |                                                                                                                                      | X |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       | 1 |  |                                                              |  |  |          |  |           |  |  |  |  |
| <small>Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte &amp; accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing North Central, LLC.</small> |  |                                  |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| <b>Possible Hazard Identification</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |                                  |                    |                                                                                                                    |                                                                     | <b>Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)</b>                                          |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Unconfirmed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                  |                    |                                                                                                                    |                                                                     | <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Deliverable Requested: I, II, III, IV, Other (specify)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                                  |                    |                                                                                                                    |                                                                     | Primary Deliverable Rank: 2                                                                                                          |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  | Special Instructions/QC Requirements: |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Empty Kit Relinquished by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                                  |                    |                                                                                                                    |                                                                     | Date:                                                                                                                                |   |                         | Time:    |                                                                                                                                                                                                                                                                                                                                                                                         |  | Method of Shipment:                   |   |  |                                                              |  |  |          |  |           |  |  |  |  |
| Relinquished by: <i>Denise Heckler</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                                  |                    |                                                                                                                    |                                                                     | Date/Time: <i>8-28-23 12:10</i>                                                                                                      |   |                         | Company: |                                                                                                                                                                                                                                                                                                                                                                                         |  | Received by: <i>TH</i>                |   |  | Date/Time: <i>08-29-23</i>                                   |  |  | Company: |  |           |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                  |                    |                                                                                                                    |                                                                     | Date/Time:                                                                                                                           |   |                         | Company: |                                                                                                                                                                                                                                                                                                                                                                                         |  | Received by:                          |   |  | Date/Time: <i>11:16</i>                                      |  |  | Company: |  |           |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                  |                    |                                                                                                                    |                                                                     | Date/Time:                                                                                                                           |   |                         | Company: |                                                                                                                                                                                                                                                                                                                                                                                         |  | Received by:                          |   |  | Date/Time:                                                   |  |  | Company: |  |           |  |  |  |  |
| Page 55 of 56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                  |                    |                                                                                                                    |                                                                     |                                                                                                                                      |   |                         |          |                                                                                                                                                                                                                                                                                                                                                                                         |  |                                       |   |  | Cooler Temperature(s) °C and Other Remarks: <i>2.8 - 2.9</i> |  |  |          |  | 9/12/2023 |  |  |  |  |

## Login Sample Receipt Checklist

Client: Haley & Aldrich, Inc.

Job Number: 240-190795-1

**Login Number: 190795**

**List Number: 2**

**Creator: Harley, Tynisha**

**List Source: Eurofins Savannah**

**List Creation: 08/29/23 12:57 PM**

| Question                                                                                 | Answer | Comment |
|------------------------------------------------------------------------------------------|--------|---------|
| Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.      | N/A    |         |
| The cooler's custody seal, if present, is intact.                                        | True   |         |
| Sample custody seals, if present, are intact.                                            | True   |         |
| 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.                                                            | N/A    |         |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs         | True   |         |
| Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4"). | N/A    |         |
| Multiphasic samples are not present.                                                     | True   |         |
| Samples do not require splitting or compositing.                                         | True   |         |
| Residual Chlorine Checked.                                                               | N/A    |         |

## **Data Usability Summary Report**

**Project Name: Keokuk, Iowa Groundwater**

**Project Description: Groundwater Samples**

**Sample Date(s): 18 through 19 April 2023**

**Analytical Laboratory: Eurofins Test America Laboratories, Inc. – Barberton, OH**

**Validation Performed by: Kathryn Lindenschmidt**

**Validation Reviewed by: Katherine Miller**

**Validation Date: 29 June 2023**

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Haley & Aldrich, Inc. prepared this Data Usability Summary Report (DUSR) to summarize the review and validation of the analytical results for Sample Delivery Group (SDG) listed. This DUSR is organized into the following sections:

- 1. Sample Delivery Group Number 240-183868-1**
  - 2. Explanations**
  - 3. Glossary**
  - 4. Abbreviations**
  - 5. Qualifiers**
- References**

This data validation and usability assessment was performed per the guidance and requirements established by the United States Environmental Protection Agency (USEPA) using the following reference materials:

- National Functional Guidelines (NFG) for Inorganic Data Review.
- The project-specific Work Plan (WP), herein referred to as the specified limits (see references section).

Data reported in this sampling event were reported to the laboratory method detection limit (MDL). Results found between the MDL and reporting limit (RL) are flagged J as estimated.

Sample data were qualified in accordance with the laboratory's standard operating procedures (SOP). The results presented in each laboratory report were found to be compliant with the data quality objectives (DQO) for the project and therefore usable; any exceptions are noted in the following pages.

## 1. Sample Delivery Group Number 240-183868-1

### 1.1 SAMPLE MANAGEMENT

This DUSR summarizes the review of SDG number 240-183868-1, dated 3 May 2023. Samples were collected, preserved, and shipped following standard chain of custody (COC) protocol.

Samples were also received appropriately, identified correctly, and analyzed according to the COC. Issues noted with sample management are listed below:

Sample MW-26-041923-1255 was not listed on the COC. Methods were added per client request.

Analyses were performed on the following samples:

| Sample ID         | Sample Type | Lab ID        | Sample Date | Matrix | Methods          |
|-------------------|-------------|---------------|-------------|--------|------------------|
| SW-2-041823-1035  | N           | 240-183868-1  | 04/18/2023  | WS     | A, B, C, D, F, G |
| SW-1-041823-1135  | N           | 240-183868-2  | 04/18/2023  | WS     | A, B, C, D, F, G |
| MW-21-041823-1517 | N           | 240-183868-3  | 04/18/2023  | WG     | A, B, C, D, E, F |
| MW-7-041823-1656  | N           | 240-183868-4  | 04/18/2023  | WG     | A, B, C, D, E, F |
| MW-12-041823-1520 | N           | 240-183868-5  | 04/18/2023  | WG     | A, B, C, D, E, F |
| MW-6-041823-1751  | N           | 240-183868-6  | 04/18/2023  | WG     | A, B, C, D, E, F |
| MW-16-041823-1800 | N           | 240-183868-7  | 04/18/2023  | WG     | A, B, C, D, E, F |
| MW-27-041923-0856 | N           | 240-183868-8  | 04/19/2023  | WG     | A, B, C, D, E, F |
| 20609-041923-0001 | FD          | 240-183868-9  | 04/19/2023  | WG     | A, B, C, D, E, F |
| MW-20-041923-0930 | N           | 240-183868-10 | 04/19/2023  | WG     | A, B, C, D, E, F |
| 20760-041923-0001 | EB          | 240-183868-11 | 04/19/2023  | WQ     | A, B, C, D, E, F |
| MW-25-041923-1120 | N           | 240-183868-12 | 04/19/2023  | WG     | A, B, C, D, E, F |
| MW-5-041923-1023  | N           | 240-183868-13 | 04/19/2023  | WG     | A, B, C, D, E, F |
| MW-26-041923-1255 | N           | 240-183868-14 | 04/19/2023  | WG     | A, B, C, D, E, F |

| Method Holding Times |             |                                    |          |
|----------------------|-------------|------------------------------------|----------|
| A.                   | SM4500-NH3H | Ammonia (as N)                     | 28 days  |
| B.                   | SM5220      | Chemical Oxygen Demand (COD)       | 28 days  |
| C.                   | EPA 6010B   | Total Boron, Lithium and Strontium | 180 days |
| D.                   | EPA 6020A   | Total Manganese and Sodium         | 180 days |
| E.                   | EPA 6020A   | Dissolved Iron                     | 180 days |
| F.                   | EPA 9056A   | Chloride, Fluoride and Sulfate     | 28 days  |
| G.                   | EPA 6020A   | Total Iron                         | 180 days |

### 1.2 HOLDING TIMES/PRESERVATION

The samples arrived at the laboratory at the proper temperature and were prepared and analyzed within the holding time and preservation criteria specified per method protocol.

### 1.3 REPORTING LIMITS AND SAMPLE DILUTIONS

All sample dilutions were reviewed and found to be justified. Only detected analytes were reported from a sample dilution analysis.

### 1.4 LABORATORY CONTROL SAMPLES

[Refer to section E 1.3.](#) Compounds associated with the laboratory control samples (LCS) analyses associated with client samples exhibited recoveries within the specified limits.

### 1.5 MATRIX SPIKE SAMPLES

[Refer to section E 1.4.](#) The sample(s) below were used for matrix spike/matrix spike duplicate (MS/MSD):

| Lab Sample Number | Matrix Spike/Matrix Spike Duplicate Sample Client ID | Method(s)   |
|-------------------|------------------------------------------------------|-------------|
| 240-183868-4      | MW-7-041823-1656                                     | SM4500-NH3H |
| 240-183868-14     | MW-26-041923-1255                                    | SM4500-NH3H |
| 240-183868-10     | MW-20-041923-0930                                    | SM5220      |
| 240-183868-6      | MW-6-041823-1751                                     | EPA 9056A   |

The MS/MSD recoveries and the relative percent difference (RPD) between the MS and MSD results were within the specified limits with the following exceptions:

| Sample Type | Method | Parent Sample     | Analyte                | %R/RPD  | Qualifier | Affected Samples |
|-------------|--------|-------------------|------------------------|---------|-----------|------------------|
| MS/MSD      | SM5220 | MW-20-041923-0930 | Chemical Oxygen Demand | 78%/68% | J/UJ      | All samples      |

### 1.6 BLANK SAMPLE ANALYSIS

[Refer to section E 1.5.](#) Method blank samples had no detections, indicating that no contamination from laboratory activities occurred with the following exceptions:

| Blank Type   | Batch ID | Analyte Detected in Blank | Concentration (mg/L) | Qualifier | Affected Samples |
|--------------|----------|---------------------------|----------------------|-----------|------------------|
| Method Blank | 571650   | Chloride                  | 0.1707 J             | J+        | 240-183868-4     |

The analysis of the blank samples for field quality control was free of target compounds.

### 1.7 DUPLICATE SAMPLE ANALYSIS

[Refer to section E 1.6.](#) The laboratory did not analyze any laboratory duplicates as per the method or laboratory SOP.

The following sample(s) were used for field duplicate analysis. RPDs were all below 35 percent for water (or the absolute difference rule was satisfied if detects were less than 5 times the RL).

| Primary Sample ID | Duplicate Sample ID | Method(s)    |
|-------------------|---------------------|--------------|
| MW-27-041923-0856 | 20609-041923-0001   | All analytes |

## 1.8 PRECISION AND ACCURACY

[Refer to section E 1.7.](#) Where required by the method, some measurement of analytical accuracy and precision was reported for each method with the site samples.

## 1.9 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

The results presented in this report were found to comply with the DQOs for the project and the guidelines specified by the analytical method. Based on the review of this report, the data are useable and acceptable as no data was rejected. The qualifiers applied to this data set are summarized in the table below.

| Sample ID        | Analyte                | Reported Result | Validated Result | Reason for Qualifier   |
|------------------|------------------------|-----------------|------------------|------------------------|
| All Samples      | Chemical Oxygen Demand | Various         | J/UJ             | LCS/LCSD %R low        |
| MW-7-041823-1656 | Chloride               | 1.51            | 1.51 J+          | Method Blank detection |

## 2. Explanations

The following explanations include more detailed information regarding each of the sections in the DUSR above. Not all sections in the Explanations are represented:

- E 1.3 Laboratory Control Samples
  - The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses are used to assess the precision and accuracy of the analytical method independent of matrix interferences.
- E 1.4 Matrix Spike Samples
  - Matrix spike/matrix spike duplicate (MS/MSD) data are used to assess the precision and accuracy of the analytical method and evaluate the effects of the sample matrix on the sample preparation procedures and measurement methodologies.
  - For inorganic methods, when a matrix spike recovery falls outside of the control limits and the sample result is less than four times the spike added, a post digestion spike (PDS) is performed.
- E 1.5 Blank Sample Analysis
  - Method blanks are prepared by the analytical laboratory and analyzed concurrently with the project samples to assess possible laboratory contamination.
  - Field blanks are prepared to identify contamination that may have been introduced during field activity. Equipment blanks are prepared to identify contamination that may have been introduced while decontaminating sampling equipment. Trip blanks are prepared when volatile analysis is requested to identify contamination that may have been introduced during transport.
- E 1.6 Laboratory and Field Duplicate Sample Analysis
  - The laboratory duplicate sample analysis is used by the laboratory at the time of the analysis to demonstrate acceptable method precision. The RPD or absolute difference was evaluated for each duplicate sample pair to monitor the reproducibility of the data.
  - The field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. The relative percent difference (RPD) or absolute difference was evaluated for each duplicate sample pair to monitor the reproducibility of the data.
- E 1.7 Precision and Accuracy
  - Precision measures the reproducibility of repetitive measurements. In a laboratory environment, this will be measured by determining the relative percent difference (RPD) found between a primary and a duplicate sample. This can be an LCS/LCSD pair, a MS/MSD pair, a laboratory duplicate performed on a site sample, or a field duplicate collected and analyzed concurrently with a site sample.
  - Accuracy is a statistical measurement of the correctness of a measured value and includes components of random error (variability caused by imprecision) and systematic error. In a laboratory environment, this will be measured by determining the percent recovery (%R) of certain spiked compounds. This can be assessed using LCS, blank spike (BS), MS, and/or surrogate recoveries.

### 3. Glossary

Not all of the following symbols, acronyms, or qualifiers occur in this document.

- Sample Types:
  - EB Equipment Blank Sample
  - FB Field Blank Sample
  - FD Field Duplicate Sample
  - N Primary Sample
  - TB Trip Blank Sample
- Units:
  - $\mu\text{g/kg}$  microgram per kilogram
  - $\mu\text{g/L}$  microgram per liter
  - $\mu\text{g/m}^3$  microgram per cubic meter
  - $\text{mg/kg}$  milligram per kilogram
  - $\text{mg/L}$  milligram per liter
  - $\text{ppb v/v}$  parts per billion volume/volume
  - $\text{pCi/L}$  picocuries per liter
  - $\text{pg/g}$  picograms per gram
- Matrices:
  - GW/WG Groundwater
  - QW Water Quality
  - WQ Water Quality control matrix
  - WS Surface Water
- Table Footnotes:
  - NA Not applicable
  - ND Non-detect
  - NR Not reported
- Common Symbols:
  - % percent
  - < less than
  - $\leq$  less than or equal to
  - > greater than
  - $\geq$  greater than or equal to
  - = equal
  - $^{\circ}\text{C}$  degrees Celsius
  - $\pm$  plus or minus
  - $\sim$  approximately
  - x times (multiplier)

## 4. Abbreviations

|                |                                                               |                 |                                                         |
|----------------|---------------------------------------------------------------|-----------------|---------------------------------------------------------|
| %D             | Percent Difference                                            | NA              | not applicable                                          |
| %R             | Percent Recovery                                              | ND              | Non-Detect                                              |
| %RSD           | Percent Relative Standard Deviation                           | NFG             | National Functional Guidelines                          |
| %v/v           | Percent volume by volume                                      | NH <sub>3</sub> | Ammonia                                                 |
| 2s             | 2 sigma                                                       | NYSDEC          | New York State Department of Environmental Conservation |
| 4,4-DDT        | 4 4-dichlorodiphenyltrichloroethane                           | PAH             | polycyclic aromatic hydrocarbon                         |
| Abs Diff       | Absolute Difference                                           | PCB             | Polychlorinated Biphenyl                                |
| amu            | atomic mass unit                                              | PDS             | Post Digestion Spike                                    |
| BPJ            | Best Professional Judgement                                   | PEM             | Performance Evaluation Mixture                          |
| BS             | Blank Spike                                                   | PFAS            | Per- and Polyfluoroalkyl Substances                     |
| CCB            | Continuing Calibration Blank                                  | PFBA            | Perfluorobutanoic Acid                                  |
| CCV            | Continuing Calibration Verification                           | PFD             | Perfluorodecalin                                        |
| CCVL           | Continuing Calibration Verification Low                       | PFOA            | Perfluorooctanoic Acid                                  |
| COC            | Chain of Custody                                              | PFOS            | Perfluorooctane sulfonate                               |
| COM            | Combined Isotope Calculation                                  | PFPeA           | Perfluoropentanoic Acid                                 |
| Cr (VI)        | Hexavalent Chromium                                           | QAPP            | Quality Assurance Project Plan                          |
| CRI            | Collision Reaction Interface                                  | QC              | Quality Control                                         |
| DoD            | Department of Defense                                         | QSM             | Quality Systems Manual                                  |
| DQO            | data quality objective                                        | R <sup>2</sup>  | R-squared value                                         |
| DUSR           | Data Usability Summary Report                                 | Ra-226          | Radium-226                                              |
| EMPC           | Estimated Maximum Possible Concentration                      | Ra-228          | Radium-228                                              |
| FBK            | Field Blank Contamination                                     | RESC            | Resolution Check Measure                                |
| FDP            | Field Duplicate                                               | RL              | Laboratory Reporting Limit                              |
| GC             | Gas Chromatograph                                             | RPD             | Relative Percent Difference                             |
| GC/MS          | Gas Chromatography/Mass Spectrometry                          | RRF             | Relative Response Factors                               |
| GPC            | Gel Permeation Chromatography                                 | RT              | Retention Time                                          |
| H <sub>2</sub> | Hydrogen gas                                                  | SAP             | sampling analysis plan                                  |
| HCl            | Hydrochloric Acid                                             | SDG             | Sample Delivery Group                                   |
| ICAL           | Initial Calibration                                           | SIM             | Selected ion monitoring                                 |
| ICB            | Initial Calibration Blank                                     | SOP             | Laboratory Standard Operating Procedures                |
| ICP/MS         | Inductively Coupled Plasma/ Mass Spectrometry                 | SPE             | Solid Phase Extraction                                  |
| ICV            | Initial Calibration Verification                              | SVOC            | Semi-Volatile Organic Compounds                         |
| ICVL           | Initial Calibration Verification Low                          | TCLP            | Toxicity Characteristic Leaching Procedure              |
| IPA            | Isopropyl Alcohol                                             | TIC             | Tentatively Identified Compound                         |
| LC             | Laboratory Control                                            | TKN             | Total Kjeldahl Nitrogen                                 |
| LCS/LCSD       | Laboratory Control Sample/Laboratory Control Sample Duplicate | TPH             | Total Petroleum Hydrocarbon                             |
| MBK            | Method Blank Contamination                                    | TPU             | Total Propagated Uncertainty                            |
| MDC            | Minimum Detectable Concentration                              | amu             | atomic mass unit                                        |
| MDL            | Laboratory Method Detection Limit                             | USEPA           | U.S. Environmental Protection Agency                    |
| MS/MSD         | Matrix Spike/Matrix Spike Duplicate                           | VOC             | Volatile Organic Compounds                              |
|                |                                                               | WP              | Work Plan                                               |

## 5. Qualifiers

The qualifiers below are from the USEPA National Functional Guidelines and the data in the DUSR may contain these qualifiers:

- Concentration (C) Qualifiers:
  - U      The compound was analyzed for but not detected. The associated value is either the compound quantitation limit if not detected by the analytical instrument or could be the reported or blank concentration if qualified by blank contamination. This can also be displayed as less than the associated compound quantitation limit (<RL or <MDL), or “ND”.
  - B      The compound was found in the sample and its associated blank. Its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers:
  - E      The compound was quantitated above the calibration range.
  - D      The concentration is based on a diluted sample analysis.
- Validation Qualifiers:
  - J      The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - J+     The result is an estimated quantity, but the result may be biased high.
  - J-     The result is an estimated quantity, but the result may be biased low.
  - J/UJ   as listed in exception tables J applies to detected data and UJ applies to non-detected data as reported by the laboratory.
  - UJ     The compound was not detected above the reported sample quantitation limit; however, the reported limit is estimated and may or may not represent the actual limit of quantitation.
  - NJ     The analysis indicated the presence of a compound for which there is presumptive evidence to make a tentative identification; the associated numerical value is an estimated concentration only.
  - R      The sample results were rejected as unusable; the compound may or may not be present in the sample.
  - S      Result is suspect. See DUSR for details.

## References

1.      Haley & Aldrich, Inc, 2016. Revised Hydrologic Monitoring System Plan. Amsted Foundry Materials Recovery and Reuse Area. Keukok, Iowa. January 2016  
  
United States Environmental Protection Agency, 2020. National Functional Guidelines for Inorganic Superfund Methods Data Review. EPA-542-R-20-006. November 2020.

## **Data Usability Summary Report**

**Project Name: Keokuk, Iowa Groundwater**

**Project Description: Groundwater Samples**

**Sample Date(s): 22 through 24 August 2023**

**Analytical Laboratory: Eurofins Test America Laboratories, Inc. – Barberton, OH**

**Eurofins Test America Laboratories, Inc. – Savannah, GA**

**Validation Performed by: Therese Rowland**

**Validation Reviewed by: Katherine Miller**

**Validation Date: 19 September 2023**

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Haley & Aldrich, Inc. prepared this Data Usability Summary Report (DUSR) to summarize the review and validation of the analytical results for Sample Delivery Group (SDG) listed. This DUSR is organized into the following sections:

- 1. Sample Delivery Group Number 240-190795-1**
  - 2. Explanations**
  - 3. Glossary**
  - 4. Abbreviations**
  - 5. Qualifiers**
- References**

This data validation and usability assessment was performed per the guidance and requirements established by the United States Environmental Protection Agency (USEPA) using the following reference materials:

- National Functional Guidelines (NFG) for Inorganic Data Review.
- The project-specific Work Plan (WP), herein referred to as the specified limits (see references section).

Data reported in this sampling event were reported to the laboratory method detection limit (MDL). Results found between the MDL and reporting limit (RL) are flagged J as estimated.

Sample data were qualified in accordance with the laboratory's standard operating procedures (SOP). The results presented in each laboratory report were found to be compliant with the data quality objectives (DQO) for the project and therefore usable; any exceptions are noted in the following pages.

## 1. Sample Delivery Group Number 240-190795-1

### 1.1 SAMPLE MANAGEMENT

This DUSR summarizes the review of SDG number 240-190795-1, dated 12 September 2023. Samples were collected, preserved, and shipped following standard chain of custody (COC) protocol.

Samples were also received appropriately, identified correctly, and analyzed according to the COC.

Analyses were performed on the following samples:

| Sample ID         | Sample Type | Lab ID        | Sample Date | Matrix | Methods             |
|-------------------|-------------|---------------|-------------|--------|---------------------|
| MW-21-082323-1325 | N           | 240-190795-1  | 08/23/2023  | WG     | A, B, C, D, E, F, G |
| MW-20-082323-1515 | N           | 240-190795-2  | 08/23/2023  | WG     | A, B, C, D, E, F, G |
| MW-07-082323-1750 | N           | 240-190795-3  | 08/23/2023  | WG     | A, B, C, D, E, F, G |
| MW-06-082323-1915 | N           | 240-190795-4  | 08/23/2023  | WG     | A, B, C, D, E, F, G |
| 20760-082323-0001 | FD          | 240-190795-5  | 08/23/2023  | WG     | A, B, C, D, E, F, G |
| SW-01-082223-1620 | N           | 240-190795-6  | 08/22/2023  | WG     | A, B, C, D, E, F, G |
| SW-02-082223-1730 | N           | 240-190795-7  | 08/22/2023  | WG     | A, B, C, D, E, F, G |
| MW-26-082423-1200 | N           | 240-190795-8  | 08/24/2023  | WG     | A, B, C, D, E, F, G |
| MW-25-082423-1315 | N           | 240-190795-9  | 08/24/2023  | WG     | A, B, C, D, E, F, G |
| MW-16-082423-1540 | N           | 240-190795-10 | 08/24/2023  | WG     | A, B, C, D, E, F, G |
| MW-12-082423-1705 | N           | 240-190795-11 | 08/24/2023  | WG     | A, B, C, D, E, F, G |
| MW-05-082423-1850 | N           | 240-190795-12 | 08/24/2023  | WG     | A, B, C, D, E, F, G |
| 20760-082423-0001 | EB          | 240-190795-13 | 08/24/2023  | WQ     | A, B, C, D, E, F, G |
| MW-27-082423-2015 | N           | 240-190795-14 | 08/24/2023  | WG     | A, B, C, D, E, F, G |

| Method Holding Times |             |                                                 |          |
|----------------------|-------------|-------------------------------------------------|----------|
| A.                   | SM4500-NH3H | Ammonia (as N)                                  | 28 days  |
| B.                   | E420.4      | Total Recoverable Phenols                       | 28 days  |
| C.                   | SM5220D     | Chemical Oxygen Demand (COD)                    | 28 days  |
| D.                   | EPA 6010D   | Total Boron, Lithium and Strontium              | 180 days |
| E.                   | EPA 6020B   | Total Manganese, Sodium, Iron<br>Dissolved Iron | 180 days |
| F.                   | EPA 9020B   | Total Organic Halides                           | 28 days  |
| G.                   | EPA 9056A   | Chloride, Fluoride and Sulfate                  | 28 days  |

### 1.2 CASE NARRATIVE

The laboratory report case narrative lists various additional quality control issues such as internal standard exceedances and initial calibration verification (ICV) and/or continuing calibration verification (CCV) exceedances.

The laboratory report case narratives included the following issues:

- For sample 240-190795-11, case narrative states that the sample duplicate results are outside 20% relative percent difference (RPD) requirement. Reanalysis was performed with concurring results. Sample results were not included in the lab report. No qualifiers were applied.

- For method EPA 9020B, the following samples had a breakthrough that exceeded 10%:
  - 240-190795-1
  - 240-190795-2
  - 240-190795-3
  - 240-190795-4
  - 240-190795-11
  - 240-190795-12
  - 240-190795-13
  - 240-190795-14

### 1.3 HOLDING TIMES/PRESERVATION

The samples arrived at the laboratory at the proper temperature and were prepared and analyzed within the holding time and preservation criteria specified per method protocol.

### 1.4 REPORTING LIMITS AND SAMPLE DILUTIONS

No sample dilutions were performed for the analysis of the samples in this report.

### 1.5 LABORATORY CONTROL SAMPLES

[Refer to section E 1.3.](#) Compounds associated with the laboratory control samples/laboratory control sample duplicates (LCS/LCSD) analyses associated with client samples exhibited recoveries within the specified limits.

### 1.6 MATRIX SPIKE SAMPLES

[Refer to section E 1.4.](#) The sample(s) below were used for matrix spike/matrix spike duplicate (MS/MSD):

| Lab Sample Number | Matrix Spike/Matrix Spike Duplicate Sample Client ID | Method(s)      |
|-------------------|------------------------------------------------------|----------------|
| 240-190795-5      | 20760-082323-0001                                    | E420.4, E9020B |
| 240-190795-2      | MW-20-082323-1515                                    | SM5220D        |

The MS/MSD recoveries and the RPD between the MS and MSD results were within the specified limits with the following exceptions:

| Sample Type | Method | Parent Sample     | Analyte                      | %R/RPD  | Qualifier | Affected Samples  |
|-------------|--------|-------------------|------------------------------|---------|-----------|-------------------|
| MS/MSD      | E420.4 | 20760-082323-0001 | Phenolics, Total Recoverable | 81%/83% | UJ        | 20760-082323-0001 |

### 1.7 BLANK SAMPLE ANALYSIS

[Refer to section E 1.5.](#) Method blank samples had no detections, indicating that no contamination from laboratory activities occurred. The analysis of the blank samples for field quality control was free of target compounds.

## 1.8 DUPLICATE SAMPLE ANALYSIS

[Refer to section E 1.6.](#) The laboratory did not analyze any laboratory duplicates as per the method or laboratory SOP.

The following sample(s) were used for field duplicate analysis. RPDs were all below 35 percent for water (or the absolute difference rule was satisfied if detects were less than 5 times the RL).

| Primary Sample ID | Duplicate Sample ID | Method(s)    |
|-------------------|---------------------|--------------|
| MW-20-082323-1515 | 20760-082323-0001   | All analytes |

## 1.9 PRECISION AND ACCURACY

[Refer to section E 1.7.](#) Where required by the method, some measurement of analytical accuracy and precision was reported for each method with the site samples.

## 1.10 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

The results presented in this report were found to comply with the DQOs for the project and the guidelines specified by the analytical method. Based on the review of this report, the data are useable and acceptable as no data was rejected. The qualifiers applied to this data set are summarized in the table below.

| Sample ID         | Analyte                      | Reported Result | Validated Result | Reason for Qualifier |
|-------------------|------------------------------|-----------------|------------------|----------------------|
| 20760-082323-0001 | Phenolics, Total Recoverable | U               | UJ               | MS/MSD %R low        |

## 2. Explanations

The following explanations include more detailed information regarding each of the sections in the DUSR above. Not all sections in the Explanations are represented:

- E 1.3 Laboratory Control Samples
  - The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses are used to assess the precision and accuracy of the analytical method independent of matrix interferences.
- E 1.4 Matrix Spike Samples
  - Matrix spike/matrix spike duplicate (MS/MSD) data are used to assess the precision and accuracy of the analytical method and evaluate the effects of the sample matrix on the sample preparation procedures and measurement methodologies.
  - For inorganic methods, when a matrix spike recovery falls outside of the control limits and the sample result is less than four times the spike added, a post digestion spike (PDS) is performed.
- E 1.5 Blank Sample Analysis
  - Method blanks are prepared by the analytical laboratory and analyzed concurrently with the project samples to assess possible laboratory contamination.
  - Field blanks are prepared to identify contamination that may have been introduced during field activity. Equipment blanks are prepared to identify contamination that may have been introduced while decontaminating sampling equipment. Trip blanks are prepared when volatile analysis is requested to identify contamination that may have been introduced during transport.
- E 1.6 Laboratory and Field Duplicate Sample Analysis
  - The laboratory duplicate sample analysis is used by the laboratory at the time of the analysis to demonstrate acceptable method precision. The RPD or absolute difference was evaluated for each duplicate sample pair to monitor the reproducibility of the data.
  - The field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. The relative percent difference (RPD) or absolute difference was evaluated for each duplicate sample pair to monitor the reproducibility of the data.
- E 1.7 Precision and Accuracy
  - Precision measures the reproducibility of repetitive measurements. In a laboratory environment, this will be measured by determining the relative percent difference (RPD) found between a primary and a duplicate sample. This can be an LCS/LCSD pair, a MS/MSD pair, a laboratory duplicate performed on a site sample, or a field duplicate collected and analyzed concurrently with a site sample.
  - Accuracy is a statistical measurement of the correctness of a measured value and includes components of random error (variability caused by imprecision) and systematic error. In a laboratory environment, this will be measured by determining the percent recovery (%R) of certain spiked compounds. This can be assessed using LCS, blank spike (BS), MS, and/or surrogate recoveries.

### 3. Glossary

Not all of the following symbols, acronyms, or qualifiers occur in this document.

- Sample Types:
  - EB Equipment Blank Sample
  - FB Field Blank Sample
  - FD Field Duplicate Sample
  - N Primary Sample
  - TB Trip Blank Sample
- Units:
  - $\mu\text{g/kg}$  microgram per kilogram
  - $\mu\text{g/L}$  microgram per liter
  - $\mu\text{g/m}^3$  microgram per cubic meter
  - $\text{mg/kg}$  milligram per kilogram
  - $\text{mg/L}$  milligram per liter
  - $\text{ppb v/v}$  parts per billion volume/volume
  - $\text{pCi/L}$  picocuries per liter
  - $\text{pg/g}$  picograms per gram
- Matrices:
  - GW/WG Groundwater
  - QW Water Quality
  - WQ Water Quality control matrix
  - WS Surface Water
- Table Footnotes:
  - NA Not applicable
  - ND Non-detect
  - NR Not reported
- Common Symbols:
  - % percent
  - < less than
  - $\leq$  less than or equal to
  - > greater than
  - $\geq$  greater than or equal to
  - = equal
  - $^{\circ}\text{C}$  degrees Celsius
  - $\pm$  plus or minus
  - $\sim$  approximately
  - x times (multiplier)

## 4. Abbreviations

|                |                                                               |                 |                                                         |
|----------------|---------------------------------------------------------------|-----------------|---------------------------------------------------------|
| %D             | Percent Difference                                            | NA              | not applicable                                          |
| %R             | Percent Recovery                                              | ND              | Non-Detect                                              |
| %RSD           | Percent Relative Standard Deviation                           | NFG             | National Functional Guidelines                          |
| %v/v           | Percent volume by volume                                      | NH <sub>3</sub> | Ammonia                                                 |
| 2s             | 2 sigma                                                       | NYSDEC          | New York State Department of Environmental Conservation |
| 4,4-DDT        | 4 4-dichlorodiphenyltrichloroethane                           | PAH             | polycyclic aromatic hydrocarbon                         |
| Abs Diff       | Absolute Difference                                           | PCB             | Polychlorinated Biphenyl                                |
| amu            | atomic mass unit                                              | PDS             | Post Digestion Spike                                    |
| BPJ            | Best Professional Judgement                                   | PEM             | Performance Evaluation Mixture                          |
| BS             | Blank Spike                                                   | PFAS            | Per- and Polyfluoroalkyl Substances                     |
| CCB            | Continuing Calibration Blank                                  | PFBA            | Perfluorobutanoic Acid                                  |
| CCV            | Continuing Calibration Verification                           | PFD             | Perfluorodecalin                                        |
| CCVL           | Continuing Calibration Verification Low                       | PFOA            | Perfluorooctanoic Acid                                  |
| COC            | Chain of Custody                                              | PFOS            | Perfluorooctane sulfonate                               |
| COM            | Combined Isotope Calculation                                  | PFPeA           | Perfluoropentanoic Acid                                 |
| Cr (VI)        | Hexavalent Chromium                                           | QAPP            | Quality Assurance Project Plan                          |
| CRI            | Collision Reaction Interface                                  | QC              | Quality Control                                         |
| DoD            | Department of Defense                                         | QSM             | Quality Systems Manual                                  |
| DQO            | data quality objective                                        | R <sup>2</sup>  | R-squared value                                         |
| DUSR           | Data Usability Summary Report                                 | Ra-226          | Radium-226                                              |
| EMPC           | Estimated Maximum Possible Concentration                      | Ra-228          | Radium-228                                              |
| FBK            | Field Blank Contamination                                     | RESC            | Resolution Check Measure                                |
| FDP            | Field Duplicate                                               | RL              | Laboratory Reporting Limit                              |
| GC             | Gas Chromatograph                                             | RPD             | Relative Percent Difference                             |
| GC/MS          | Gas Chromatography/Mass Spectrometry                          | RRF             | Relative Response Factors                               |
| GPC            | Gel Permeation Chromatography                                 | RT              | Retention Time                                          |
| H <sub>2</sub> | Hydrogen gas                                                  | SAP             | sampling analysis plan                                  |
| HCl            | Hydrochloric Acid                                             | SDG             | Sample Delivery Group                                   |
| ICAL           | Initial Calibration                                           | SIM             | Selected ion monitoring                                 |
| ICB            | Initial Calibration Blank                                     | SOP             | Laboratory Standard Operating Procedures                |
| ICP/MS         | Inductively Coupled Plasma/ Mass Spectrometry                 | SPE             | Solid Phase Extraction                                  |
| ICV            | Initial Calibration Verification                              | SVOC            | Semi-Volatile Organic Compounds                         |
| ICVL           | Initial Calibration Verification Low                          | TCLP            | Toxicity Characteristic Leaching Procedure              |
| IPA            | Isopropyl Alcohol                                             | TIC             | Tentatively Identified Compound                         |
| LC             | Laboratory Control                                            | TKN             | Total Kjeldahl Nitrogen                                 |
| LCS/LCSD       | Laboratory Control Sample/Laboratory Control Sample Duplicate | TPH             | Total Petroleum Hydrocarbon                             |
| MBK            | Method Blank Contamination                                    | TPU             | Total Propagated Uncertainty                            |
| MDC            | Minimum Detectable Concentration                              | amu             | atomic mass unit                                        |
| MDL            | Laboratory Method Detection Limit                             | USEPA           | United States Environmental Protection Agency           |
| MS/MSD         | Matrix Spike/Matrix Spike Duplicate                           | VOC             | Volatile Organic Compounds                              |
|                |                                                               | WP              | Work Plan                                               |

## 5. Qualifiers

The qualifiers below are from the USEPA National Functional Guidelines and the data in the DUSR may contain these qualifiers:

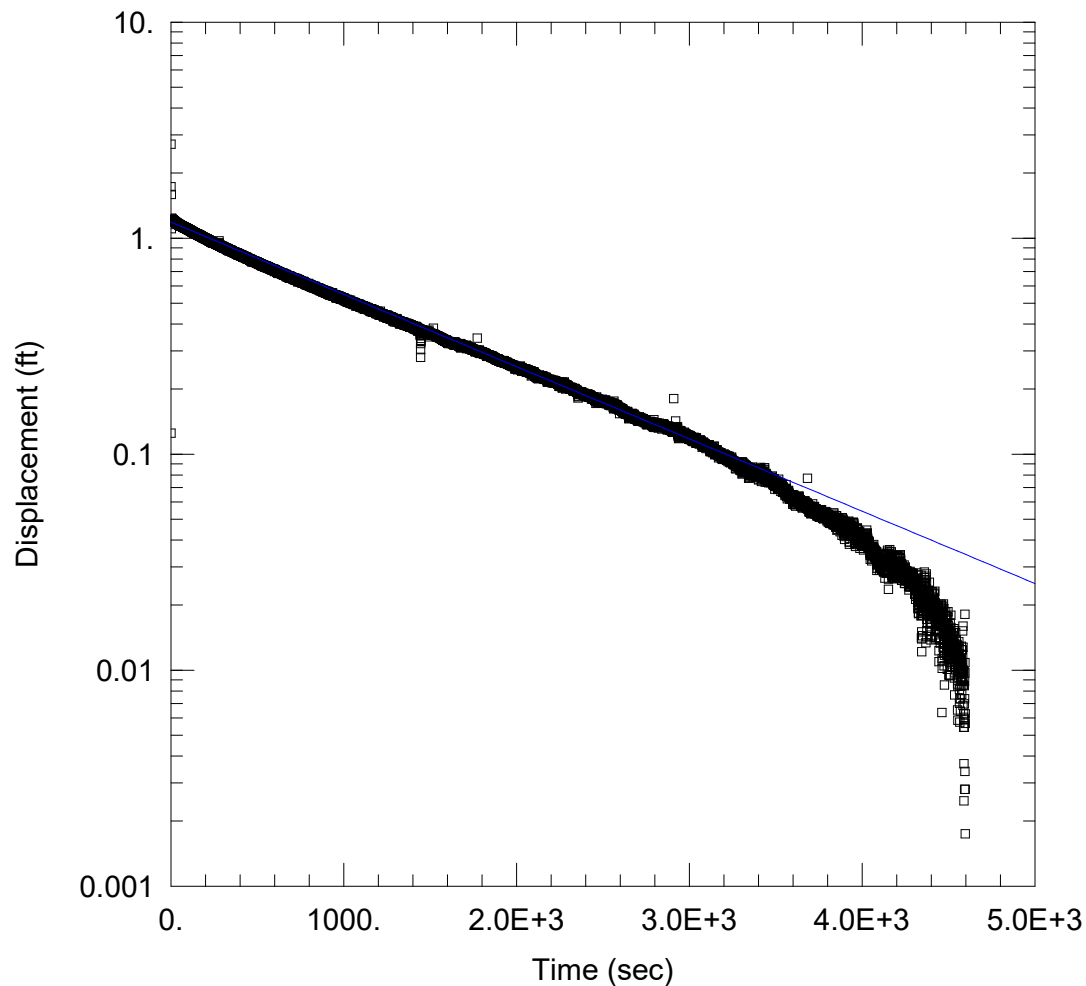
- Concentration (C) Qualifiers:
  - U      The compound was analyzed for but not detected. The associated value is either the compound quantitation limit if not detected by the analytical instrument or could be the reported or blank concentration if qualified by blank contamination. This can also be displayed as less than the associated compound quantitation limit (<RL or <MDL), or “ND”.
  - B      The compound was found in the sample and its associated blank. Its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers:
  - E      The compound was quantitated above the calibration range.
  - D      The concentration is based on a diluted sample analysis.
- Validation Qualifiers:
  - J      The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - J+     The result is an estimated quantity, but the result may be biased high.
  - J-     The result is an estimated quantity, but the result may be biased low.
  - J/UJ   as listed in exception tables J applies to detected data and UJ applies to non-detected data as reported by the laboratory.
  - UJ     The compound was not detected above the reported sample quantitation limit; however, the reported limit is estimated and may or may not represent the actual limit of quantitation.
  - NJ     The analysis indicated the presence of a compound for which there is presumptive evidence to make a tentative identification; the associated numerical value is an estimated concentration only.
  - R      The sample results were rejected as unusable; the compound may or may not be present in the sample.
  - S      Result is suspect. See DUSR for details.

## References

1. Haley & Aldrich, Inc, 2016. Revised Hydrologic Monitoring System Plan. Amsted Foundry Materials Recovery and Reuse Area. Keukuk, Iowa. January 2016
2. United States Environmental Protection Agency, 2020a. National Functional Guidelines for Inorganic Superfund Methods Data Review. EPA-542-R-20-006. November 2020.
3. United States Environmental Protection Agency, 2020b. National Functional Guidelines for Organic Superfund Methods Data Review. EPA-540-R-20-005. November 2020.

## **APPENDIX C**

### **AQTESOLV® Plots**



### WELL TEST ANALYSIS

Data Set: \\...\MW-5\_F1.aqt  
 Date: 07/31/23

Time: 10:13:52

### PROJECT INFORMATION

Company: Haley & Aldrich  
 Client: Amsted  
 Project: 129848  
 Location: Keokuk  
 Test Well: MW-5  
 Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 7.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-5)

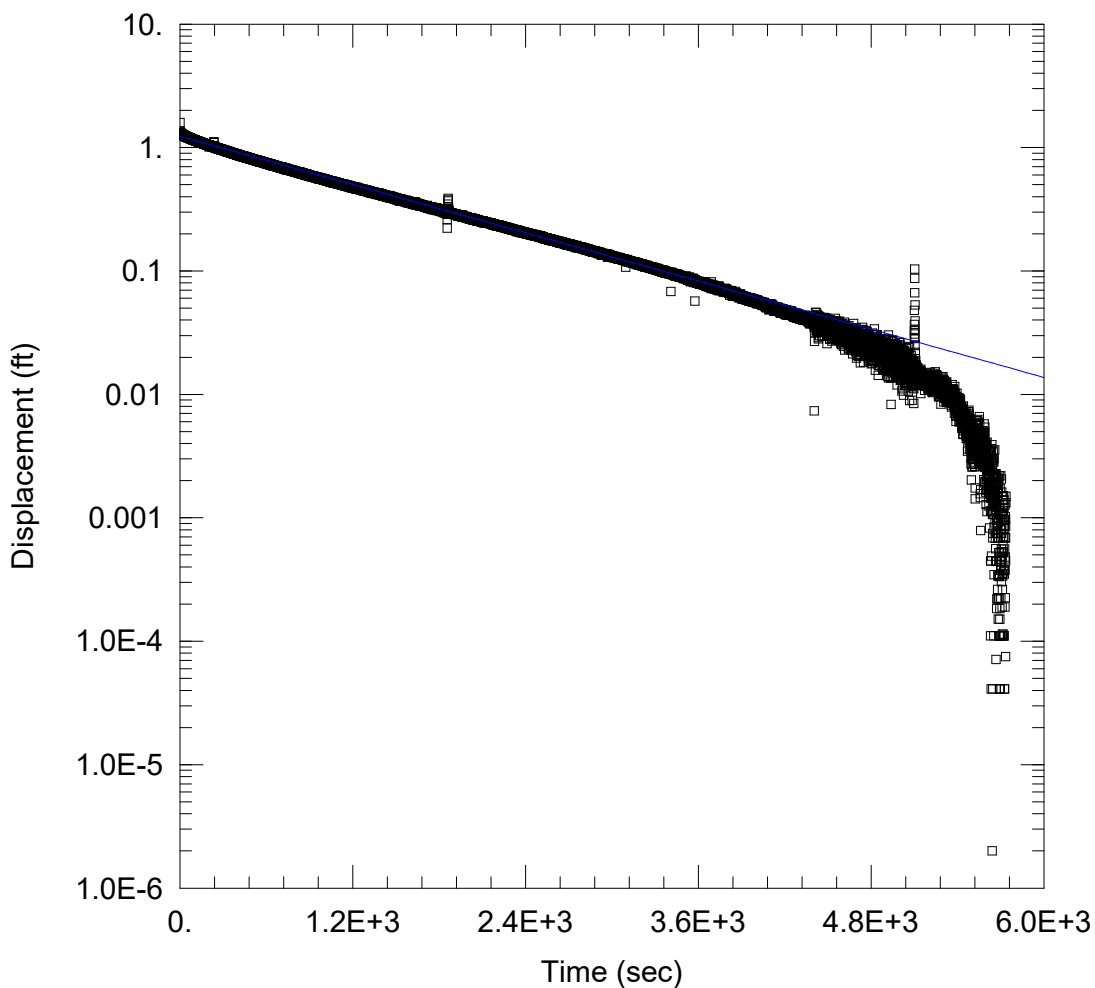
Initial Displacement: 2.725 ft  
 Total Well Penetration Depth: 10.56 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 10.65 ft  
 Screen Length: 10. ft  
 Well Radius: 0.3281 ft  
 Gravel Pack Porosity: 0.2

### SOLUTION

Aquifer Model: Confined  
 $K = 2.762E-5$  cm/sec

Solution Method: Bouwer-Rice  
 $y_0 = 1.186$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-5\_R1.aqt

Date: 07/31/23

Time: 10:14:12

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-5

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 7.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-5)

Initial Displacement: 1.597 ft

Total Well Penetration Depth: 10.56 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 10.65 ft

Screen Length: 10. ft

Well Radius: 0.3281 ft

Gravel Pack Porosity: 0.2

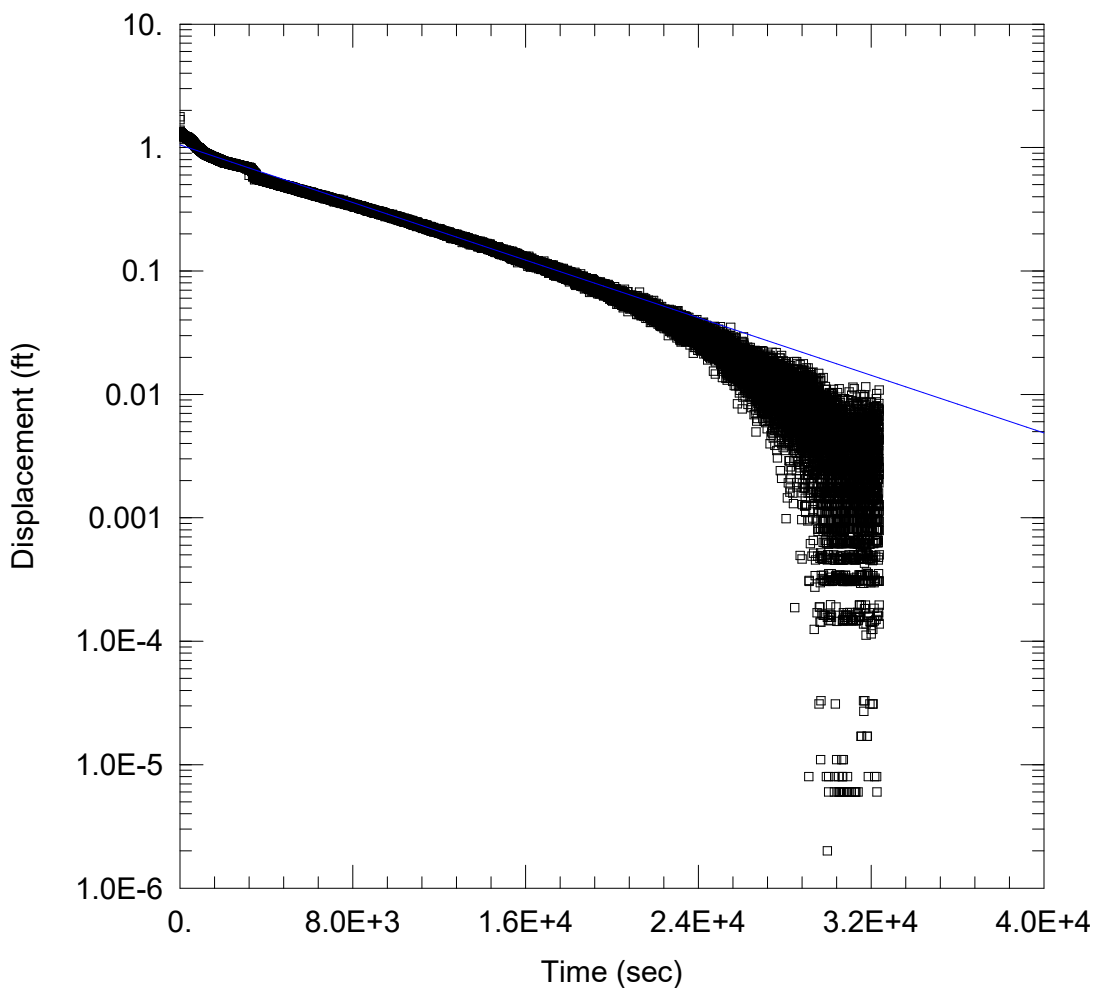
### SOLUTION

Aquifer Model: Confined

$K = 2.689E-5$  cm/sec

Solution Method: Bouwer-Rice

$y_0 = 1.238$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-6\_F-1.aqt

Date: 07/31/23

Time: 10:14:32

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-6

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-6)

Initial Displacement: 1.687 ft

Static Water Column Height: 12.61 ft

Total Well Penetration Depth: 14.12 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

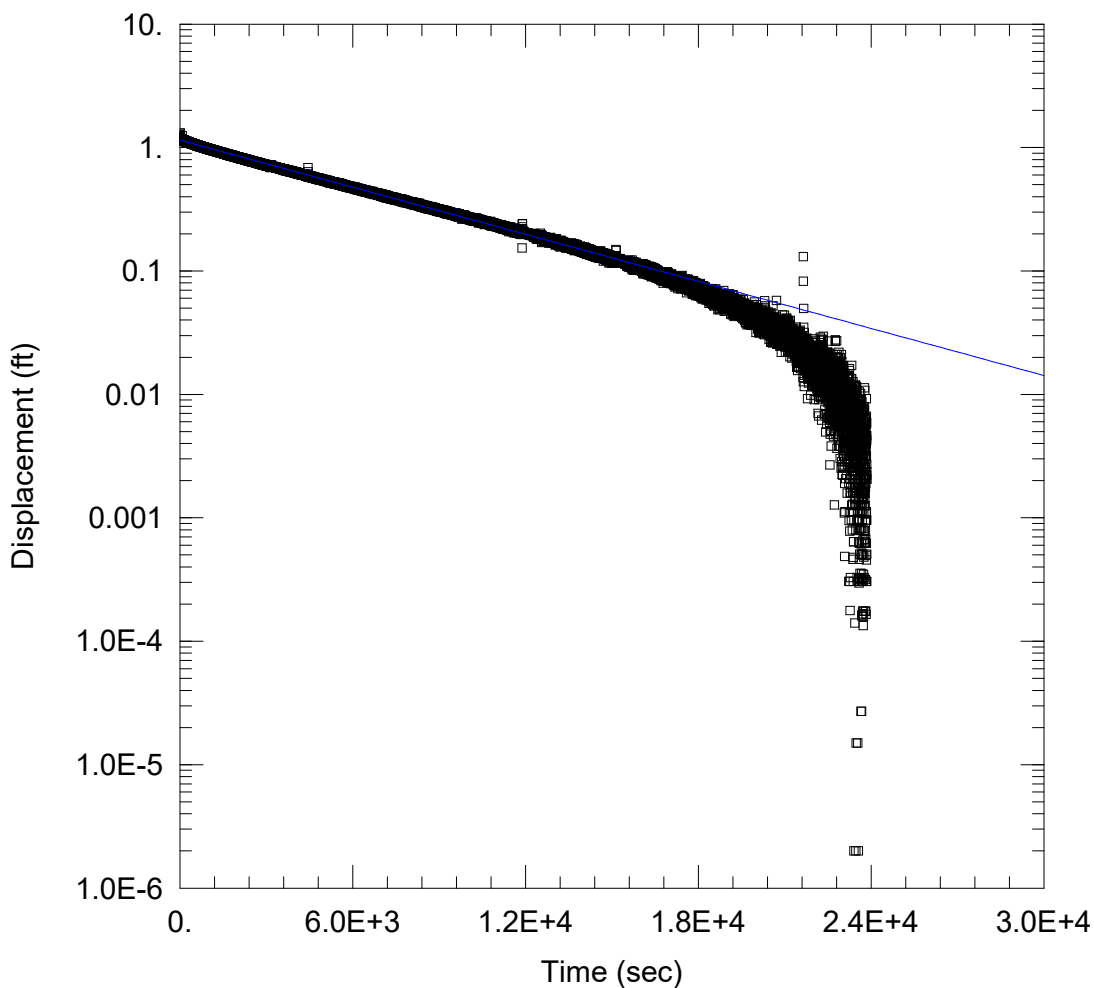
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 2.805E-5 cm/sec

y0 = 1.053 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-6\_R-1.aqt  
 Date: 07/31/23

Time: 10:14:56

### PROJECT INFORMATION

Company: Haley & Aldrich  
 Client: Amsted  
 Project: 129848  
 Location: Keokuk  
 Test Well: MW-6  
 Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-6)

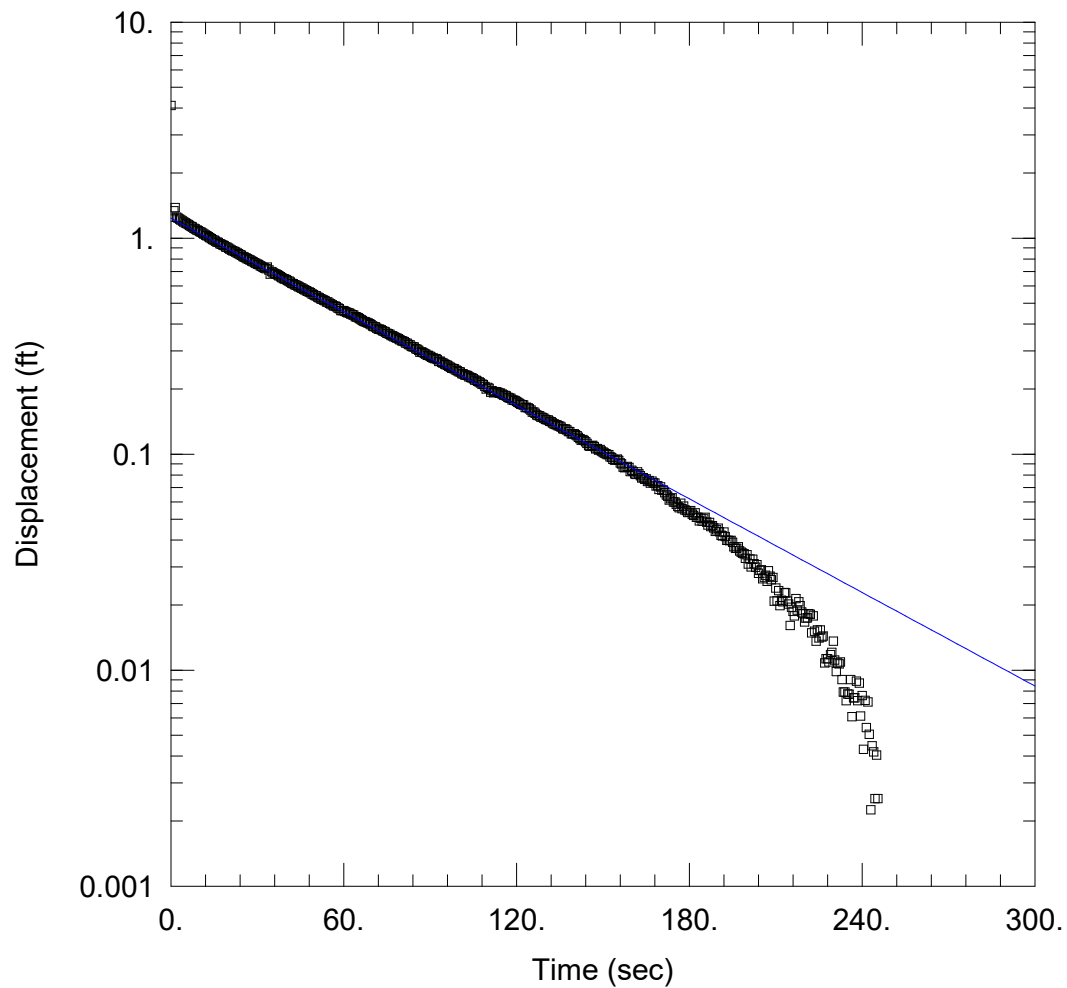
Initial Displacement: 14.52 ft  
 Total Well Penetration Depth: 14.12 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 12.61 ft  
 Screen Length: 10. ft  
 Well Radius: 0.3281 ft

### SOLUTION

Aquifer Model: Confined  
 K = 3.056E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 1.149 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-7\_F1.aqt  
 Date: 07/31/23

Time: 10:15:17

### PROJECT INFORMATION

Company: Haley & Aldrich  
 Client: Amsted  
 Project: 129848  
 Location: Keokuk  
 Test Well: MW-7  
 Test Date: 4-21-2023

### AQUIFER DATA

Saturated Thickness: 26. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-7)

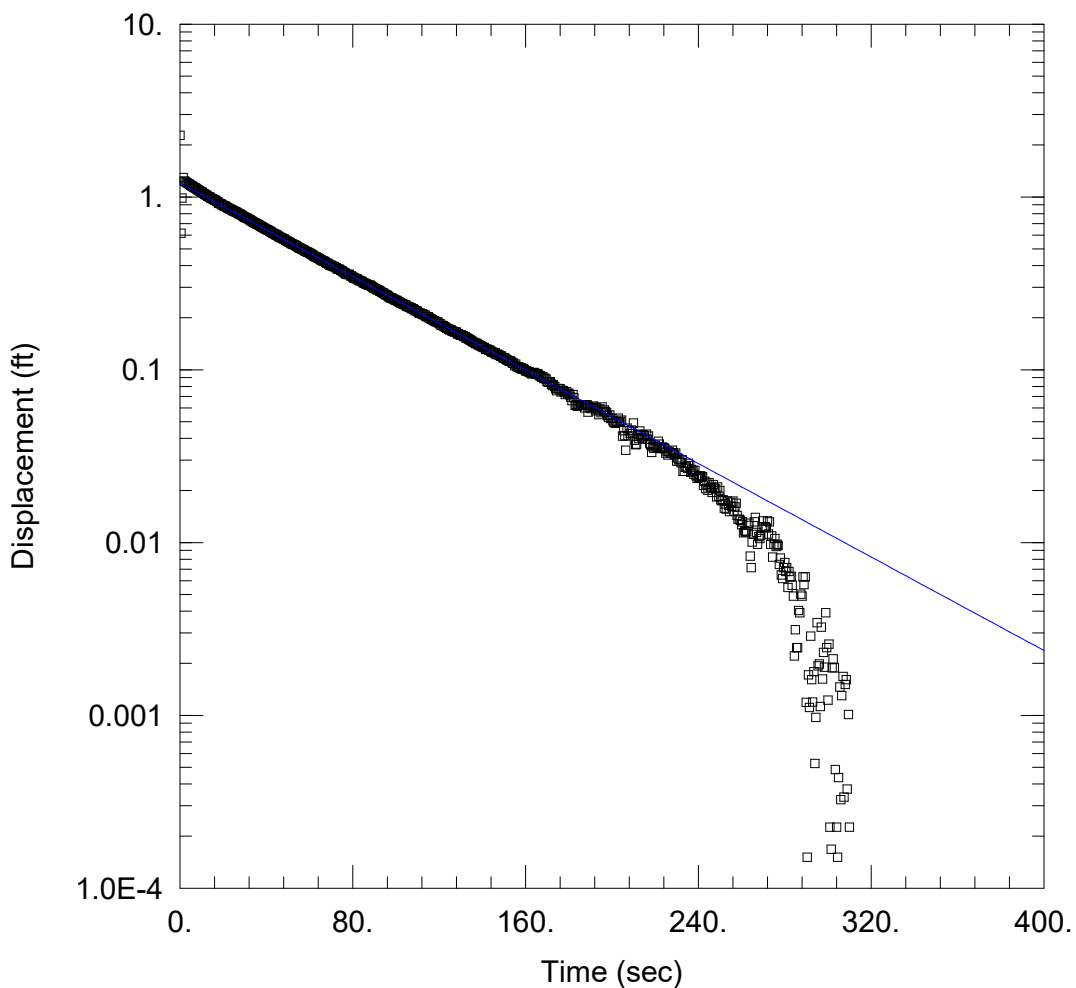
Initial Displacement: 4.111 ft  
 Total Well Penetration Depth: 69.43 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 59.43 ft  
 Screen Length: 10. ft  
 Well Radius: 0.3281 ft

### SOLUTION

Aquifer Model: Confined  
 $K = 0.00065$  cm/sec

Solution Method: Bouwer-Rice  
 $y_0 = 1.238$  ft



### WELL TEST ANALYSIS

Data Set: \...\MW-7\_F2.aqt

Date: 07/31/23

Time: 10:15:32

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-7

Test Date: 4-21-2023

### AQUIFER DATA

Saturated Thickness: 26. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-7)

Initial Displacement: 2.268 ft

Static Water Column Height: 59.43 ft

Total Well Penetration Depth: 69.43 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

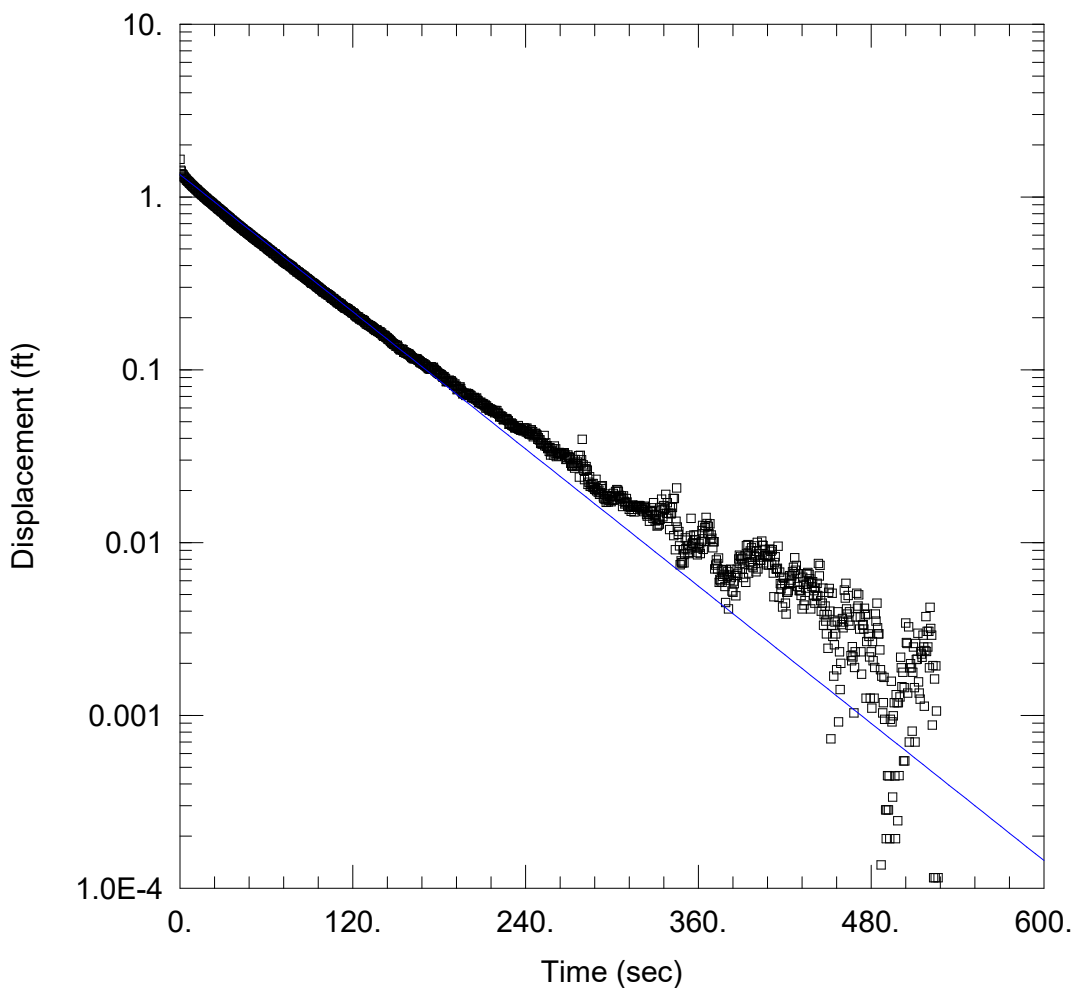
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0006088 cm/sec

y0 = 1.203 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-7\_R1.aqt

Date: 07/31/23

Time: 10:15:47

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-7

Test Date: 4-21-2023

### AQUIFER DATA

Saturated Thickness: 26. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-7)

Initial Displacement: 1.648 ft

Static Water Column Height: 59.43 ft

Total Well Penetration Depth: 69.43 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

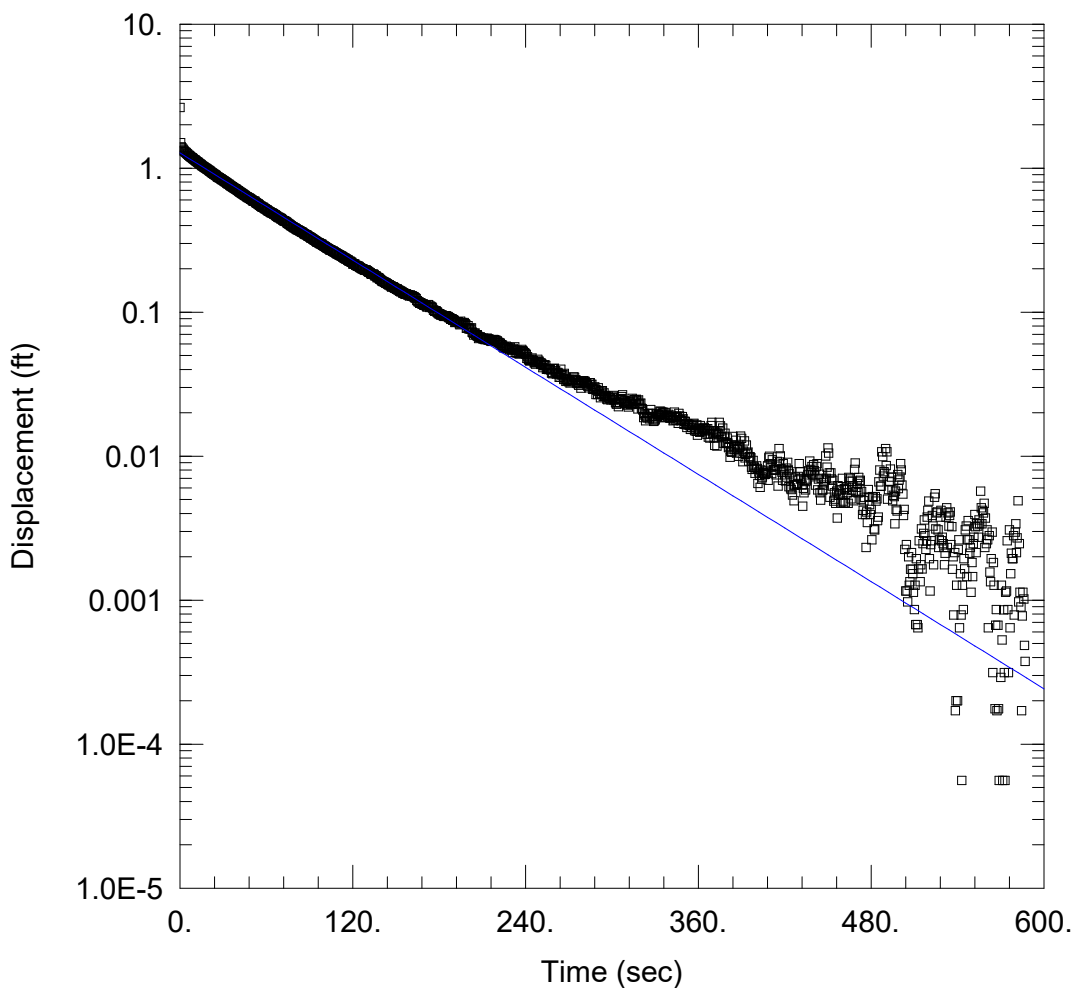
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.0005956$  cm/sec

$y_0 = 1.348$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-7\_R2.aqt

Date: 07/31/23

Time: 10:16:47

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-7

Test Date: 4-21-2023

### AQUIFER DATA

Saturated Thickness: 26. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-7)

Initial Displacement: 2.638 ft

Static Water Column Height: 59.43 ft

Total Well Penetration Depth: 69.43 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

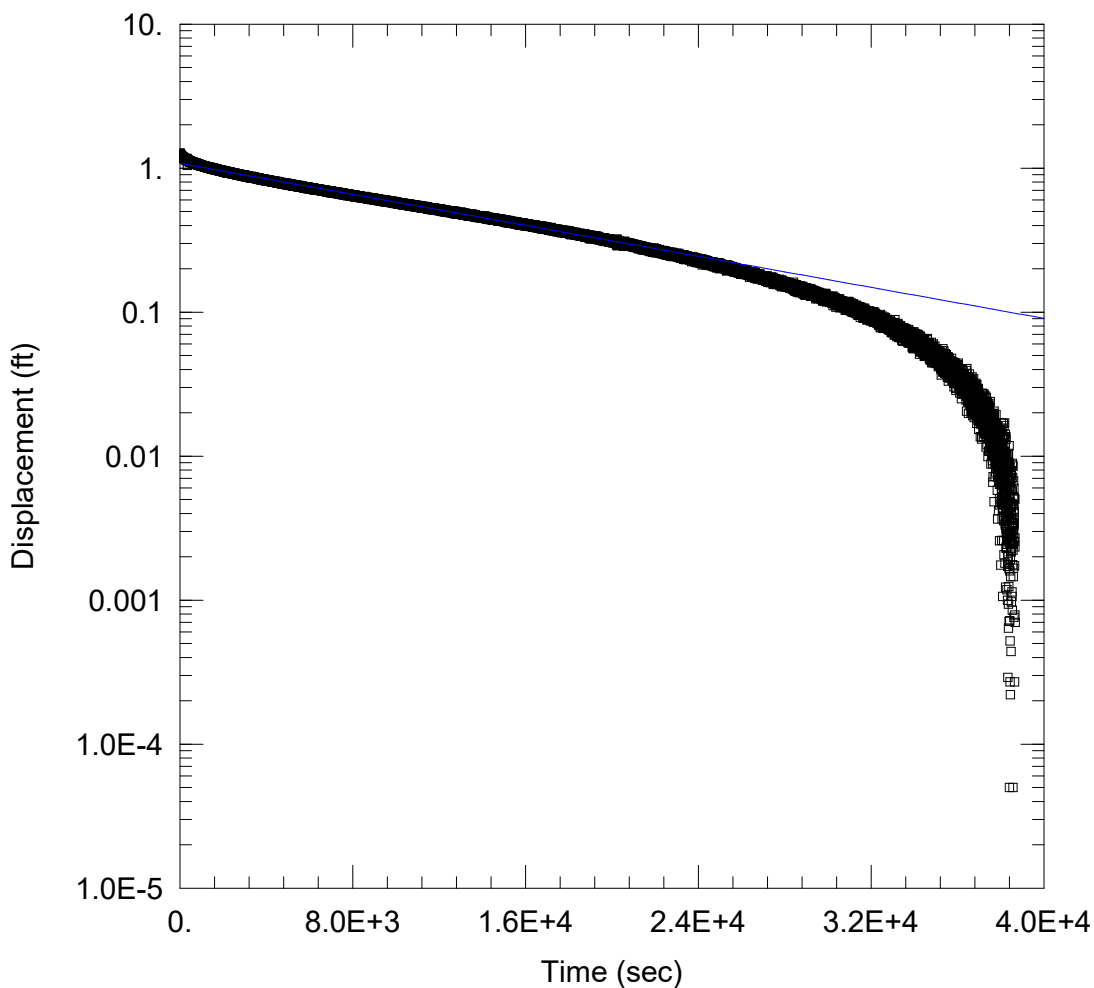
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0005583 cm/sec

y0 = 1.276 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-11\_F1.aqt

Date: 07/31/23

Time: 10:17:03

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-11

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-11)

Initial Displacement: 1.278 ft

Static Water Column Height: 42.16 ft

Total Well Penetration Depth: 43.26 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

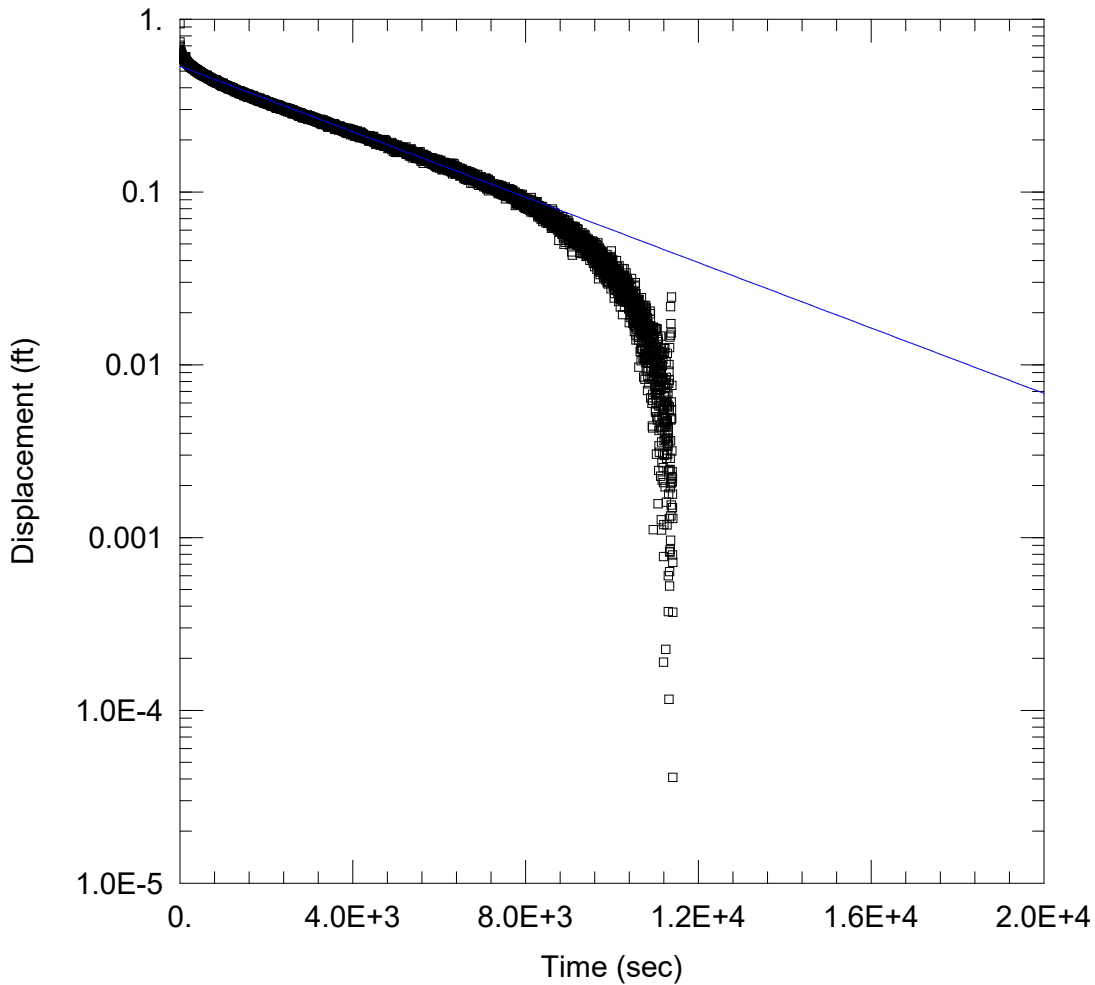
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.491E-5 cm/sec

y0 = 1.078 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-11\_R1.aqt

Date: 07/31/23

Time: 10:17:21

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-11

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-11)

Initial Displacement: 0.9405 ft

Static Water Column Height: 42.16 ft

Total Well Penetration Depth: 43.26 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

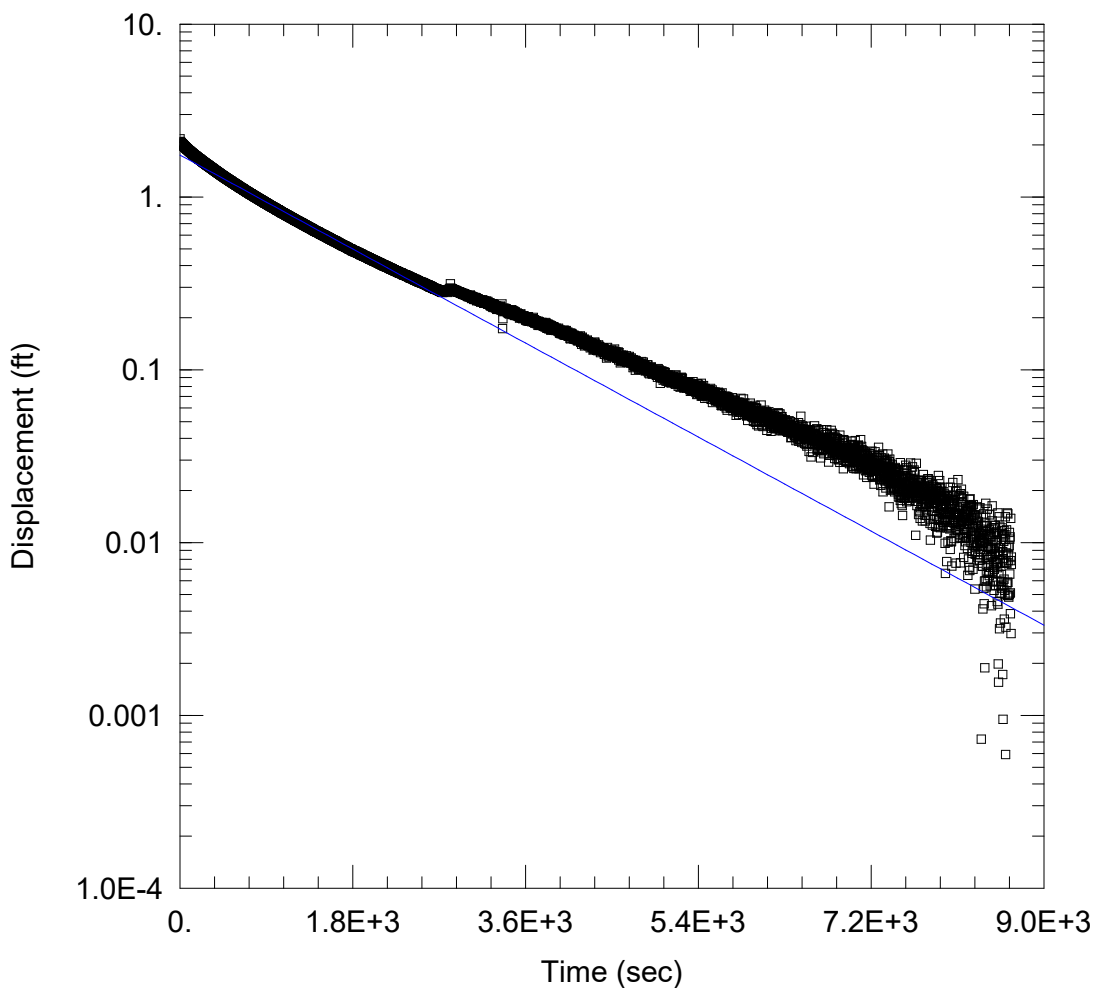
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 5.244E-5 cm/sec

y0 = 0.5328 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-12\_F1.aqt

Date: 07/31/23

Time: 10:17:40

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-12

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 12.5 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-12)

Initial Displacement: 2.17 ft

Total Well Penetration Depth: 10.33 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 10.45 ft

Screen Length: 10. ft

Well Radius: 0.3281 ft

Gravel Pack Porosity: 0.2

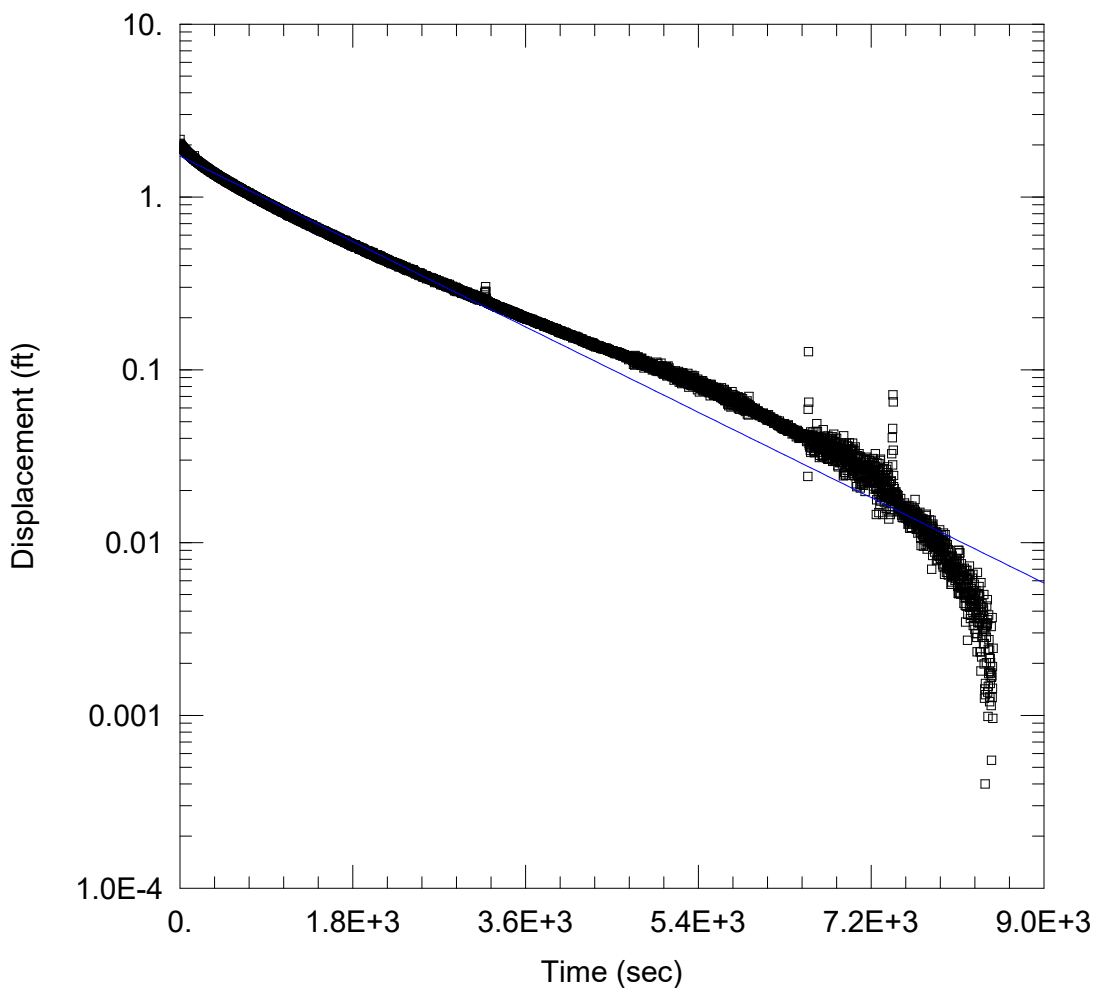
### SOLUTION

Aquifer Model: Confined

K = 1.734E-5 cm/sec

Solution Method: Bouwer-Rice

y0 = 1.747 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-12\_R1.aqt

Date: 07/31/23

Time: 10:17:54

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-12

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 12.5 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-12)

Initial Displacement: 2.149 ft

Total Well Penetration Depth: 10.33 ft

Casing Radius: 0.0833 ft

Static Water Column Height: 10.45 ft

Screen Length: 10. ft

Well Radius: 0.3281 ft

Gravel Pack Porosity: 0.2

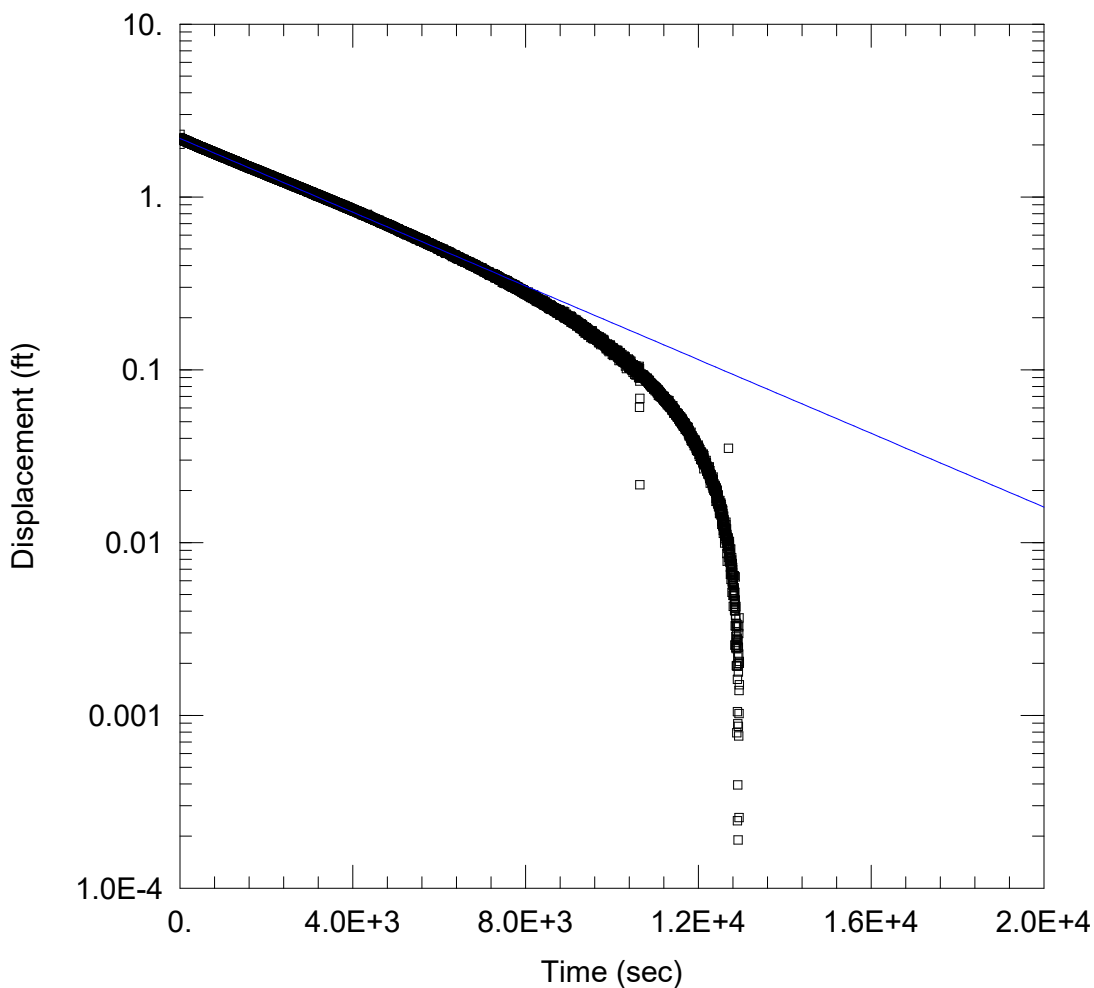
### SOLUTION

Aquifer Model: Confined

K = 1.575E-5 cm/sec

Solution Method: Bouwer-Rice

y0 = 1.722 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-13\_F1.aqt

Date: 07/31/23

Time: 10:18:08

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-13

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-13)

Initial Displacement: 2.018 ft

Static Water Column Height: 41.72 ft

Total Well Penetration Depth: 41.72 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

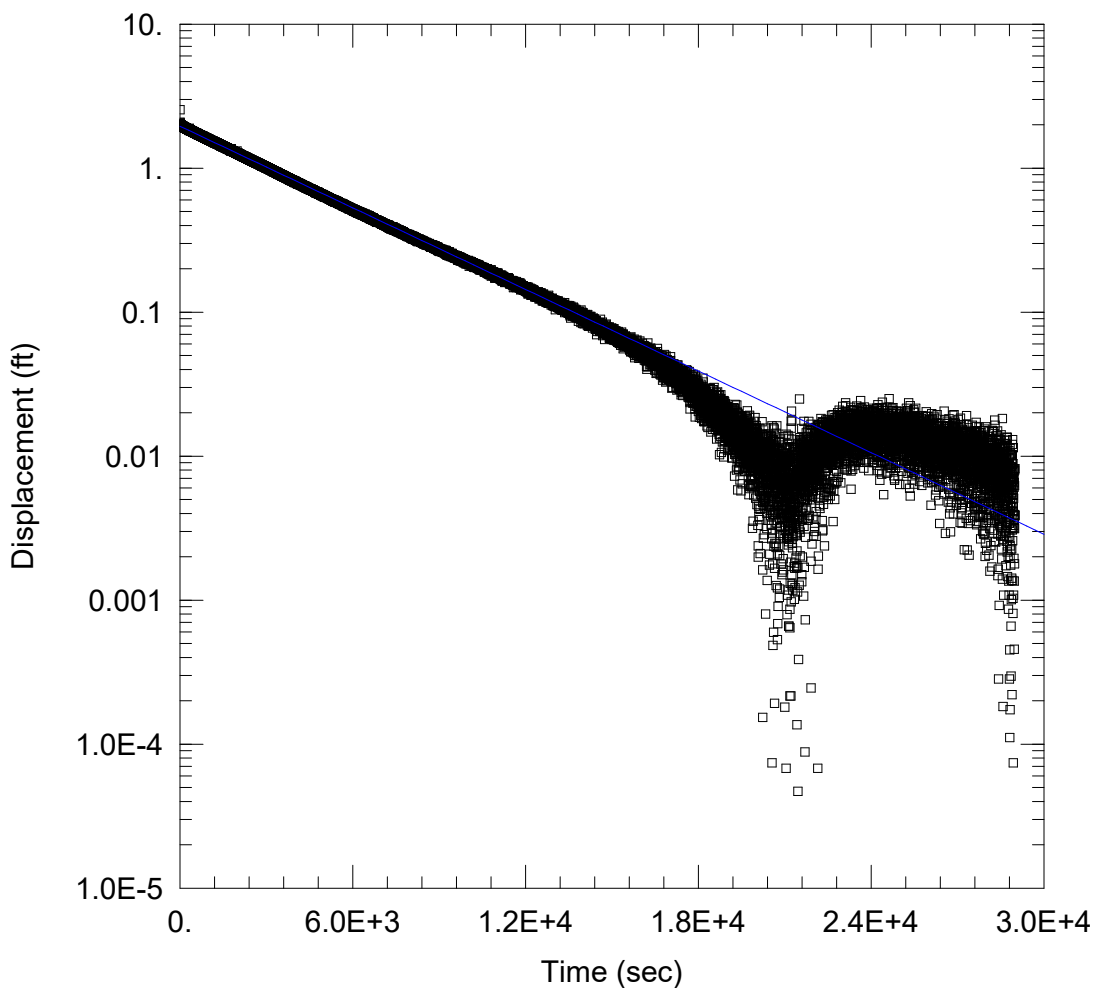
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 5.889E-5 cm/sec

y0 = 2.181 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-13\_R1.aqt

Date: 07/31/23

Time: 10:18:23

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-13

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-13)

Initial Displacement: 2.548 ft

Static Water Column Height: 41.72 ft

Total Well Penetration Depth: 41.72 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

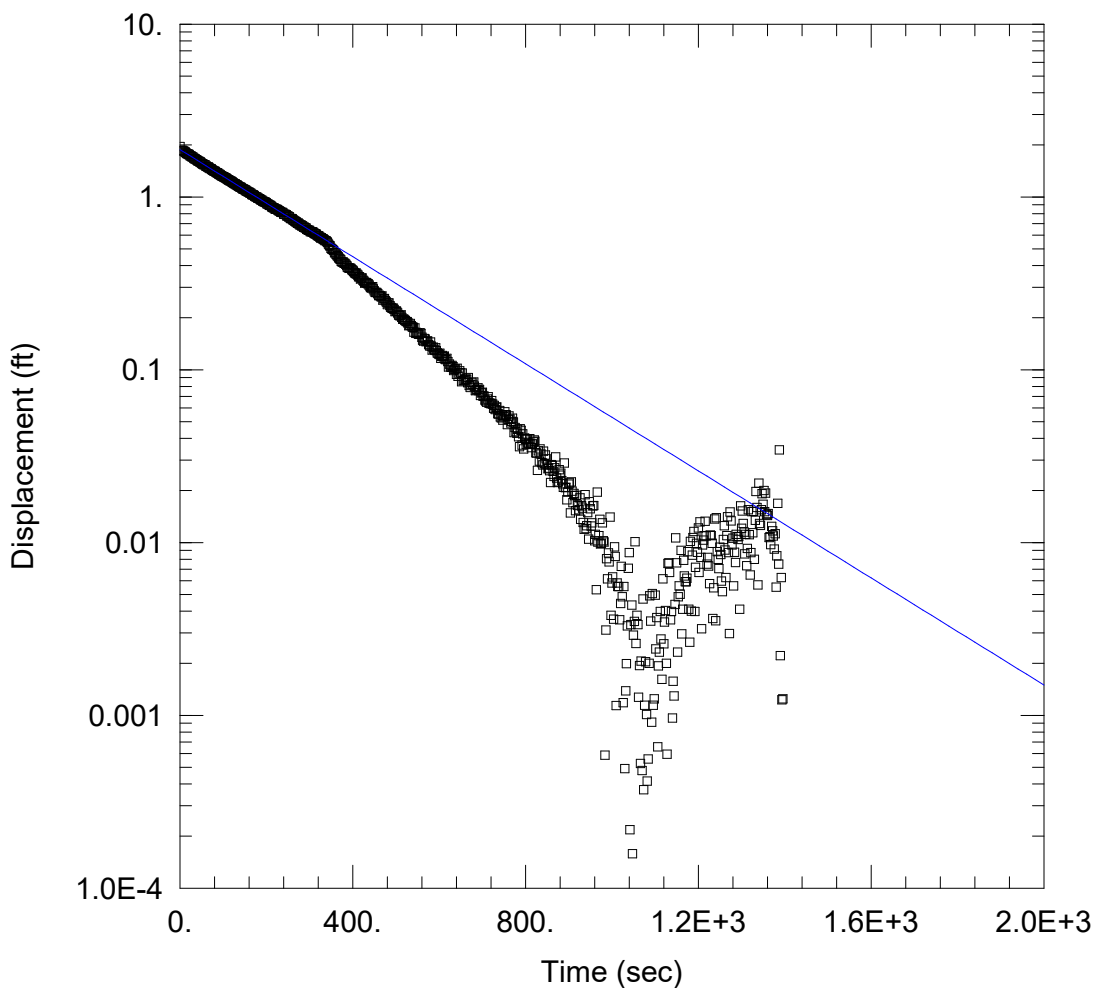
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 5.213E-5 cm/sec

y0 = 1.954 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-14\_F1.aqt

Date: 07/31/23

Time: 10:18:42

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-14

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 17.86 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-14)

Initial Displacement: 1.955 ft

Static Water Column Height: 15.75 ft

Total Well Penetration Depth: 15.69 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

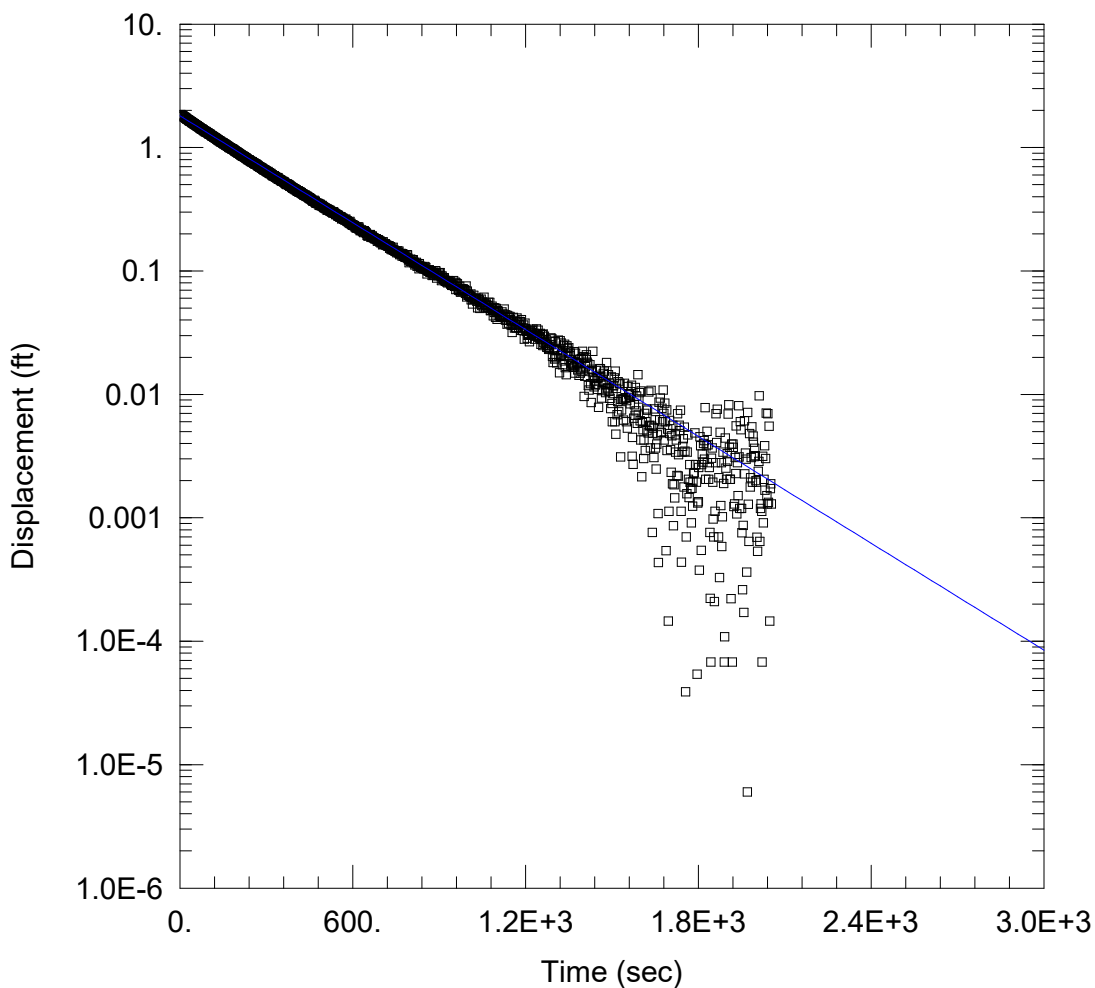
### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 9.675E-5 cm/sec

y0 = 1.878 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-14\_F2.aqt

Date: 07/31/23

Time: 10:21:05

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-14

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 17.86 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-14)

Initial Displacement: 1.774 ft

Static Water Column Height: 15.75 ft

Total Well Penetration Depth: 15.69 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

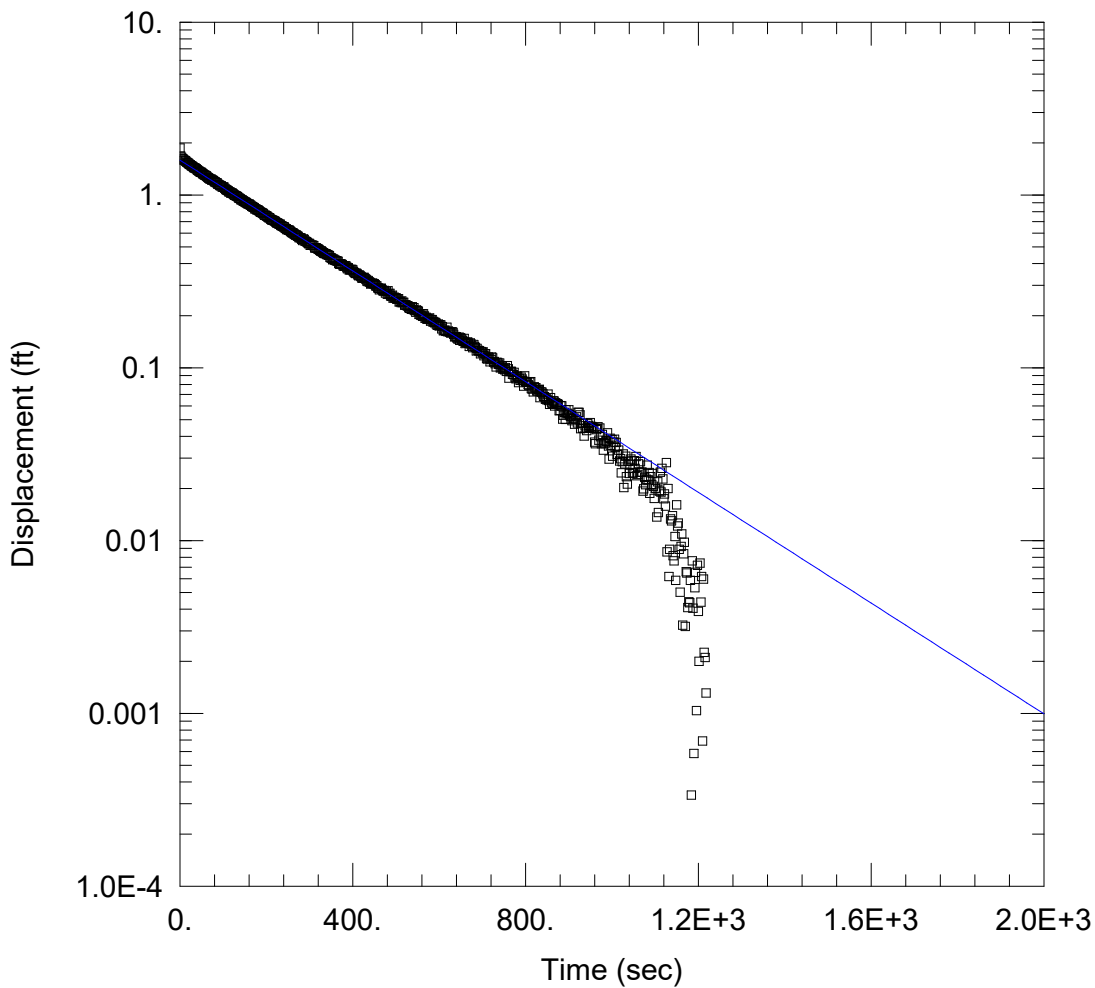
### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 9.012E-5 cm/sec

y0 = 1.808 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-14\_R1.aqt

Date: 07/31/23

Time: 10:22:14

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-14

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 17.86 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-14)

Initial Displacement: 1.87 ft

Static Water Column Height: 15.75 ft

Total Well Penetration Depth: 15.69 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

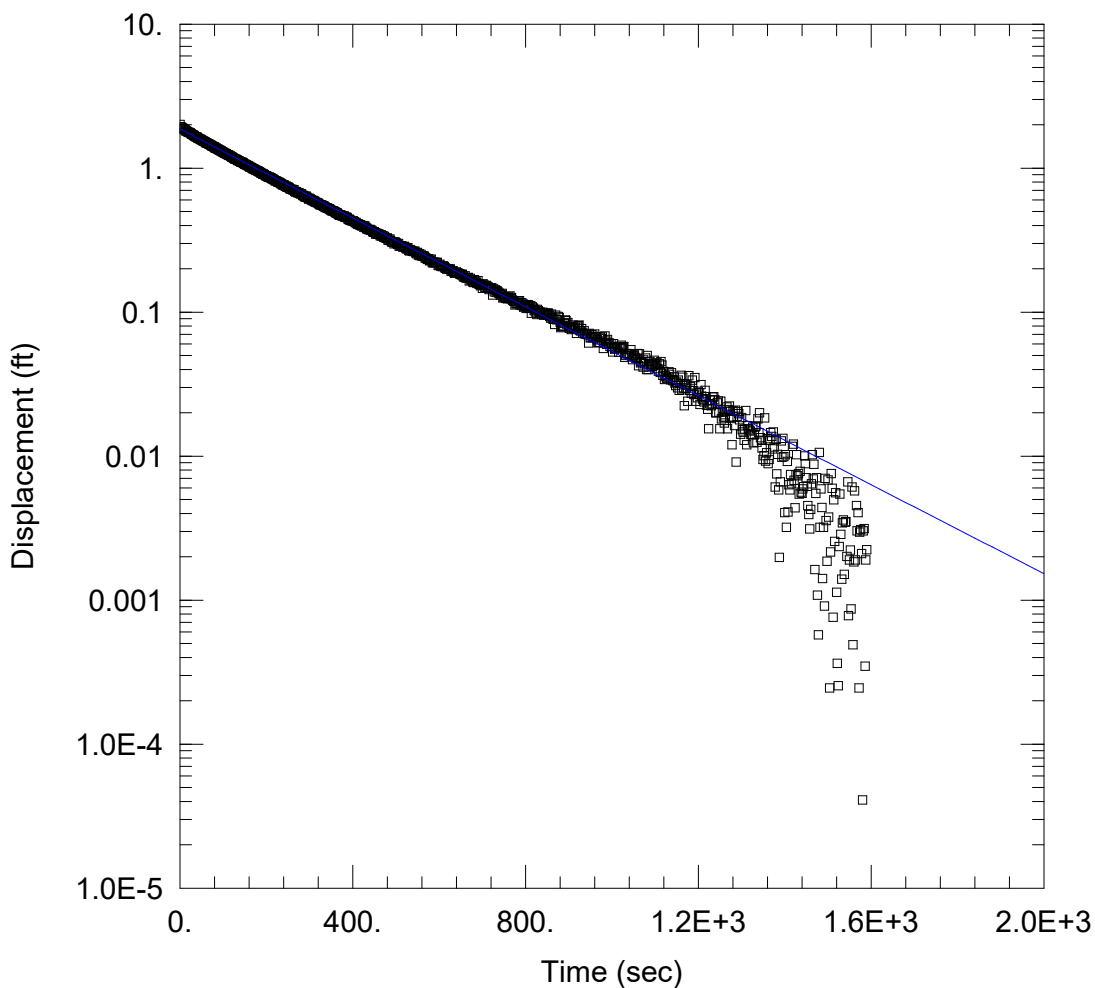
### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0001001 cm/sec

y0 = 1.59 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-14\_R2.aqt

Date: 07/31/23

Time: 10:22:46

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-14

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 17.86 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-14)

Initial Displacement: 2.013 ft

Static Water Column Height: 15.75 ft

Total Well Penetration Depth: 15.69 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

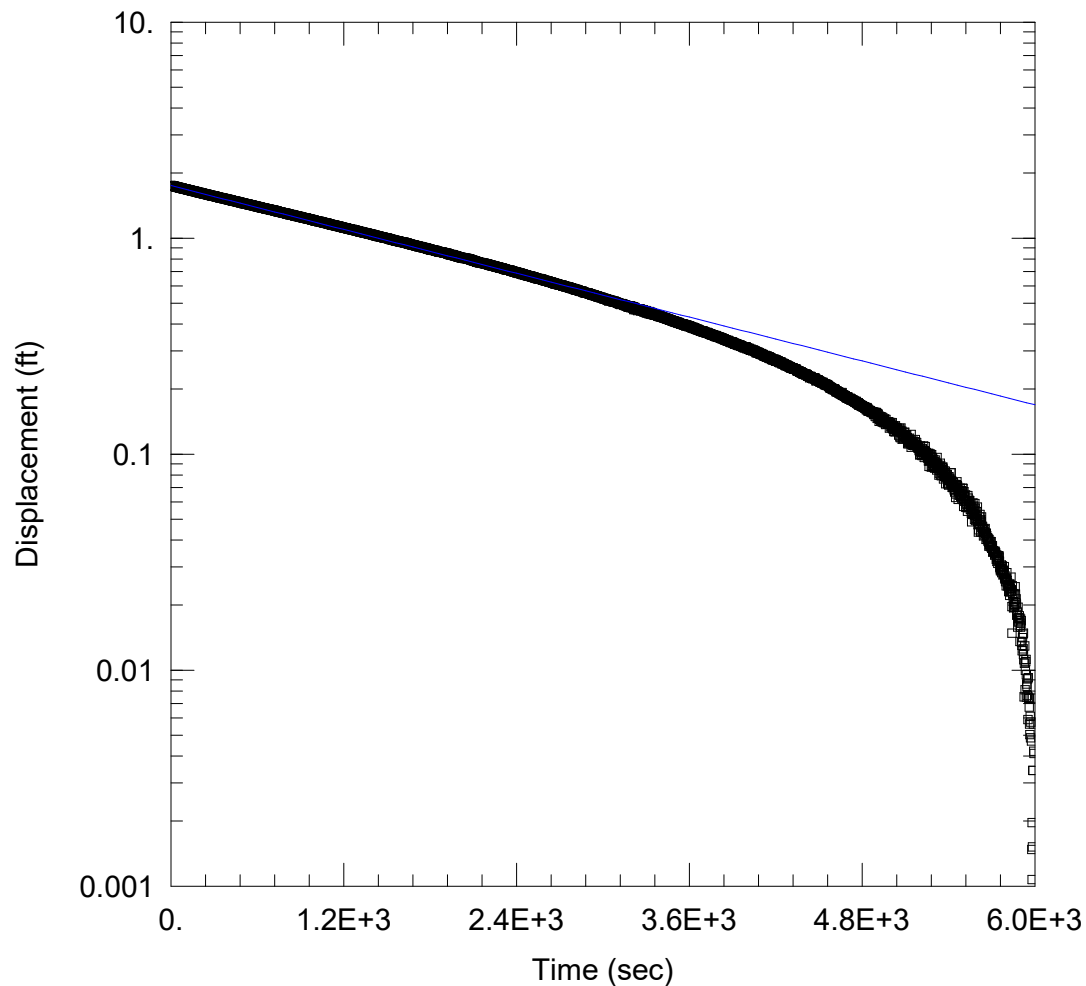
### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 9.64E-5 cm/sec

y0 = 1.867 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-17\_F1.aqt  
 Date: 07/31/23

Time: 10:23:02

### PROJECT INFORMATION

Company: Haley & Aldrich  
 Client: Amsted  
 Project: 129848  
 Location: Keokuk  
 Test Well: MW-17  
 Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (New Well)

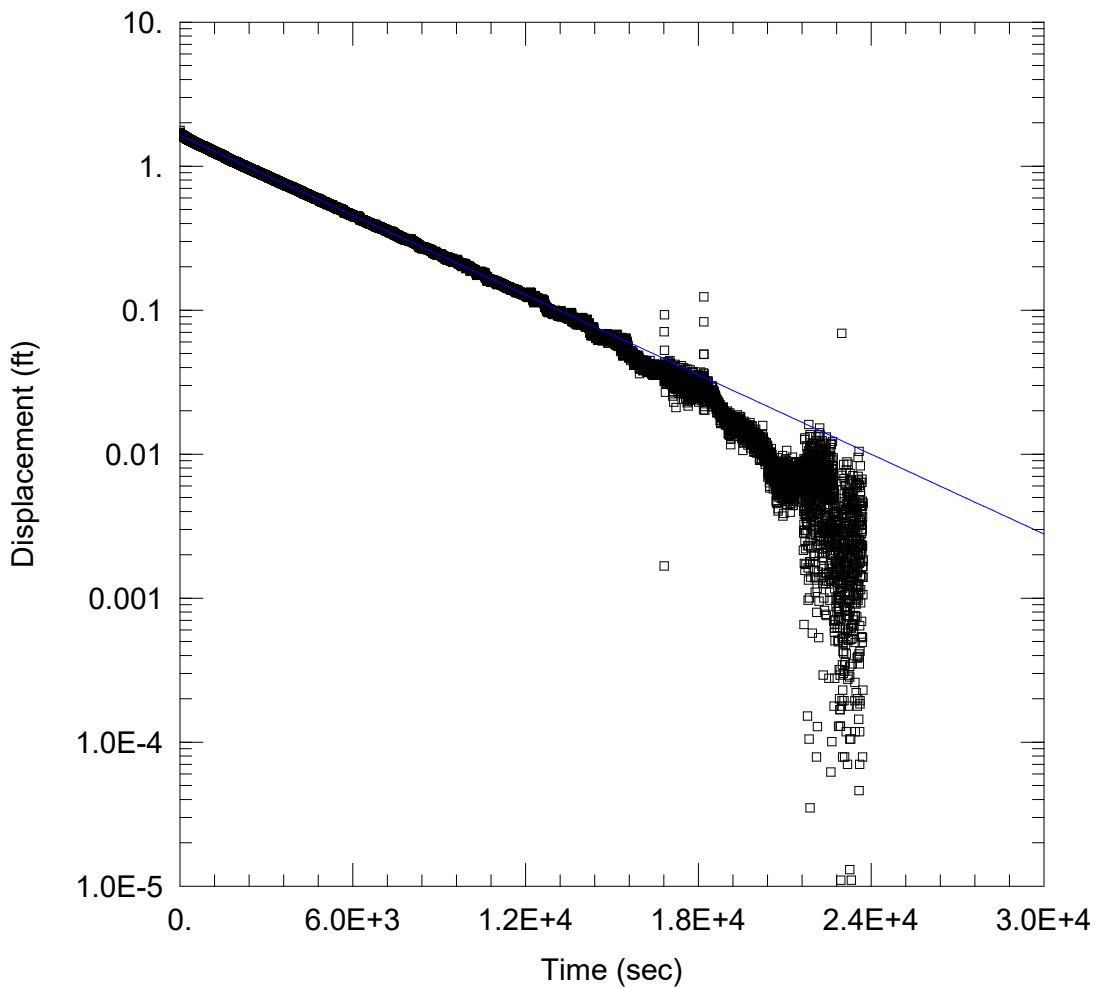
Initial Displacement: 1.754 ft  
 Total Well Penetration Depth: 10.53 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 10.6 ft  
 Screen Length: 10. ft  
 Well Radius: 0.3281 ft  
 Gravel Pack Porosity: 0.2

### SOLUTION

Aquifer Model: Confined  
 K = 7.752E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 1.75 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-17\_R1.aqt  
 Date: 07/31/23

Time: 10:23:19

### PROJECT INFORMATION

Company: Haley & Aldrich  
 Client: Amsted  
 Project: 129848  
 Location: Keokuk  
 Test Well: MW-17  
 Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (New Well)

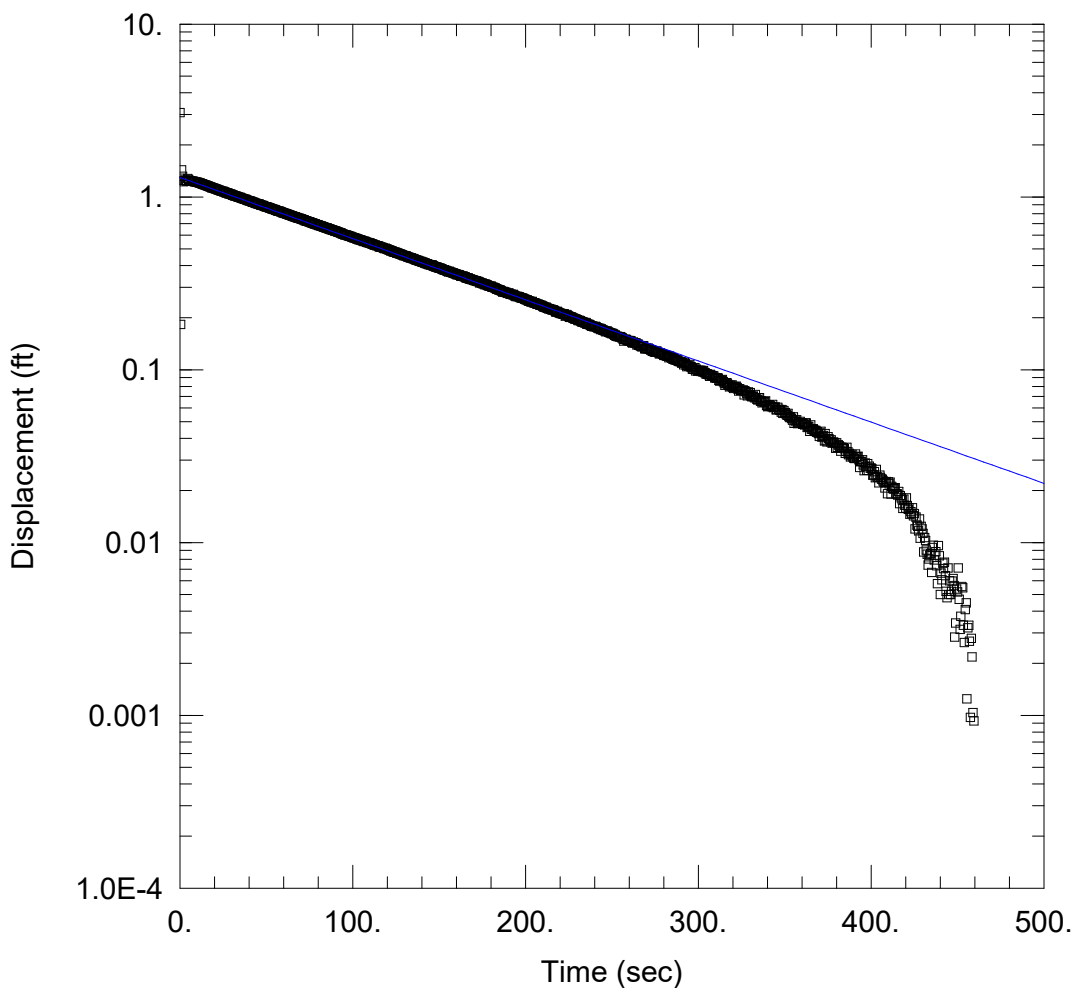
Initial Displacement: 1.768 ft  
 Total Well Penetration Depth: 10.53 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 10.6 ft  
 Screen Length: 10. ft  
 Well Radius: 0.3281 ft  
 Gravel Pack Porosity: 0.2

### SOLUTION

Aquifer Model: Confined  
 K = 4.232E-5 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 1.64 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-19\_F1.aqt

Date: 07/31/23

Time: 10:23:34

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-19

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-19)

Initial Displacement: 3.079 ft

Static Water Column Height: 44.01 ft

Total Well Penetration Depth: 45.32 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

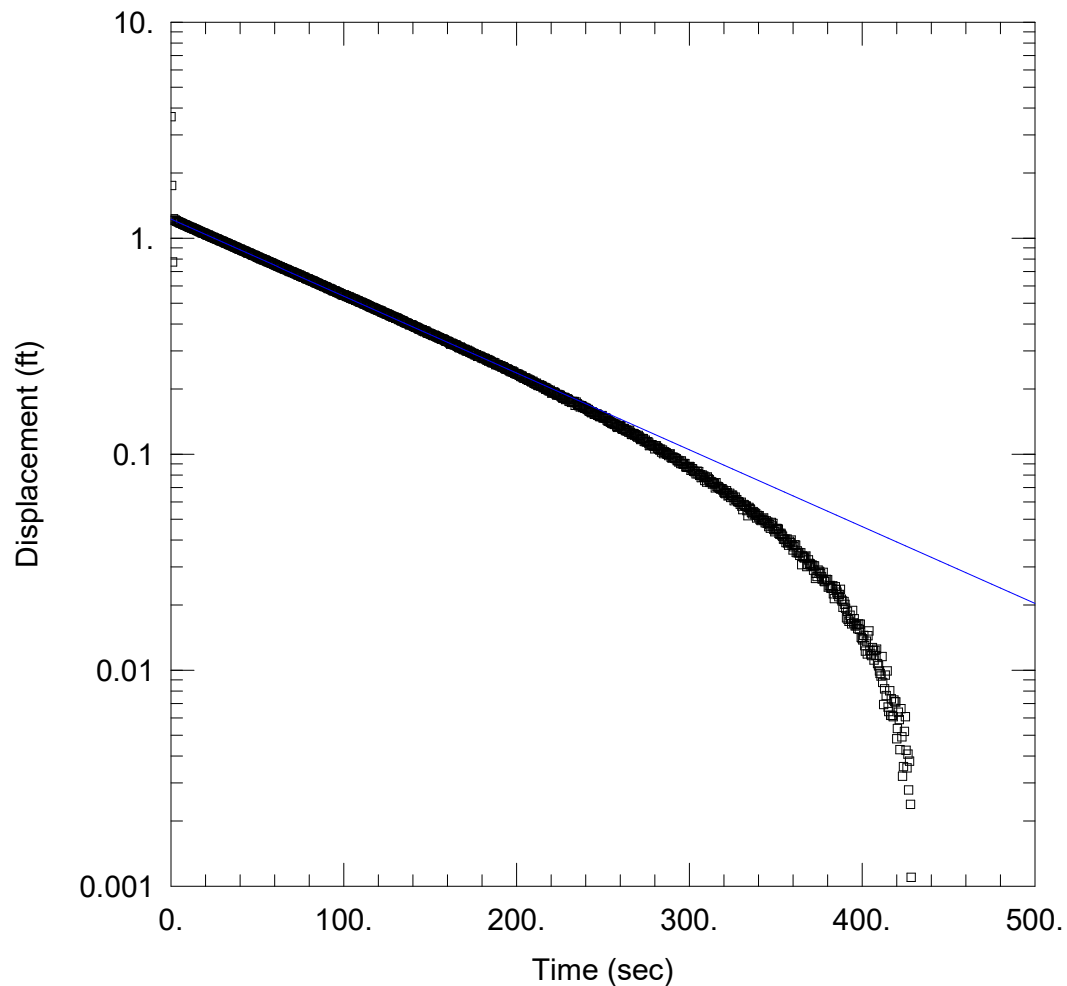
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0004066 cm/sec

y0 = 1.297 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-19\_F2.aqt  
Date: 07/31/23

Time: 10:23:49

### PROJECT INFORMATION

Company: Haley & Aldrich  
Client: Amsted  
Project: 129848  
Location: Keokuk  
Test Well: MW-19  
Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-19)

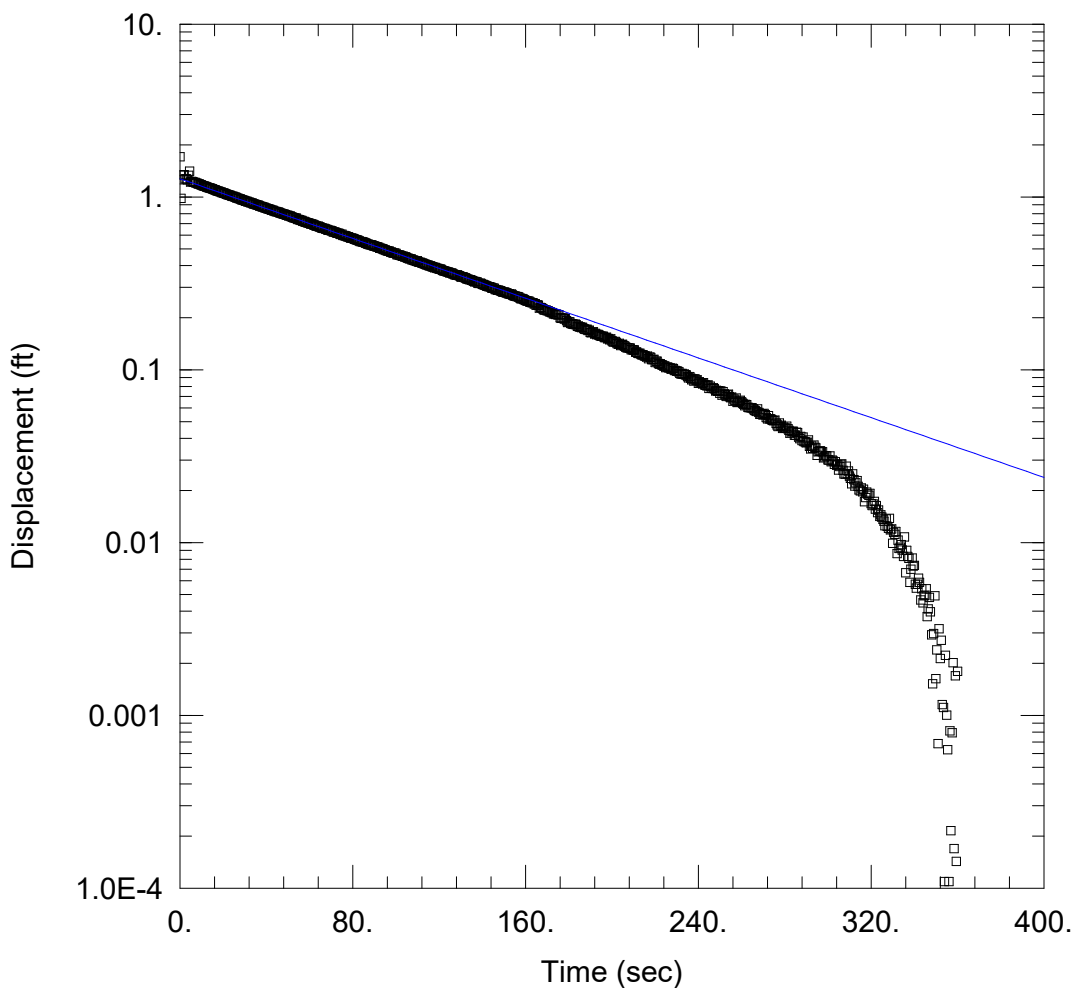
Initial Displacement: 3.646 ft  
Total Well Penetration Depth: 45.32 ft  
Casing Radius: 0.0833 ft

Static Water Column Height: 44.01 ft  
Screen Length: 10. ft  
Well Radius: 0.3281 ft

### SOLUTION

Aquifer Model: Confined  
 $K = 0.0004083$  cm/sec

Solution Method: Bouwer-Rice  
 $y_0 = 1.223$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-19\_R1.aqt

Date: 07/31/23

Time: 10:24:02

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-19

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-19)

Initial Displacement: 1.711 ft

Static Water Column Height: 44.01 ft

Total Well Penetration Depth: 45.32 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

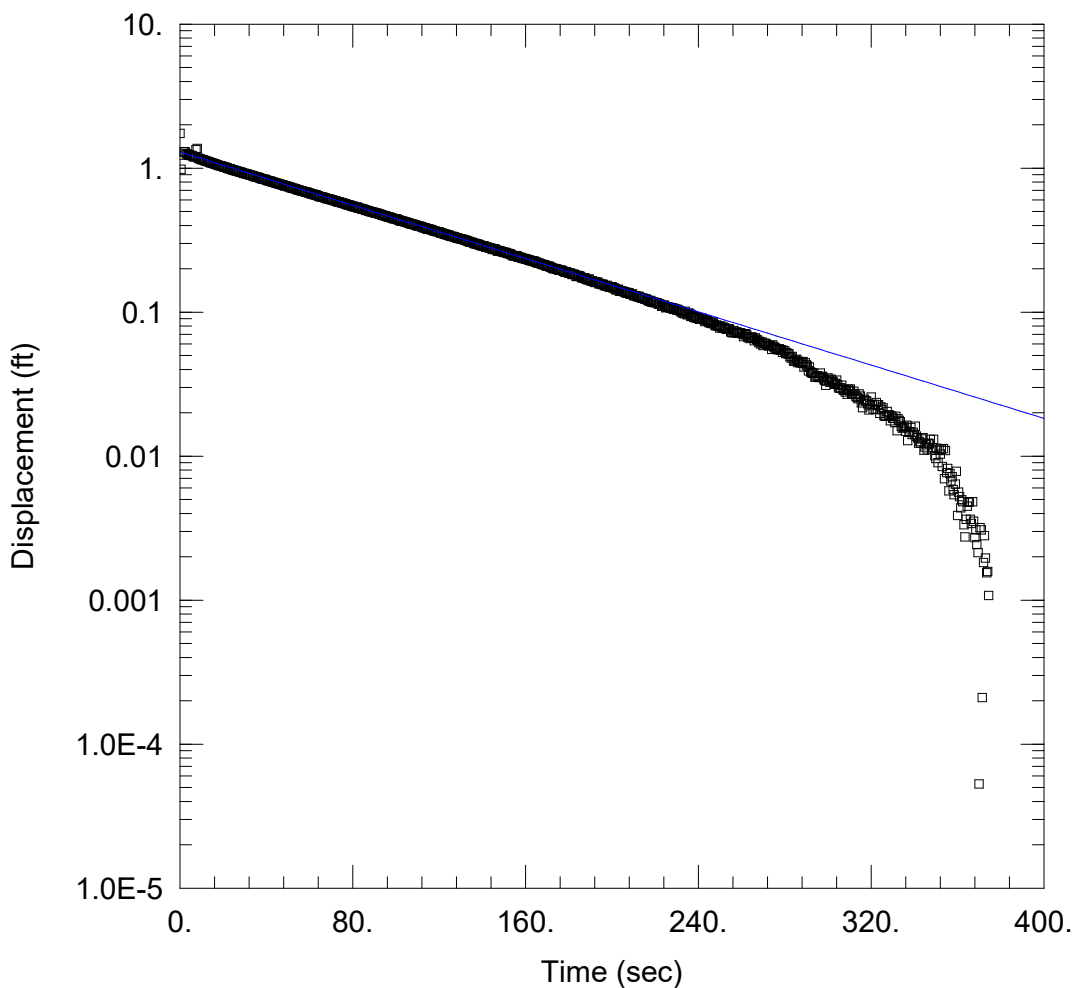
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0004961 cm/sec

y0 = 1.274 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-19\_R2.aqt

Date: 07/31/23

Time: 10:24:17

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-19

Test Date: 4-19-2023

### AQUIFER DATA

Saturated Thickness: 7. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-19)

Initial Displacement: 1.745 ft

Static Water Column Height: 44.01 ft

Total Well Penetration Depth: 45.32 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

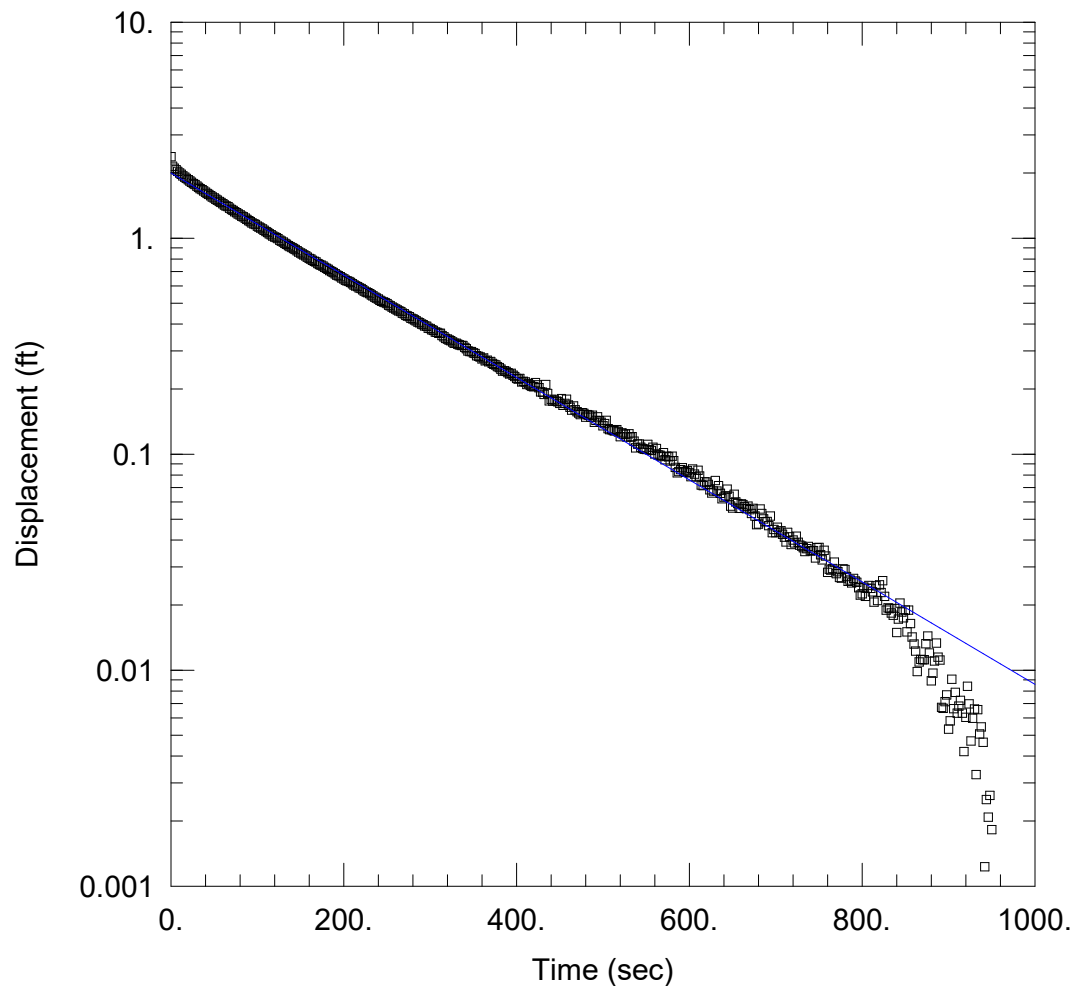
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0005307 cm/sec

y0 = 1.292 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-20\_R1.aqt

Date: 07/31/23

Time: 10:25:36

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-20

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 42. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-20)

Initial Displacement: 2.384 ft

Static Water Column Height: 20.67 ft

Total Well Penetration Depth: 20.61 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

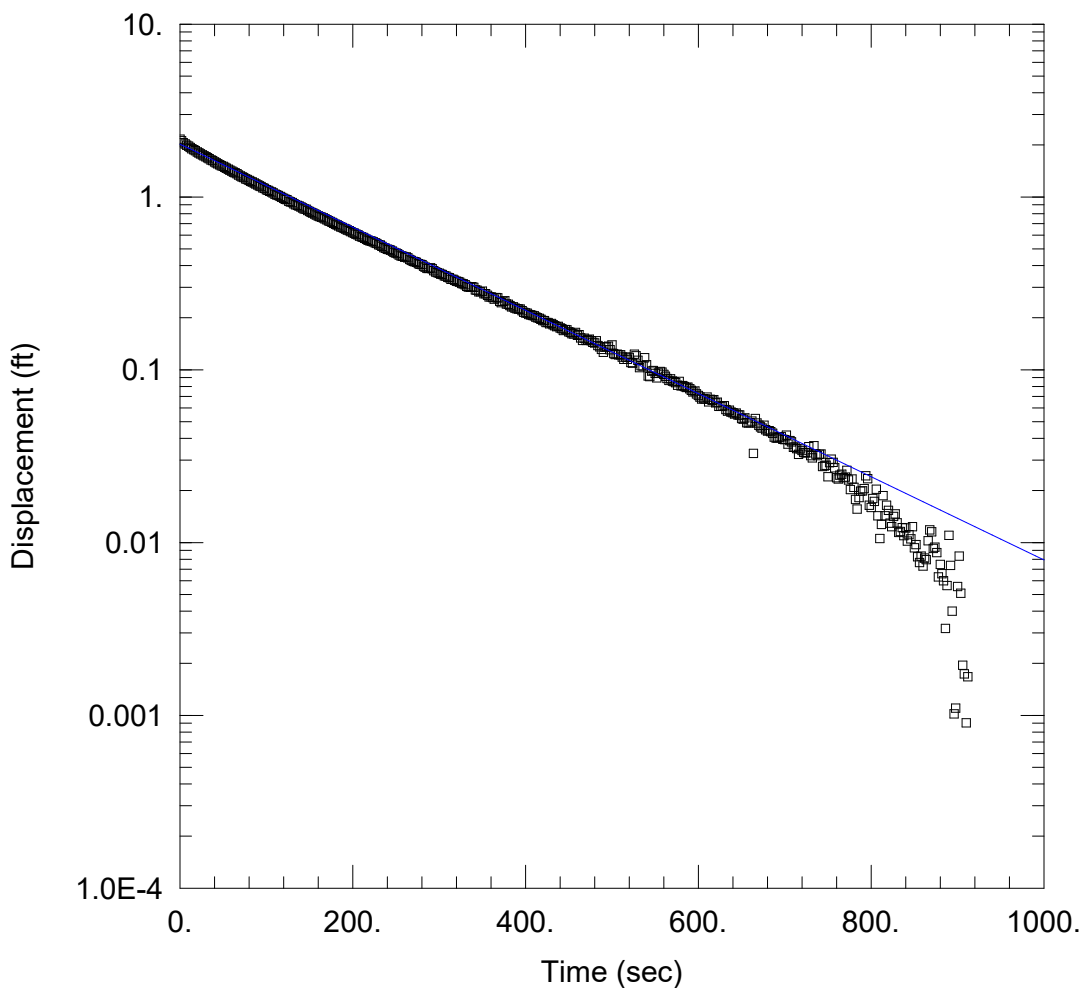
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0001437 cm/sec

y0 = 2.003 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-20\_R2.aqt

Date: 07/31/23

Time: 10:25:52

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-20

Test Date: 4-20-2023

### AQUIFER DATA

Saturated Thickness: 42. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-20)

Initial Displacement: 2.161 ft

Static Water Column Height: 20.67 ft

Total Well Penetration Depth: 20.61 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

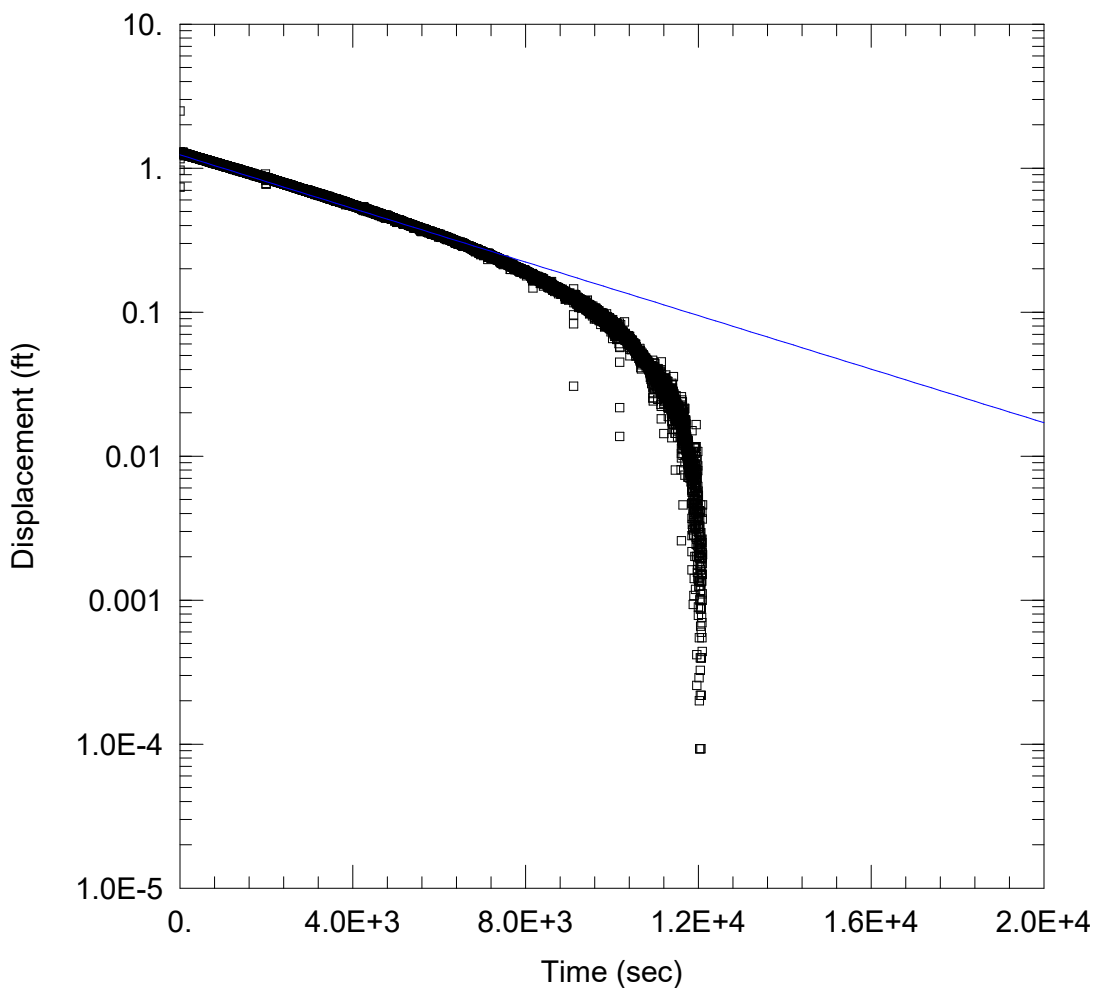
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0001461 cm/sec

y0 = 2.021 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-21\_F1.aqt

Date: 07/31/23

Time: 10:26:06

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-21

Test Date: 4-21-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-21)

Initial Displacement: 2.498 ft

Static Water Column Height: 57.31 ft

Total Well Penetration Depth: 57.36 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

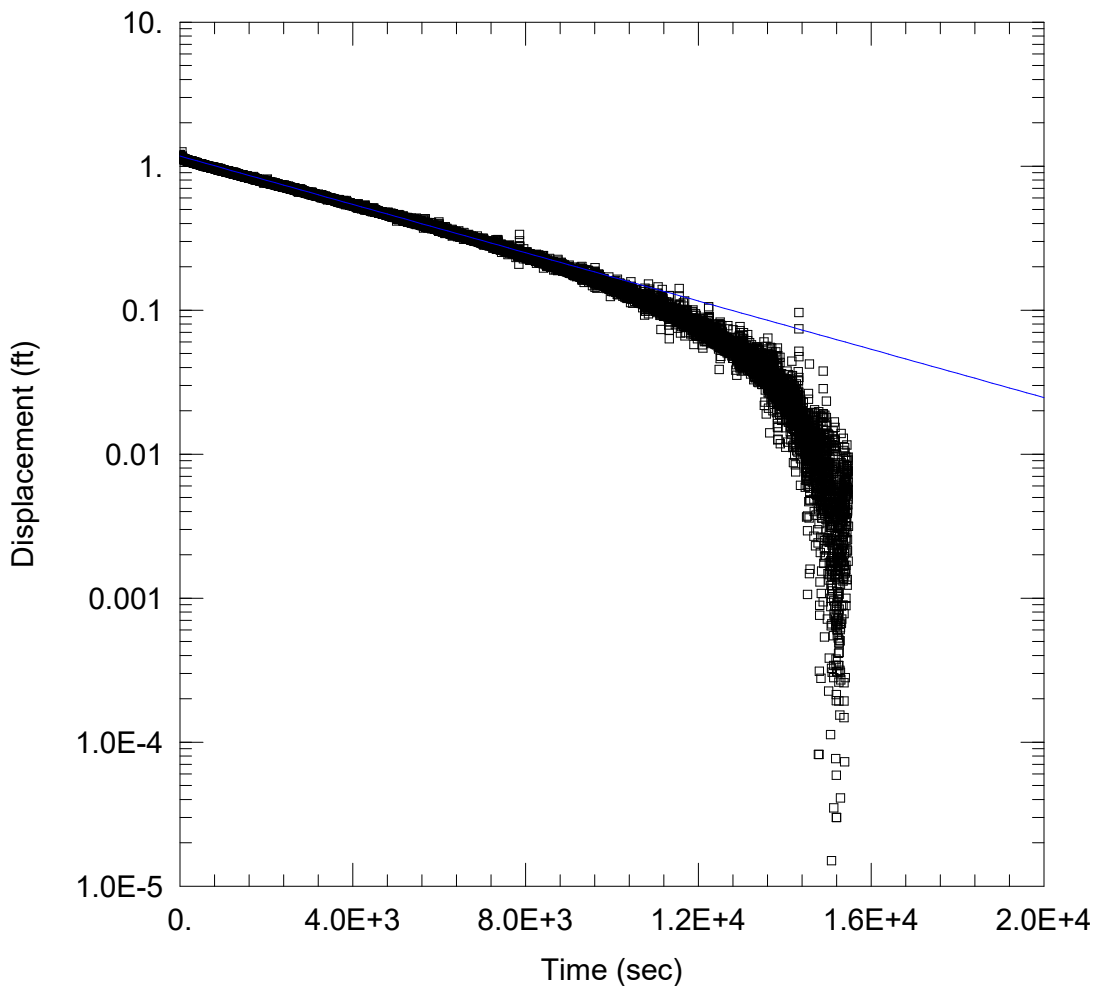
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 5.301E-5 cm/sec

y0 = 1.236 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-21\_R1.aqt

Date: 07/31/23

Time: 10:26:24

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 129848

Location: Keokuk

Test Well: MW-21

Test Date: 4-21-2023

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-21)

Initial Displacement: 1.203 ft

Static Water Column Height: 57.31 ft

Total Well Penetration Depth: 57.36 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3281 ft

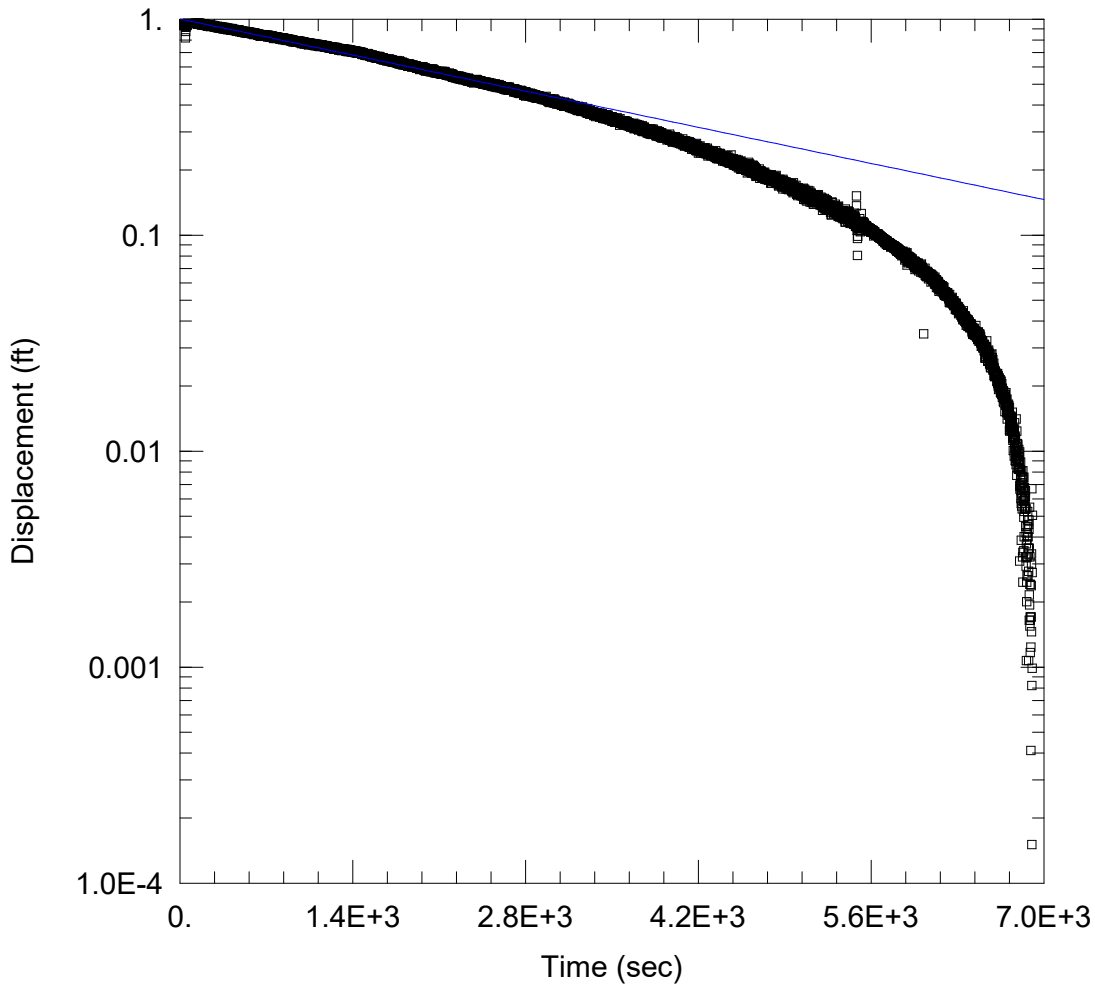
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 4.779E-5 cm/sec

y0 = 1.173 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-23\_F1.aqt

Date: 07/31/23

Time: 10:26:40

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-23

Test Date: 4/22/23

### AQUIFER DATA

Saturated Thickness: 0.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-23)

Initial Displacement: 0.976 ft

Static Water Column Height: 40.95 ft

Total Well Penetration Depth: 50.85 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.33 ft

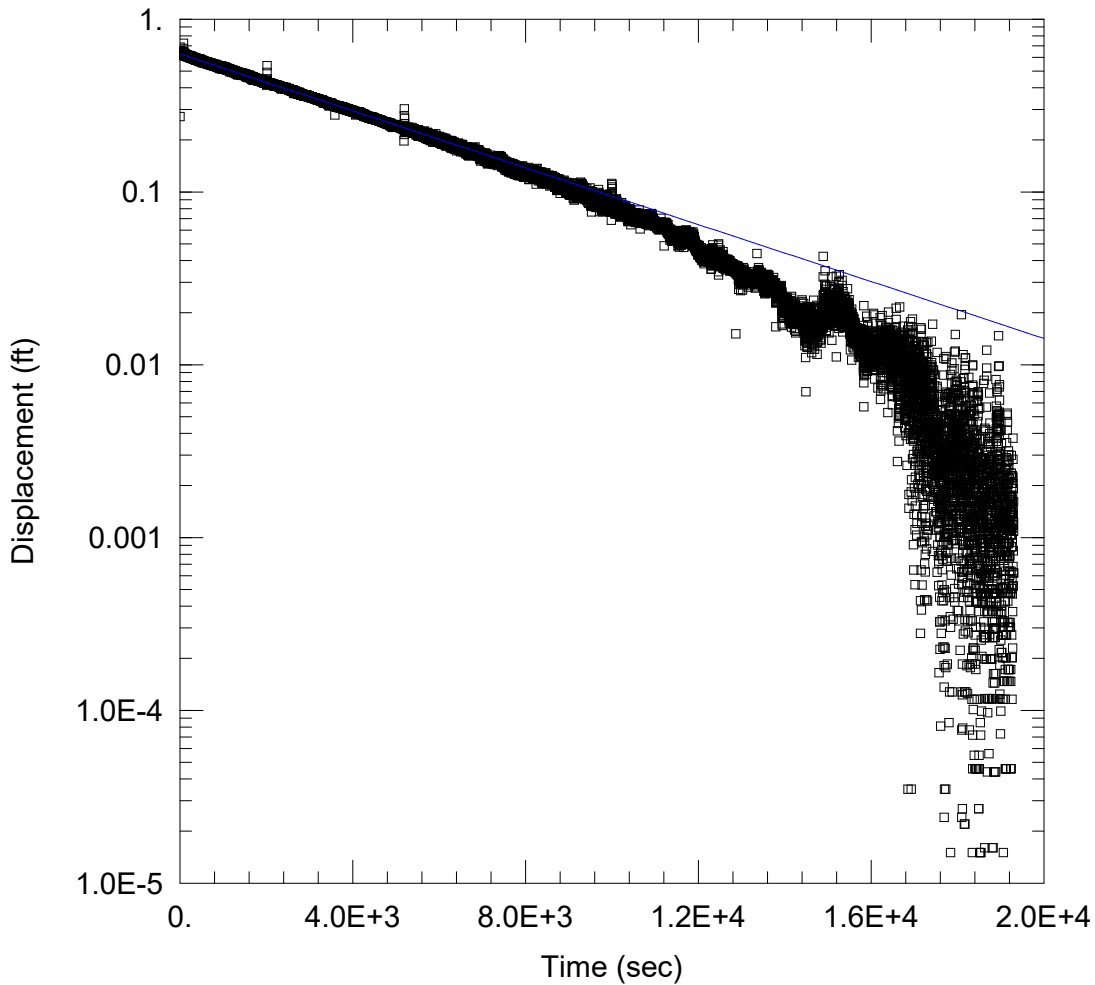
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 8.826E-5$  cm/sec

$y_0 = 1.002$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-23\_R1.aqt  
 Date: 07/31/23

Time: 10:26:55

### PROJECT INFORMATION

Company: Haley & Aldrich  
 Client: Amsted  
 Project: 0129848  
 Location: Keokuk  
 Test Well: MW-23  
 Test Date: 4/22/23

### AQUIFER DATA

Saturated Thickness: 0.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-23)

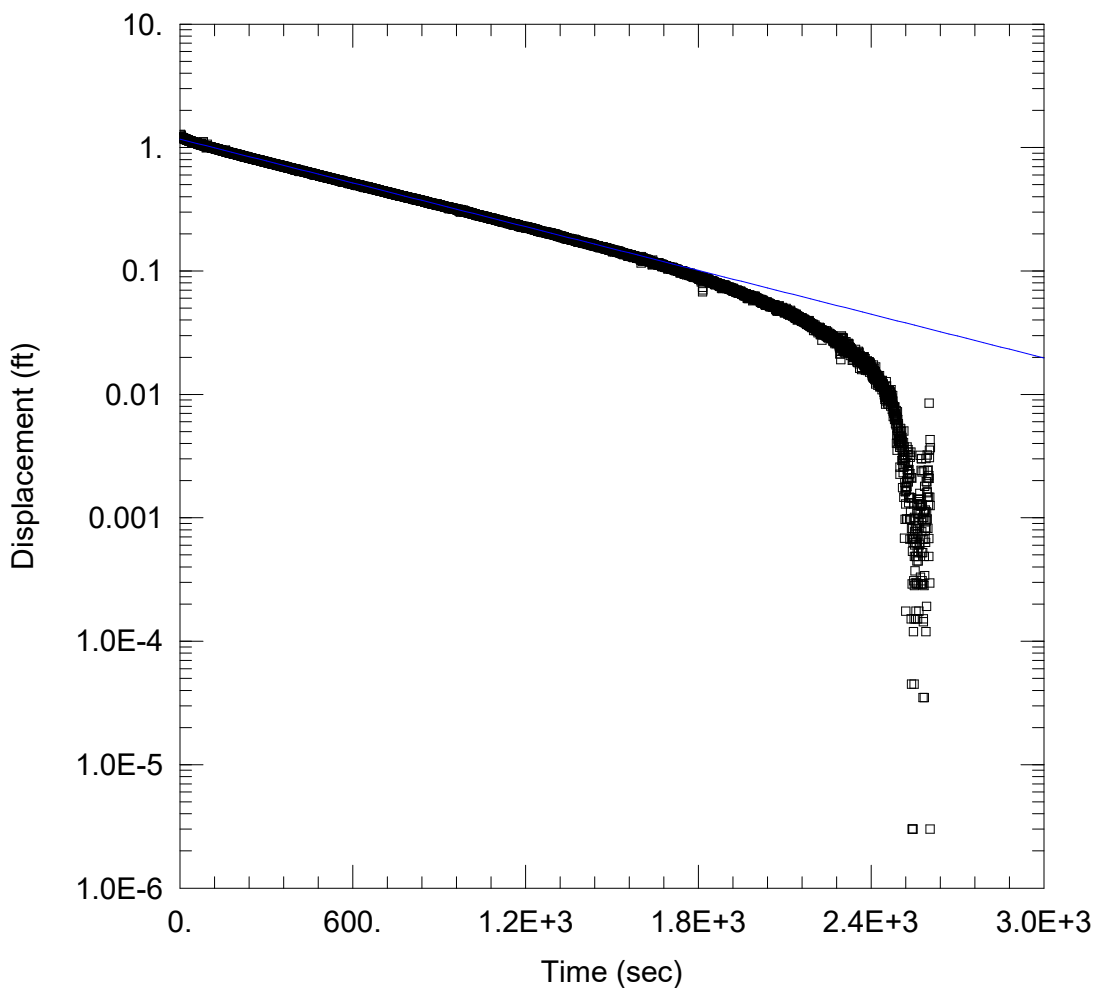
Initial Displacement: 1.796 ft  
 Total Well Penetration Depth: 50.85 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 40.95 ft  
 Screen Length: 10. ft  
 Well Radius: 0.33 ft

### SOLUTION

Aquifer Model: Confined  
 $K = 6.085E-5$  cm/sec

Solution Method: Bouwer-Rice  
 $y_0 = 0.6299$  ft



### WELL TEST ANALYSIS

Data Set: \...\MW-24\_F1.aqt

Date: 07/31/23

Time: 10:27:10

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-24

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 1.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-24)

Initial Displacement: 1.208 ft

Static Water Column Height: 32.56 ft

Total Well Penetration Depth: 32.5 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.33 ft

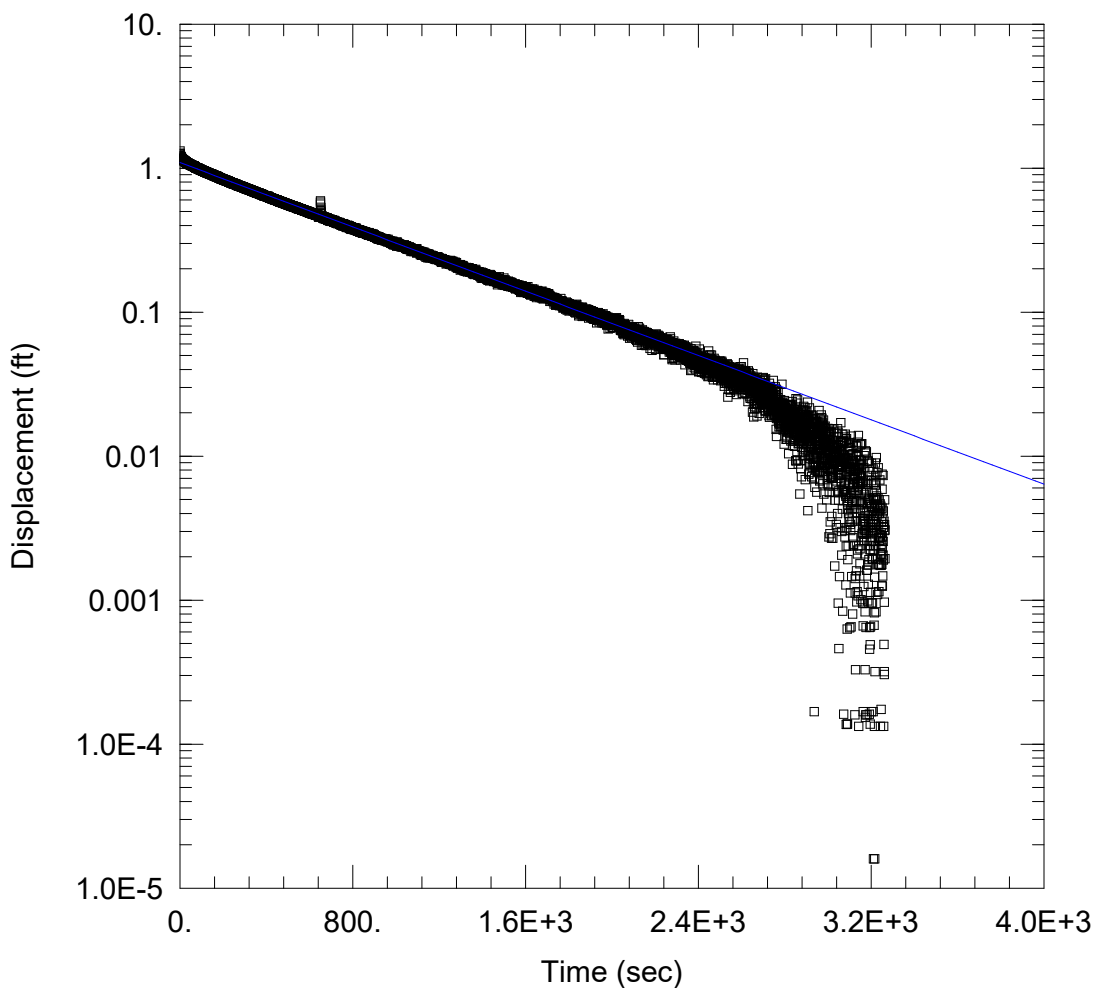
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.0002283$  cm/sec

$y_0 = 1.171$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-24\_R1.aqt

Date: 07/31/23

Time: 10:27:25

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-24

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 1.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-24)

Initial Displacement: 1.317 ft

Static Water Column Height: 32.56 ft

Total Well Penetration Depth: 32.5 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.33 ft

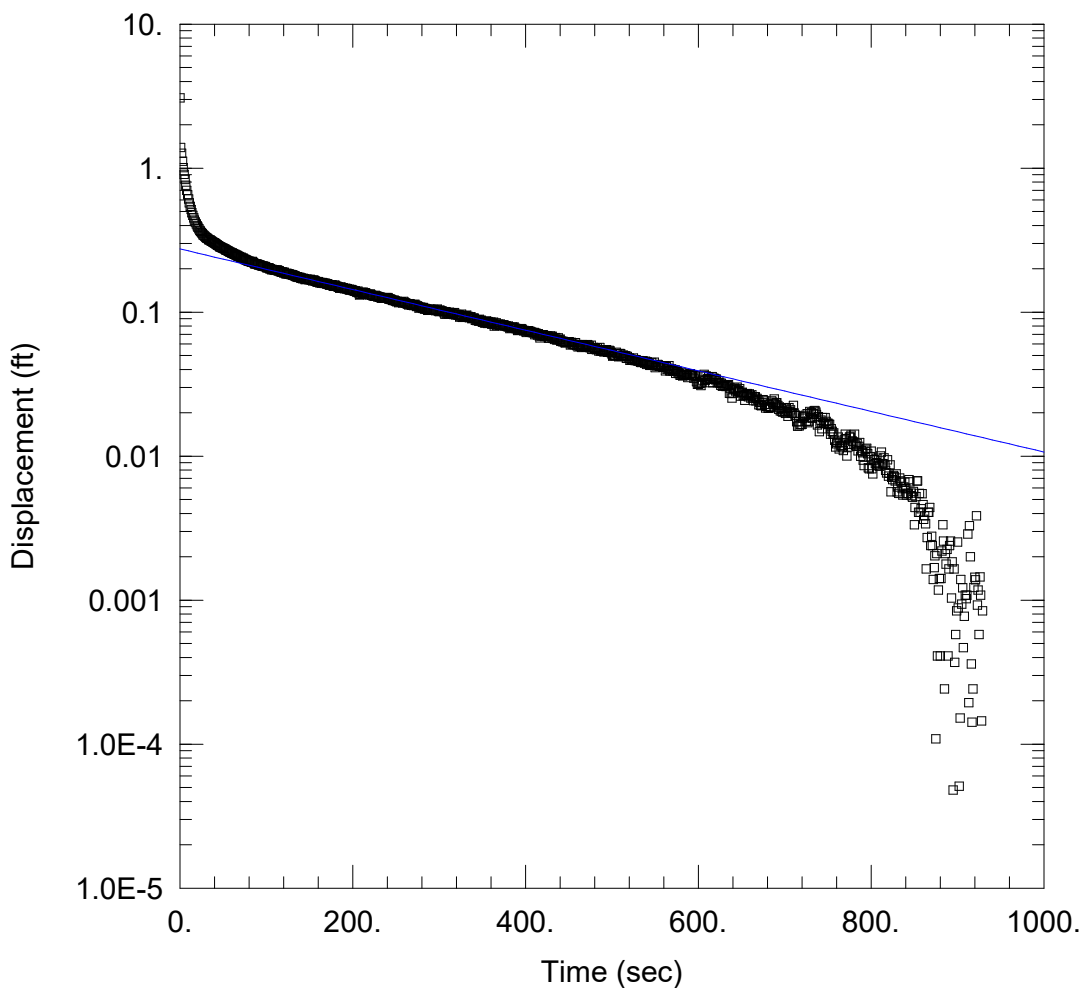
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.0002156$  cm/sec

$y_0 = 1.092$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-25\_F2.aqt

Date: 07/31/23

Time: 10:27:54

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-25

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 0.5 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-25)

Initial Displacement: 3.081 ft

Total Well Penetration Depth: 10. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 9.27 ft

Screen Length: 10. ft

Well Radius: 0.33 ft

Gravel Pack Porosity: 0.2

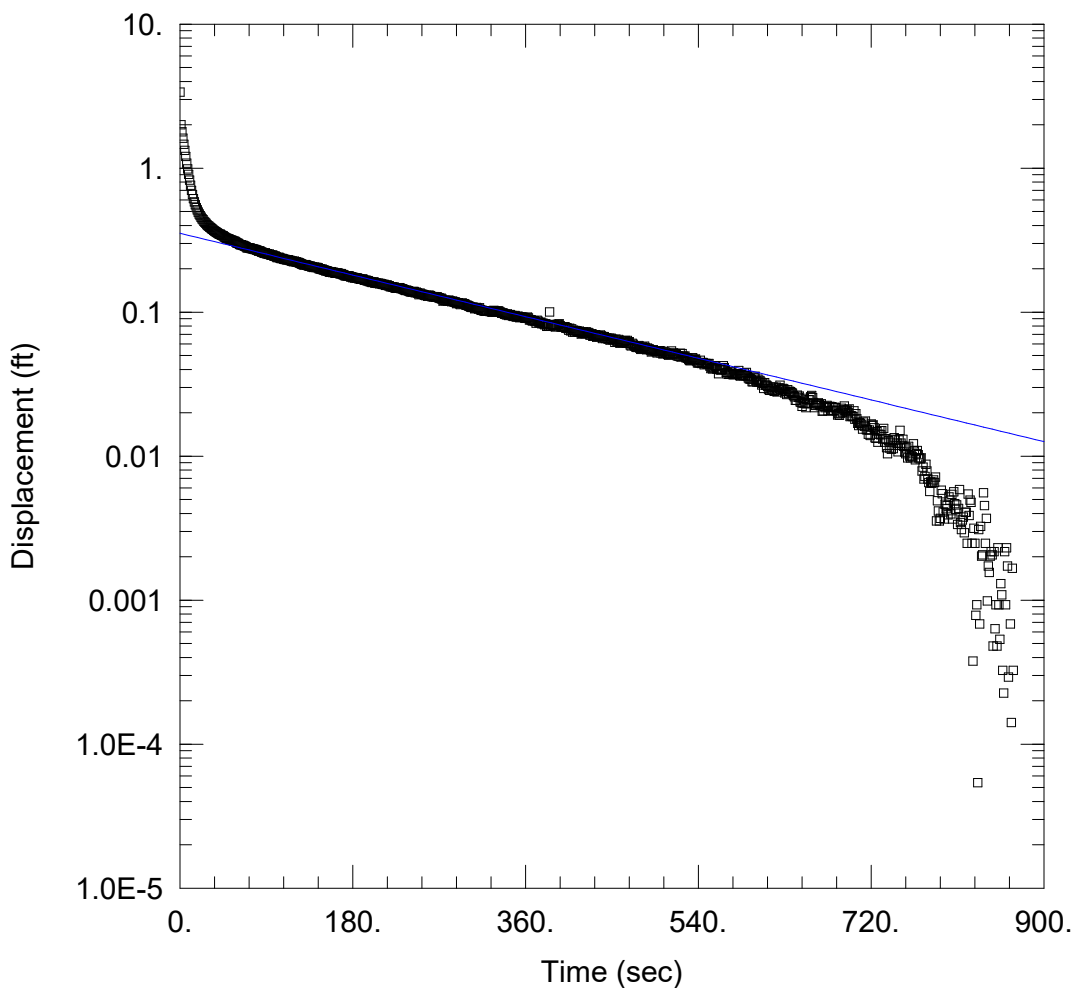
### SOLUTION

Aquifer Model: Confined

K = 0.0008997 cm/sec

Solution Method: Bouwer-Rice

y0 = 0.2745 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-25\_R1.aqt

Date: 07/31/23

Time: 10:28:08

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-25

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 0.5 ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-25)

Initial Displacement: 3.367 ft

Total Well Penetration Depth: 10. ft

Casing Radius: 0.0833 ft

Static Water Column Height: 9.27 ft

Screen Length: 10. ft

Well Radius: 0.33 ft

Gravel Pack Porosity: 0.2

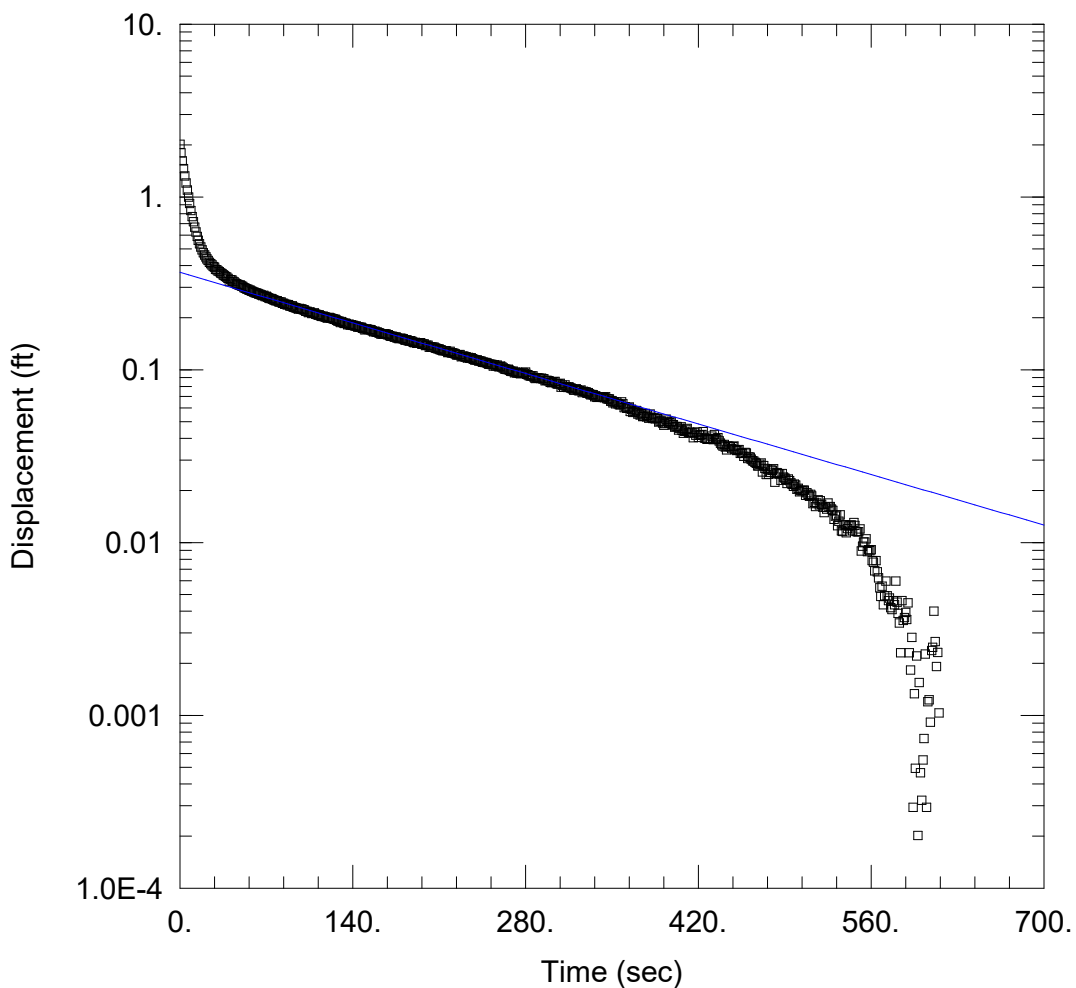
### SOLUTION

Aquifer Model: Confined

K = 0.001025 cm/sec

Solution Method: Bouwer-Rice

y0 = 0.3523 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-25\_R2.aqt

Date: 07/31/23

Time: 10:28:23

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-25

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 0.5 ft

Anisotropy Ratio ( $K_z/K_r$ ): 1.

### WELL DATA (MW-25)

Initial Displacement: 2.019 ft

Static Water Column Height: 9.27 ft

Total Well Penetration Depth: 10. ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.33 ft

Gravel Pack Porosity: 0.2

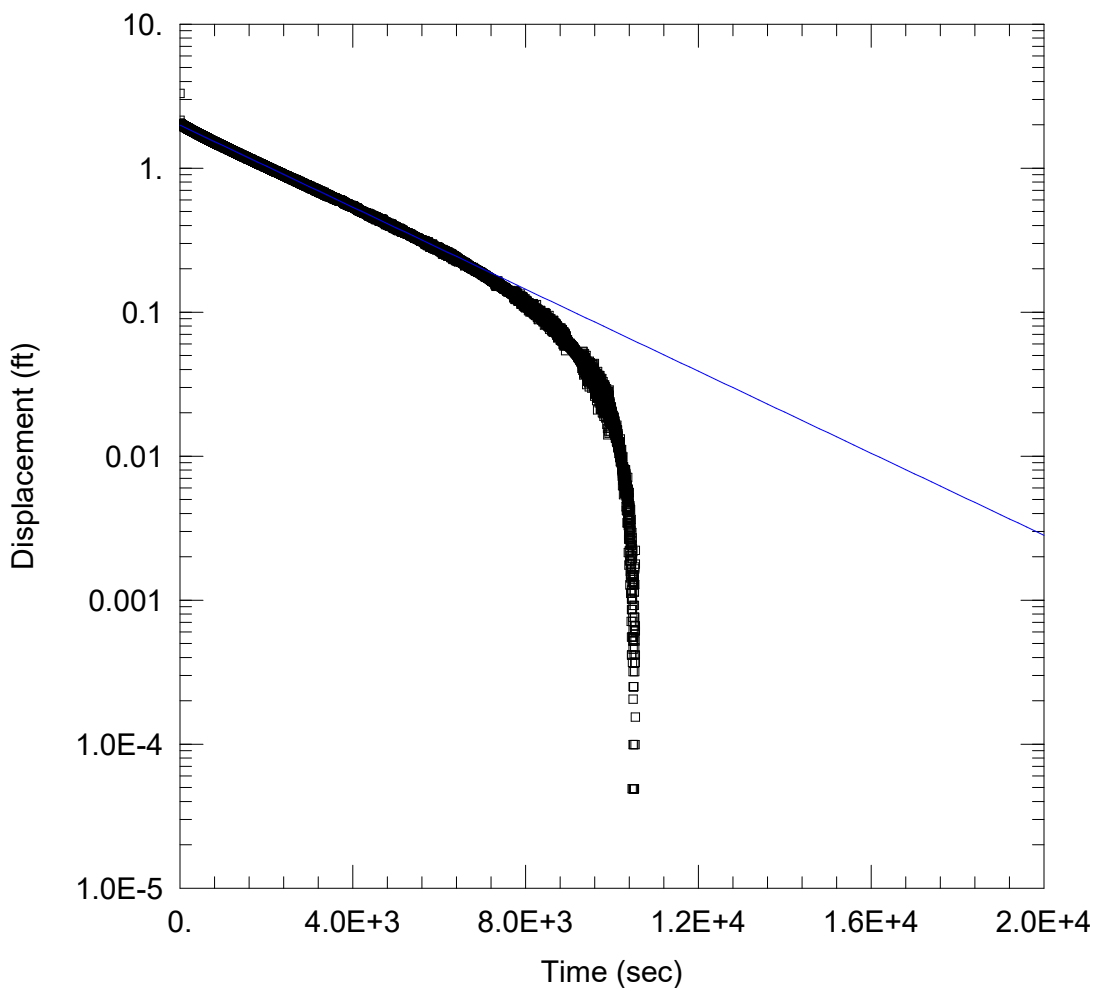
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.001333$  cm/sec

$y_0 = 0.3656$  ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-26\_F1.aqt

Date: 07/31/23

Time: 10:28:37

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-26

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-26)

Initial Displacement: 3.305 ft

Static Water Column Height: 39.15 ft

Total Well Penetration Depth: 38.29 ft

Screen Length: 5. ft

Casing Radius: 0.0833 ft

Well Radius: 0.33 ft

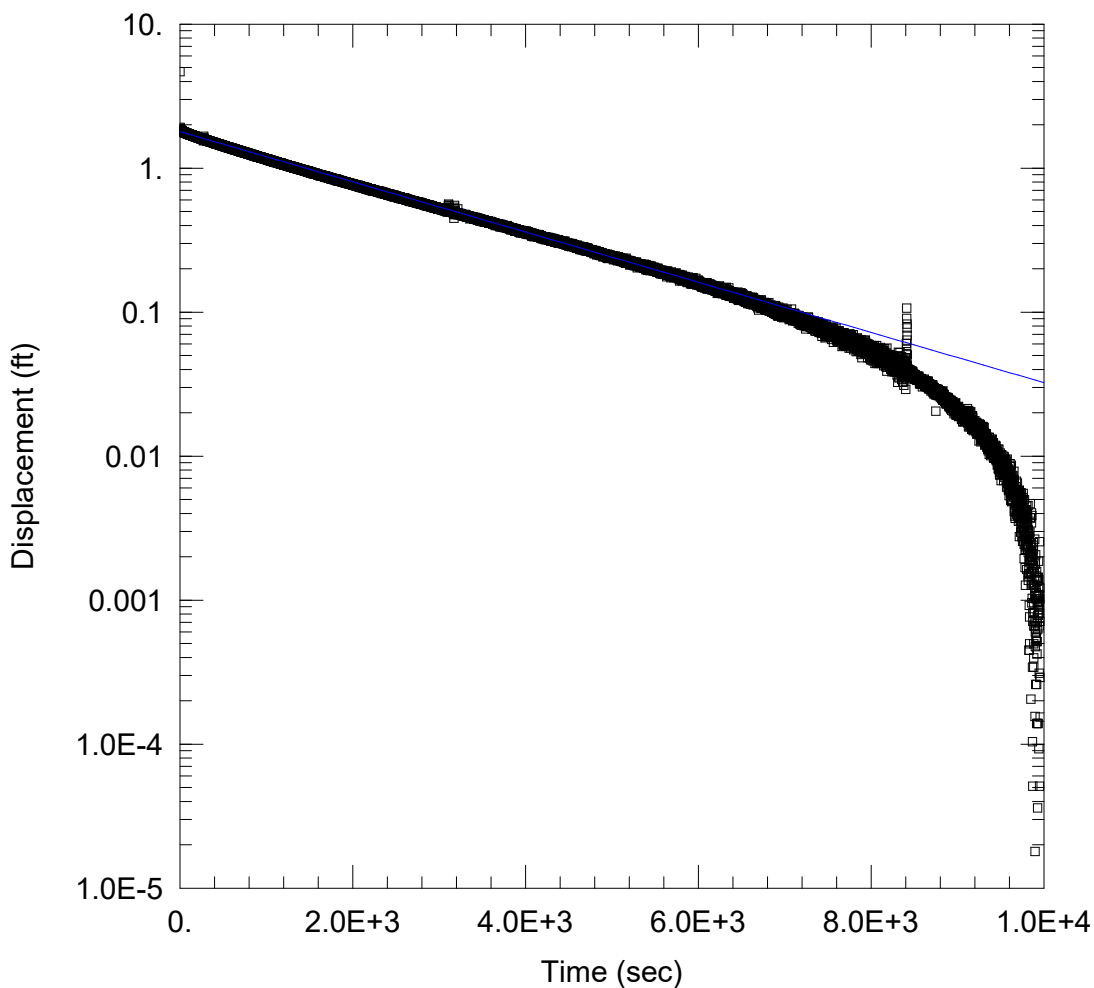
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 7.77E-5 cm/sec

y0 = 1.987 ft



### WELL TEST ANALYSIS

Data Set: \\...\MW-26\_R1.aqt

Date: 07/31/23

Time: 10:28:58

### PROJECT INFORMATION

Company: Haley & Aldrich

Client: Amsted

Project: 0129848

Location: Keokuk

Test Well: MW-26

Test Date: 4/21/23

### AQUIFER DATA

Saturated Thickness: 1. ft

Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (MW-26)

Initial Displacement: 4.682 ft

Static Water Column Height: 39.15 ft

Total Well Penetration Depth: 38.29 ft

Screen Length: 5. ft

Casing Radius: 0.0833 ft

Well Radius: 0.33 ft

### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 9.516E-5 cm/sec

y0 = 1.795 ft

**APPENDIX D**  
**Groundwater and Surface Water Quality Data Summaries,**  
**Including Time vs. Concentration Graphs**

# WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

Ammonia (mg/L)

|                                                                                                                                                                                                                                                                                     | Quantitation | Water Table |             |               |      |              | Uppermost Aquifer |               |              |              |             | Surface Water |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|-------------|---------------|------|--------------|-------------------|---------------|--------------|--------------|-------------|---------------|--------------|
|                                                                                                                                                                                                                                                                                     |              | Upgradient  |             | Downgradient  |      |              | Upgradient        |               | Downgradient |              |             | Upstream      | Downstream   |
| Date                                                                                                                                                                                                                                                                                | Limit        | MW-12       | MW-20       | MW-5          | MW-6 | MW-25        | MW-16             | MW-21         | MW-7         | MW-26        | MW-27       | SW-1          | SW-2         |
| Apr-18                                                                                                                                                                                                                                                                              | 0.1          | 0.1         | 0.1         | <b>0.0851</b> | 0.1  | 0.1          | 0.1               | <b>0.267</b>  | 0.1          | <b>1.21</b>  | <b>1.49</b> | <b>0.212</b>  | <b>0.452</b> |
| Oct-18                                                                                                                                                                                                                                                                              | 0.1          | 0.1         | 0.1         | 0.1           | 0.1  | 0.1          | 0.1               | 0.1           | <b>0.809</b> | <b>0.951</b> | <b>1.52</b> | <b>0.271</b>  | <b>0.554</b> |
| Apr-19                                                                                                                                                                                                                                                                              | 0.1          | 0.139       | <b>0.12</b> | 0.127         | 0.1  | <b>0.123</b> | <b>0.135</b>      | <b>0.173</b>  | <b>0.165</b> | <b>0.825</b> | <b>1.54</b> | <b>0.298</b>  | <b>0.381</b> |
| Oct-19                                                                                                                                                                                                                                                                              | 0.2          | 0.2         | 0.2         | 0.2           | 0.2  | 0.2          | 0.2               | 0.2           | <b>1.07</b>  | <b>0.702</b> | <b>1.82</b> | <b>2.78</b>   | <b>0.323</b> |
| Apr-20                                                                                                                                                                                                                                                                              | 0.2          | 0.2         | 0.2         | 0.2           | 0.2  | 0.2          | 0.2               | 0.2           | <b>0.492</b> | <b>0.921</b> | <b>1.48</b> | <b>0.281</b>  | <b>0.16</b>  |
| Oct-20                                                                                                                                                                                                                                                                              | 0.5          | 0.5         | 0.5         | 0.5           | 0.5  | 0.5          | 0.5               | 0.5           | <b>0.992</b> | <b>1.18</b>  | <b>1.44</b> | <b>0.483</b>  | 0.5          |
| Apr-21                                                                                                                                                                                                                                                                              | 0.2          | 0.147       | 0.102       | 0.2           | 0.2  | 0.2          | 0.2               | 0.2           | <b>0.994</b> | <b>0.818</b> | <b>1.42</b> | 0.17          | 0.29         |
| Oct-21                                                                                                                                                                                                                                                                              | 0.5          | 0.5         | 0.5         | 0.5           | 0.5  | 0.5          | 0.5               | 0.5           | <b>0.934</b> | <b>0.93</b>  | <b>1.32</b> | 0.5           | 0.5          |
| Apr-22                                                                                                                                                                                                                                                                              | 0.2          | 0.2         | 0.2         | 0.2           | 0.2  | 0.2          | 0.2               | <b>0.0881</b> | <b>0.979</b> | <b>1.03</b>  | <b>1.4</b>  | <b>0.147</b>  | <b>0.117</b> |
| Sep-22                                                                                                                                                                                                                                                                              | 0.5          | 0.5         | 0.5         | 0.5           | 0.5  | 0.5          | 0.5               | 0.5           | <b>0.918</b> | <b>1.32</b>  | <b>1.27</b> | 0.399         | 0.307        |
| Apr-23                                                                                                                                                                                                                                                                              | 0.2          | 0.2         | 0.2         | 0.2           | 0.2  | 0.2          | 0.2               | <b>0.11</b>   | 0.2          | <b>1.26</b>  | <b>1.37</b> | <b>0.212</b>  | <b>0.191</b> |
| Aug-23                                                                                                                                                                                                                                                                              | 0.2          | 0.2         | 0.2         | 0.2           | 0.2  | 0.2          | 0.2               | 0.2           | <b>0.703</b> | <b>1.19</b>  | <b>1.37</b> | <b>7.68</b>   | <b>0.134</b> |
| <div> <div>Mean</div> <div>0.25</div> </div> <div> <div>Mean</div> <div>0.25</div> </div> <div> <div>Mean</div> <div>1.12</div> </div> <div> <div>WT UCL</div> <div>0.56</div> </div> <div> <div>UA UCL</div> <div>0.56</div> </div> <div> <div>SW UCL</div> <div>5.50</div> </div> |              |             |             |               |      |              |                   |               |              |              |             |               |              |

## Notes:

CL = Control Limit

NA = Not applicable

NS = Not sampled due to insufficient amount of water

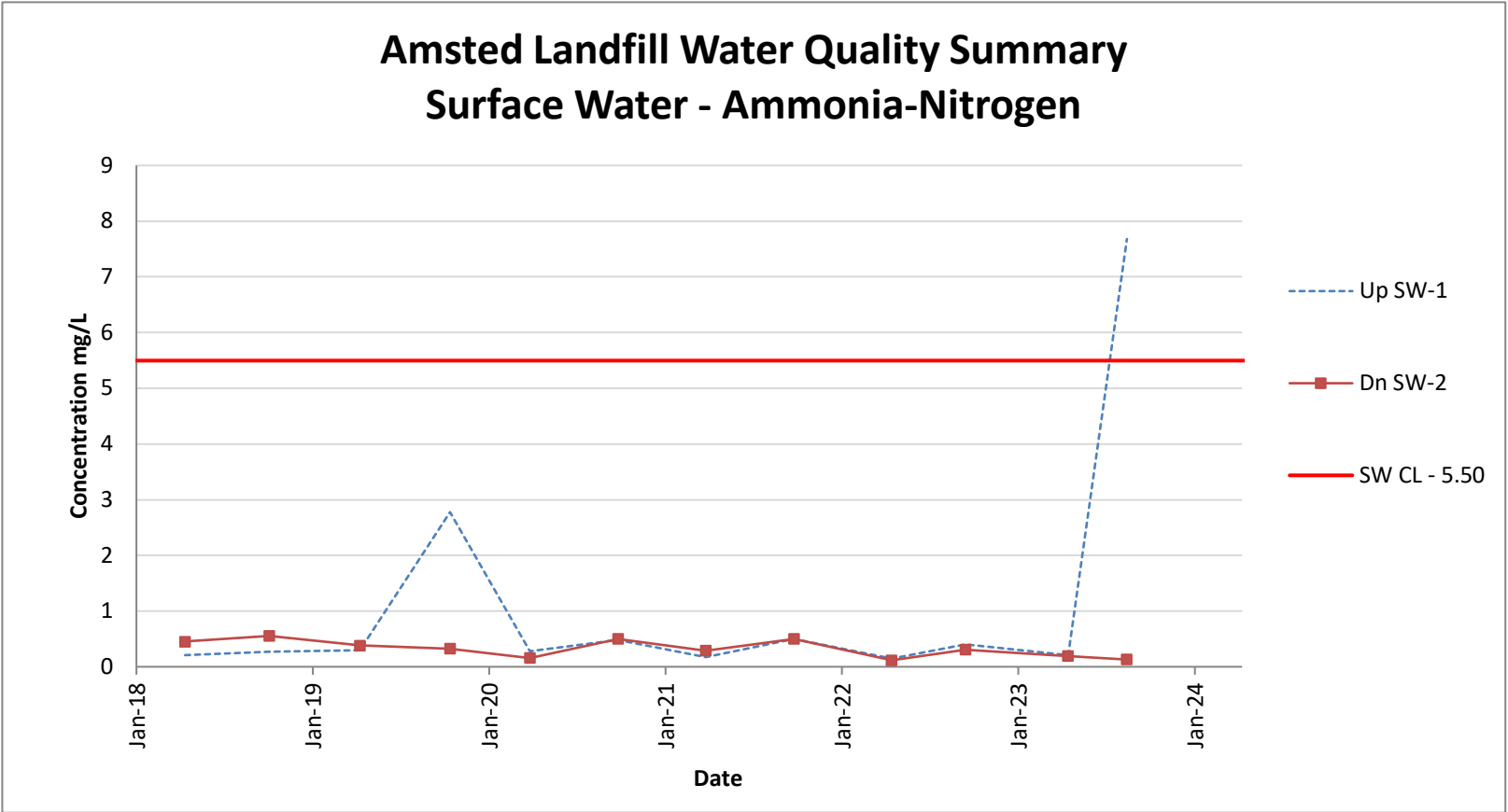
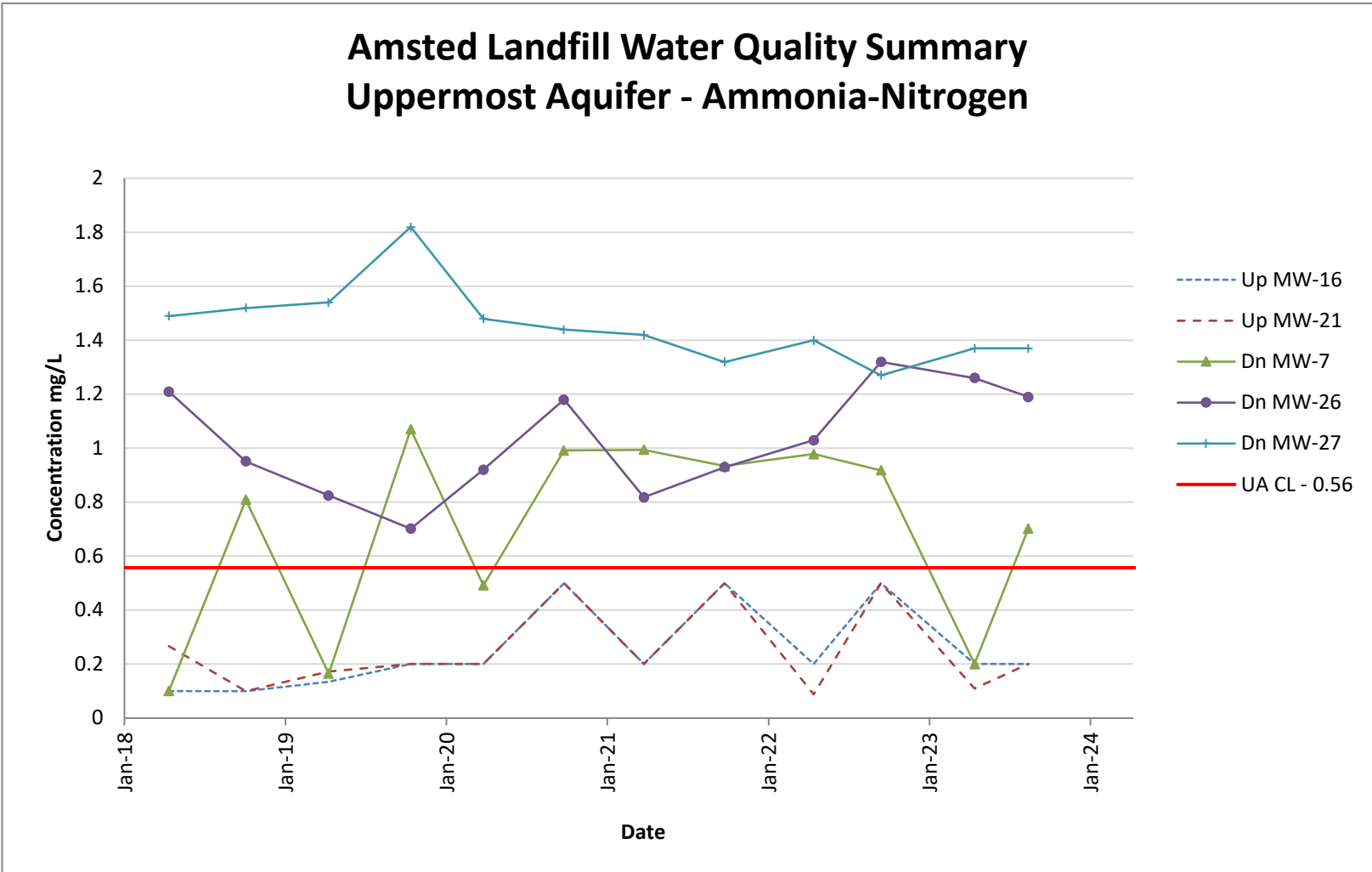
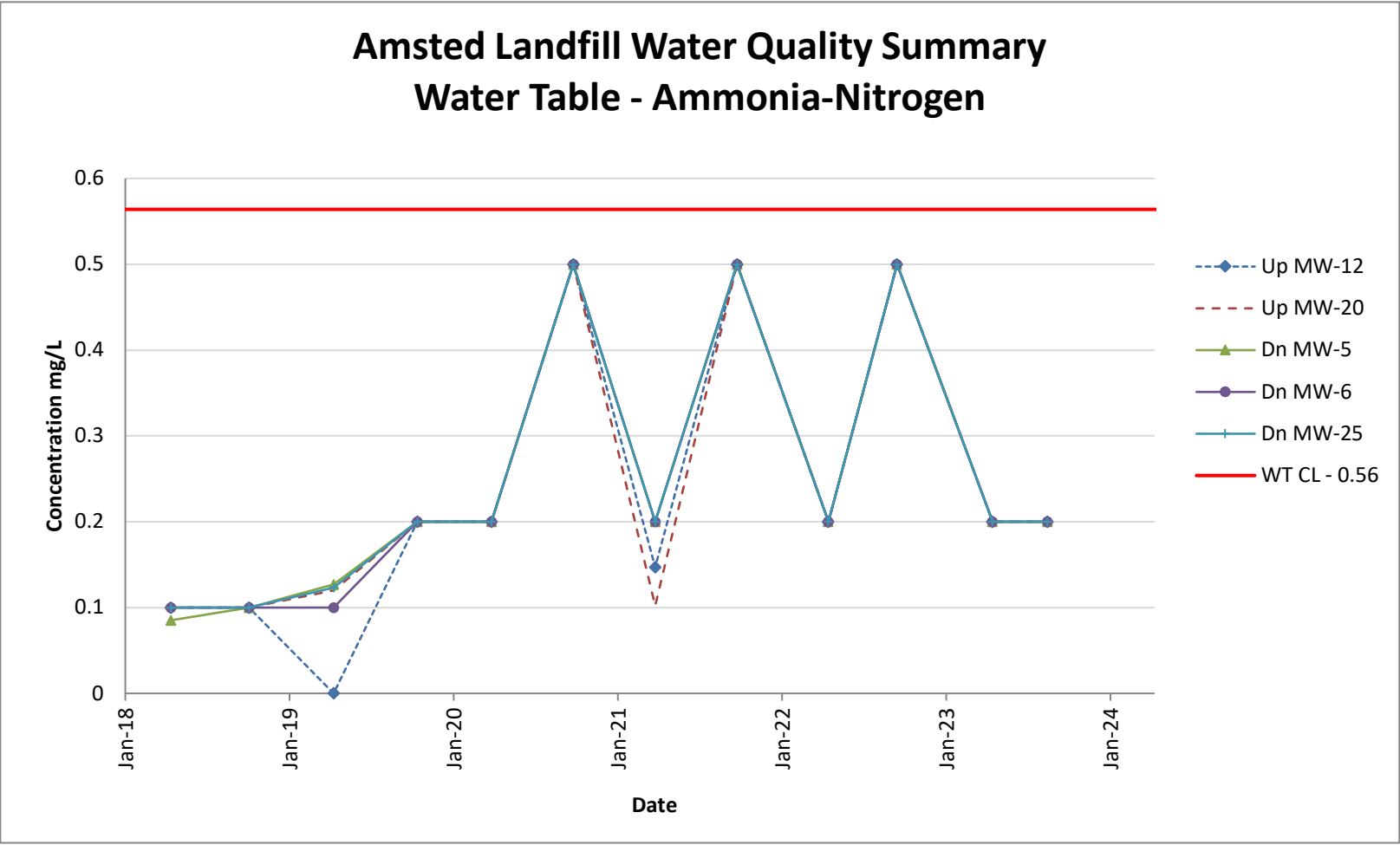
SW = Surface Water

UA = Uppermost Aquifer

WT = Water Table

R = Rejected during validation

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

# WATER QUALITY DATA - GRIFFIN WHEEL AMSTED LANDFILL

Boron (mg/L)

|                                                                                                                                                                                                                                                                                       | Quantitation | Water Table |               |               |      |              | Uppermost Aquifer |               |              |              |              | Surface Water |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|---------------|---------------|------|--------------|-------------------|---------------|--------------|--------------|--------------|---------------|---------------|
|                                                                                                                                                                                                                                                                                       |              | Upgradient  |               | Downgradient  |      |              | Upgradient        |               | Downgradient |              |              | Upstream      | Downstream    |
| Date                                                                                                                                                                                                                                                                                  | Limit        | MW-12       | MW-20         | MW-5          | MW-6 | MW-25        | MW-16             | MW-21         | MW-7         | MW-26        | MW-27        | SW-1          | SW-2          |
| Apr-18                                                                                                                                                                                                                                                                                | 0.05         | 0.05        | <b>0.0201</b> | 0.05          | 0.05 | <b>0.134</b> | <b>0.0706</b>     | <b>0.11</b>   | <b>0.18</b>  | <b>0.203</b> | <b>0.15</b>  | <b>0.253</b>  | <b>0.193</b>  |
| Oct-18                                                                                                                                                                                                                                                                                | 0.05         | 0.05        | 0.05          | 0.05          | 0.05 | <b>0.167</b> | <b>0.0516</b>     | <b>0.044</b>  | <b>0.108</b> | <b>0.104</b> | <b>0.142</b> | <b>0.229</b>  | <b>0.135</b>  |
| Apr-19                                                                                                                                                                                                                                                                                | 0.05         | 0.05        | 0.05          | 0.05          | 0.05 | <b>0.163</b> | <b>0.0638</b>     | <b>0.0567</b> | <b>0.181</b> | <b>0.2</b>   | <b>0.152</b> | <b>0.199</b>  | <b>0.167</b>  |
| Oct-19                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | <b>0.0305</b> | <b>0.0247</b> | 0.1  | <b>0.234</b> | <b>0.0767</b>     | <b>0.0627</b> | <b>0.244</b> | <b>0.271</b> | <b>0.172</b> | <b>0.239</b>  | <b>0.144</b>  |
| Apr-20                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.188</b> | <b>0.0504</b>     | <b>0.0375</b> | <b>0.243</b> | <b>0.273</b> | <b>0.152</b> | <b>0.193</b>  | <b>0.145</b>  |
| Oct-20                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | <b>0.0308</b> | <b>0.0238</b> | 0.1  | <b>0.278</b> | <b>0.079</b>      | <b>0.0395</b> | <b>0.228</b> | <b>0.26</b>  | <b>0.177</b> | <b>0.301</b>  | <b>0.224</b>  |
| Apr-21                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.165</b> | <b>0.066</b>      | <b>0.051</b>  | <b>0.204</b> | <b>0.217</b> | <b>0.144</b> | <b>0.2</b>    | <b>0.101</b>  |
| Oct-21                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.26</b>  | <b>0.0658</b>     | 0.1           | <b>0.192</b> | <b>0.177</b> | <b>0.117</b> | <b>0.187</b>  | <b>0.173</b>  |
| Apr-22                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.198</b> | <b>0.0785</b>     | <b>0.0691</b> | <b>0.277</b> | <b>0.285</b> | <b>0.153</b> | <b>0.155</b>  | <b>0.0828</b> |
| Sep-22                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.258</b> | <b>0.0799</b>     | 0.1           | <b>0.244</b> | <b>0.248</b> | <b>0.168</b> | <b>0.251</b>  | <b>0.127</b>  |
| Apr-23                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.207</b> | <b>0.0764</b>     | <b>0.0919</b> | <b>0.317</b> | <b>0.358</b> | <b>0.183</b> | <b>0.205</b>  | <b>0.116</b>  |
| Aug-23                                                                                                                                                                                                                                                                                | 0.1          | 0.1         | 0.1           | 0.1           | 0.1  | <b>0.222</b> | <b>0.0769</b>     | <b>0.0652</b> | <b>0.248</b> | <b>0.275</b> | <b>0.165</b> | <b>0.528</b>  | <b>0.267</b>  |
| <div> <div>Mean</div> <div>0.080</div> </div> <div> <div>WT UCL</div> <div>0.138</div> </div> <div> <div>Mean</div> <div>0.07</div> </div> <div> <div>UA UCL</div> <div>0.11</div> </div> <div> <div>Mean</div> <div>0.25</div> </div> <div> <div>SW UCL</div> <div>0.44</div> </div> |              |             |               |               |      |              |                   |               |              |              |              |               |               |

## Notes:

CL = Control Limit

NA = Not applicable.

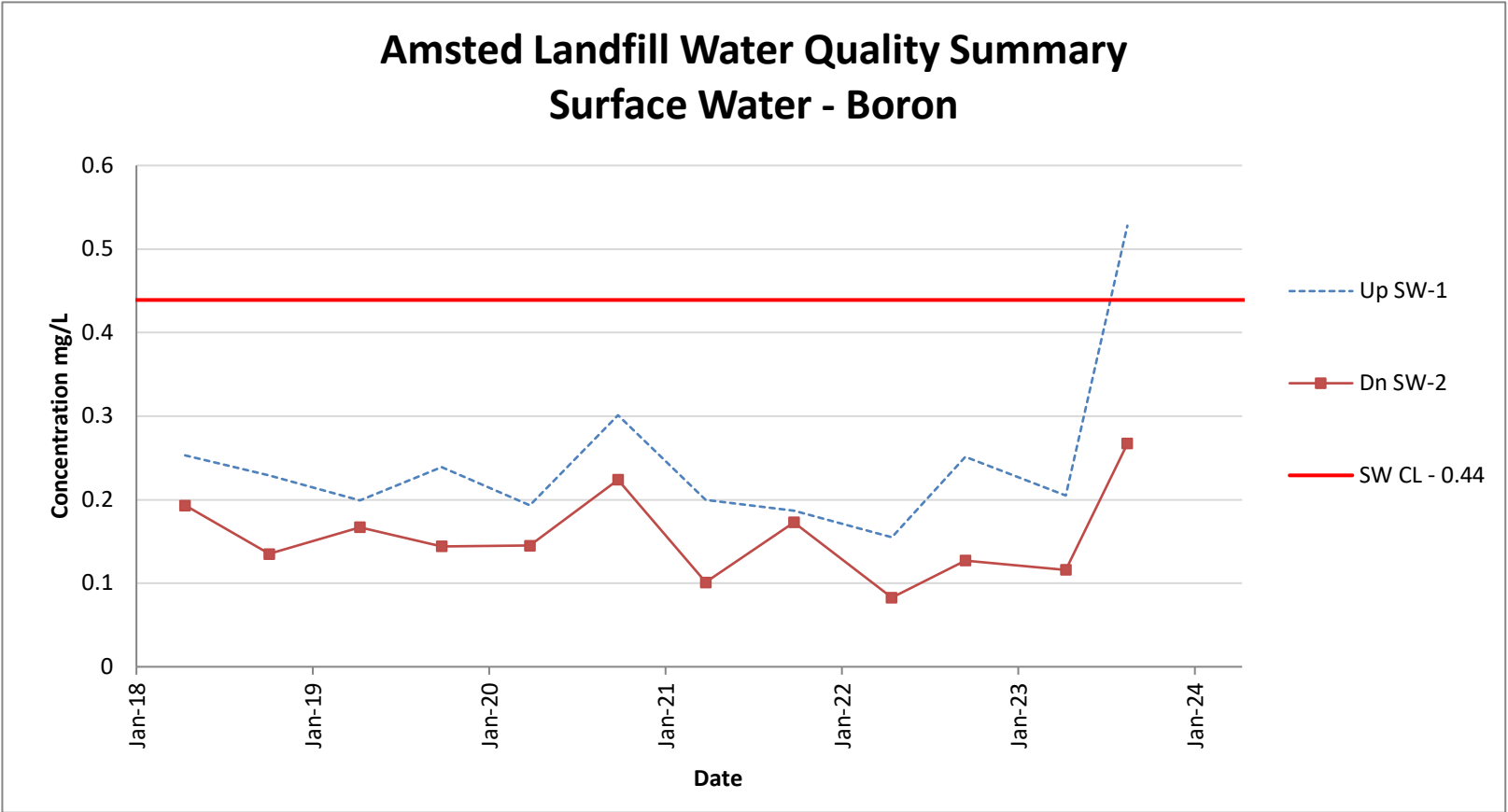
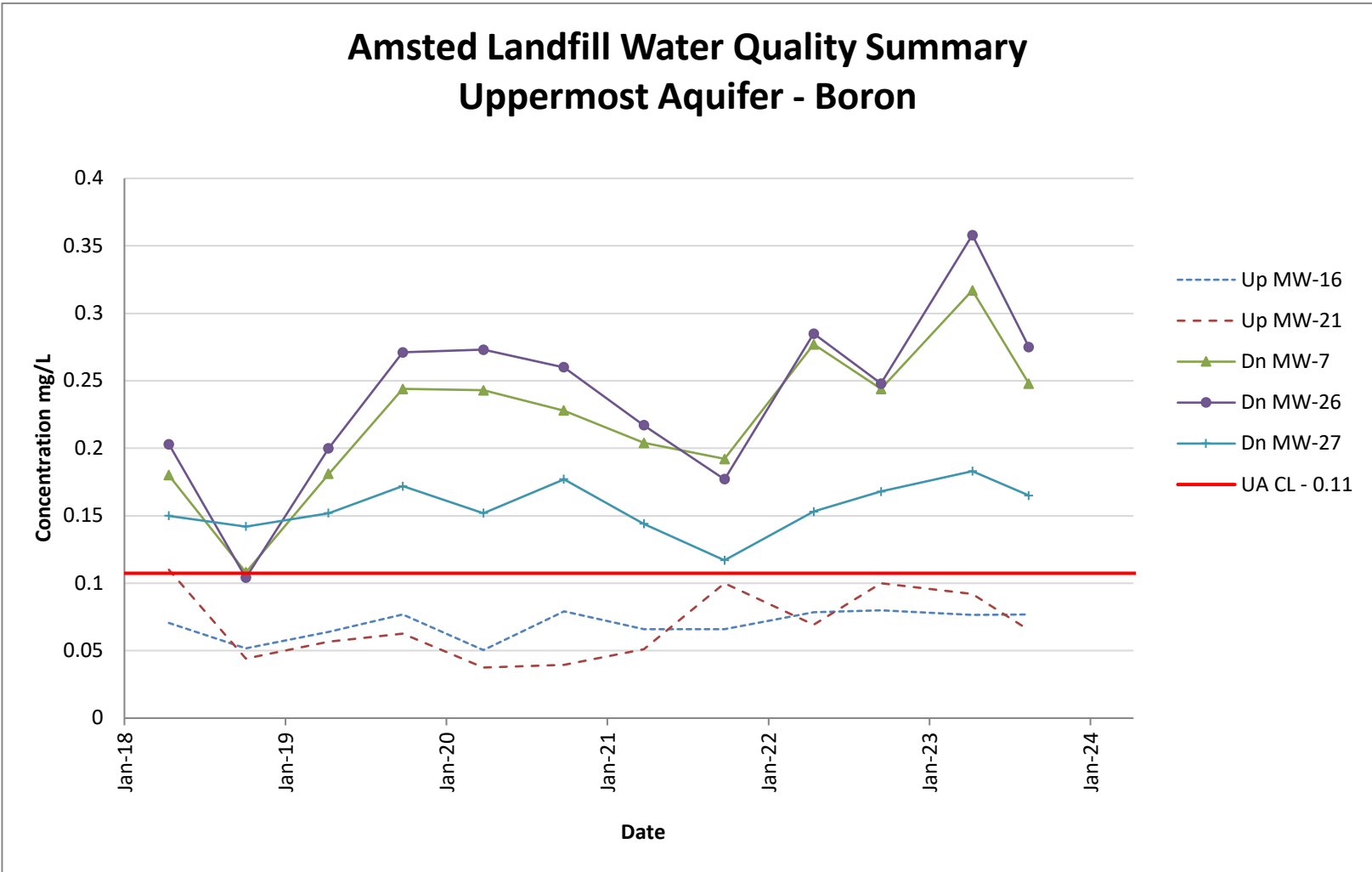
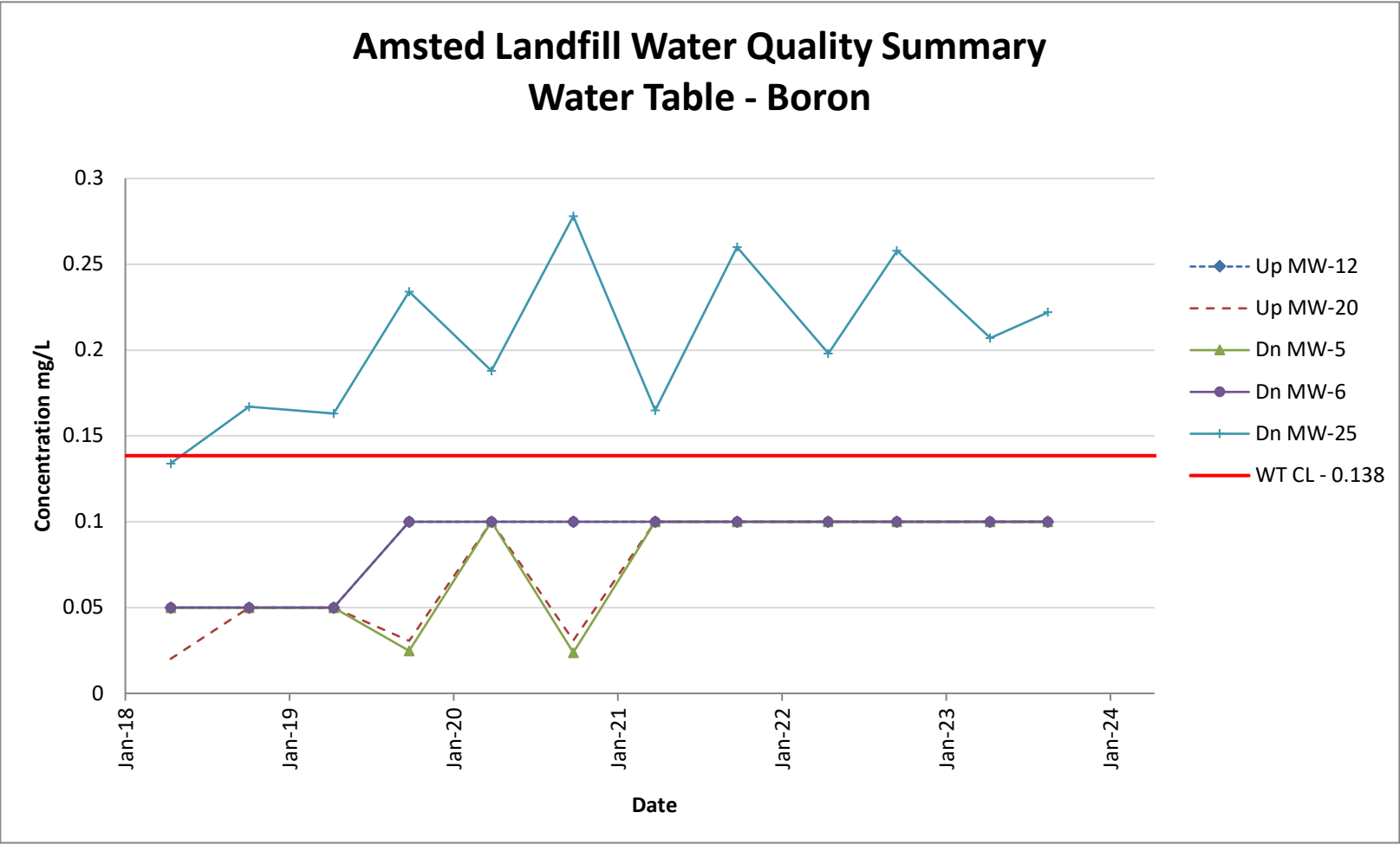
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppermost Aquifer

WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

# WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

## Chemical Oxygen Demand (mg/L)

|                                                                                                                                                                                                                                                                                         | Quantitation | Water Table |             |              |             |             | Uppermost Aquifer |             |              |             |             | Surface Water |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|-------------|--------------|-------------|-------------|-------------------|-------------|--------------|-------------|-------------|---------------|-------------|
|                                                                                                                                                                                                                                                                                         |              | Upgradient  |             | Downgradient |             |             | Upgradient        |             | Downgradient |             |             | Upstream      | Downstream  |
| Date                                                                                                                                                                                                                                                                                    | Limit        | MW-12       | MW-20       | MW-5         | MW-6        | MW-25       | MW-16             | MW-21       | MW-7         | MW-26       | MW-27       | SW-1          | SW-2        |
| Apr-18                                                                                                                                                                                                                                                                                  | 20           | 20          | 20          | 20           | <b>5.09</b> | <b>4.17</b> | <b>4.03</b>       | 20          | 20           | <b>5.4</b>  | 20          | <b>11.5</b>   | <b>14.4</b> |
| Oct-18                                                                                                                                                                                                                                                                                  | 20           | <b>5.25</b> | 20          | 20           | 20          | 20          | 20                | 20          | 20           | 20          | 20          | <b>15.1</b>   | <b>14.1</b> |
| Apr-19                                                                                                                                                                                                                                                                                  | 20           | <b>7.52</b> | <b>8.15</b> | <b>6.97</b>  | <b>8.65</b> | <b>6.5</b>  | <b>6.31</b>       | 20          | <b>7.19</b>  | <b>10.8</b> | <b>4.14</b> | <b>4.45</b>   | <b>16.2</b> |
| Oct-19                                                                                                                                                                                                                                                                                  | 10           | <b>8.59</b> | 10          | 10           | 10          | <b>5.63</b> | 10                | 10          | 10           | <b>6.68</b> | 10          | <b>20.3</b>   | <b>11.8</b> |
| Apr-20                                                                                                                                                                                                                                                                                  | 10           | <b>11.3</b> | <b>9.25</b> | <b>7.2</b>   | <b>7.71</b> | <b>12.3</b> | <b>13.4</b>       | <b>6.68</b> | <b>48.3</b>  | <b>56</b>   | <b>7.2</b>  | <b>20.1</b>   | <b>36.5</b> |
| Oct-20                                                                                                                                                                                                                                                                                  | 25           | <b>25.5</b> | <b>38.9</b> | 25           | <b>52.3</b> | 25          | <b>48.9</b>       | <b>36.3</b> | <b>43.9</b>  | <b>37.2</b> | <b>30.5</b> | <b>35.6</b>   | <b>47.3</b> |
| Apr-21                                                                                                                                                                                                                                                                                  | 10           | 10          | 10          | 10           | 10          | <b>10.7</b> | 10                | <b>6.11</b> | <b>8.65</b>  | 10          | 10          | <b>14.3</b>   | <b>10.2</b> |
| Oct-21                                                                                                                                                                                                                                                                                  | 25           | 25          | <b>33.8</b> | 25           | <b>42.8</b> | <b>35.6</b> | <b>25</b>         | <b>26.6</b> | <b>37.4</b>  | 25          | 25          | <b>42.8</b>   | <b>41</b>   |
| Apr-22                                                                                                                                                                                                                                                                                  | 10           | <b>9</b>    | <b>7.5</b>  | 10           | 10          | 10          | 10                | 10          | 10           | <b>7.5</b>  | 10          | <b>11</b>     | <b>18</b>   |
| Sep-22                                                                                                                                                                                                                                                                                  | 25           | 25          | 25          | 25           | 25          | 25          | 25                | 25          | 25           | 25          | <b>42.6</b> | 25            | 25          |
| Apr-23                                                                                                                                                                                                                                                                                  | 10           | 10          | <b>5.42</b> | 10           | 10          | <b>5.42</b> | 10                | <b>2.27</b> | 10           | <b>3.53</b> | 10          | <b>2.58</b>   | <b>6.69</b> |
| Aug-23                                                                                                                                                                                                                                                                                  | 10           | 10          | <b>5.62</b> | 10           | <b>4.65</b> | 10          | 10                | <b>3.03</b> | <b>5.62</b>  | 10          | 10          | <b>5.07</b>   | 10          |
| <div> <div>Mean</div> <div>15.03</div> </div> <div> <div>WT UCL</div> <div>34.11</div> </div> <div> <div>Mean</div> <div>15.8</div> </div> <div> <div>UA UCL</div> <div>38.4</div> </div> <div> <div>Mean</div> <div>17.32</div> </div> <div> <div>SW UCL</div> <div>42.03</div> </div> |              |             |             |              |             |             |                   |             |              |             |             |               |             |

### Notes:

CL = Control Limit

NA = Not applicable.

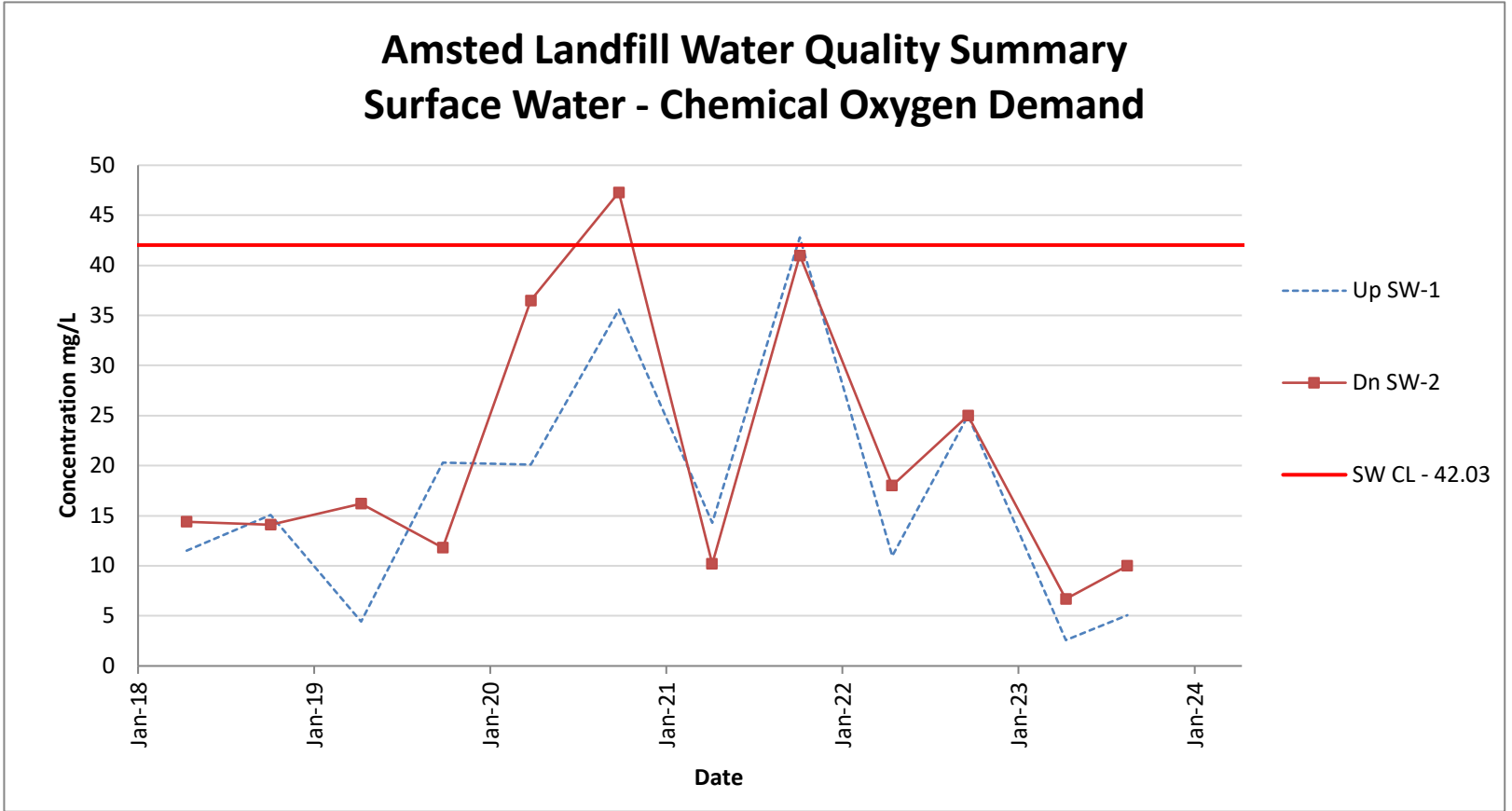
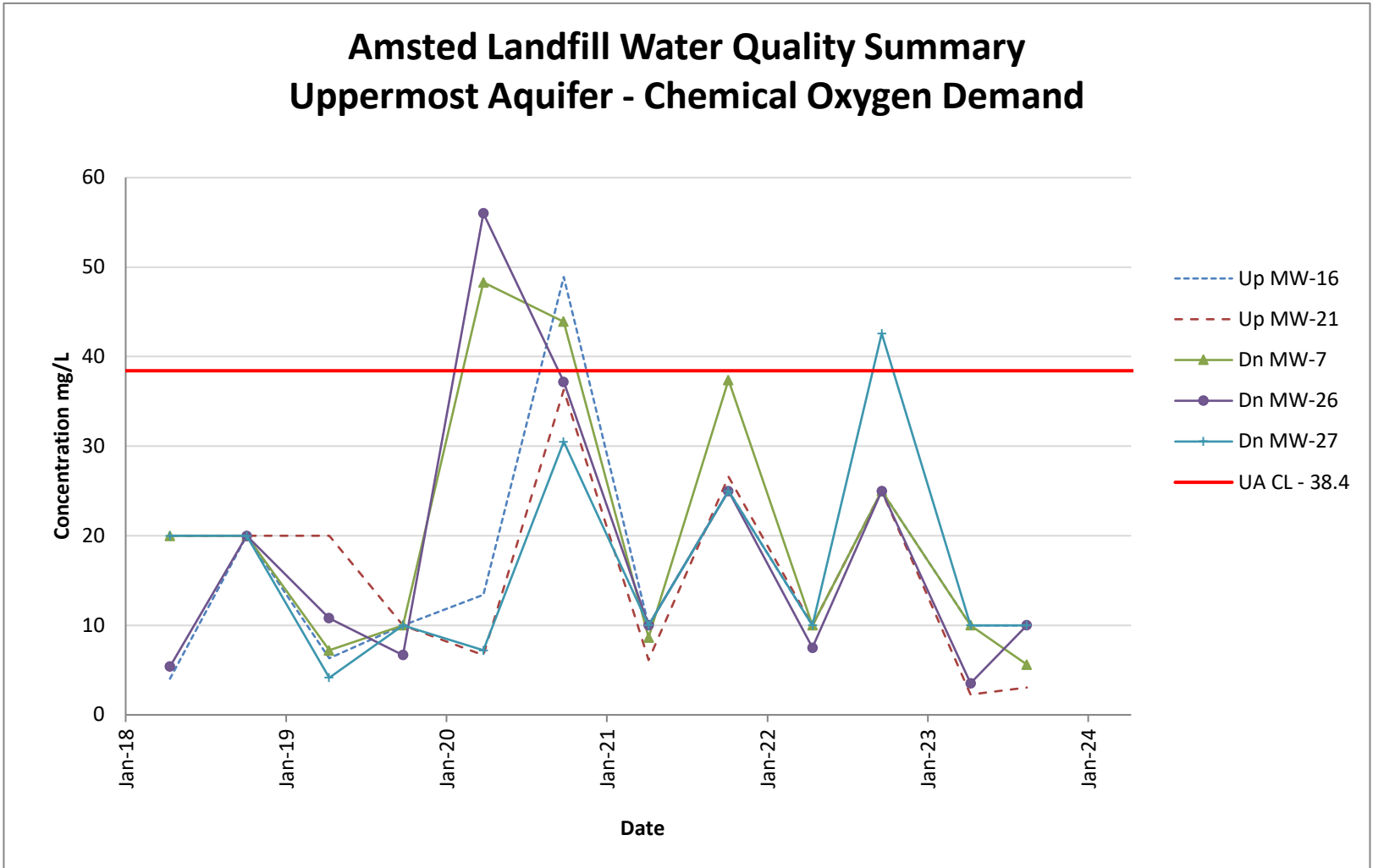
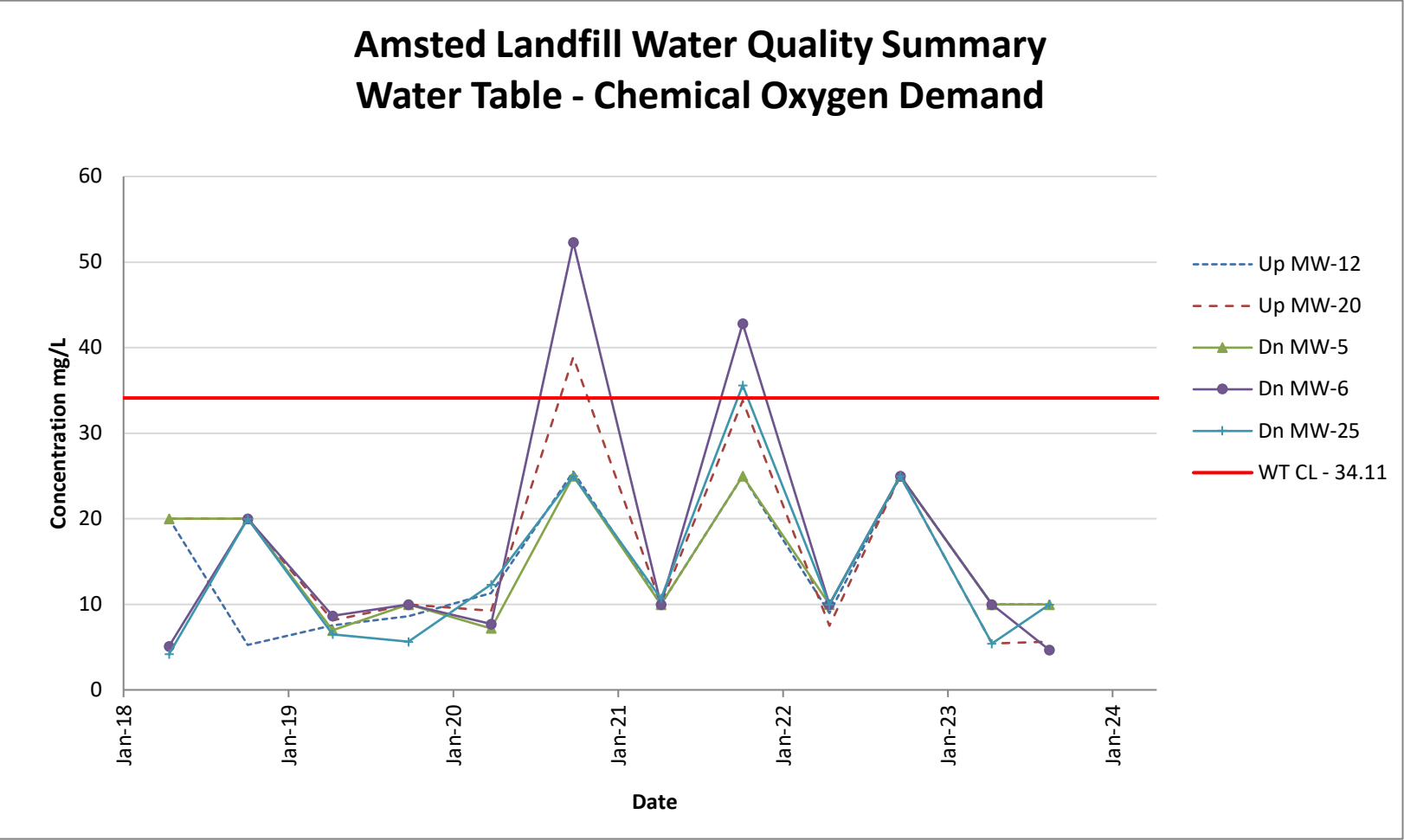
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppermost Aquifer

WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

# WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

Chloride (mg/L)

|                                                                                                                                                                                                                                                                                        | Quantitation | Water Table |       |              |      |       | Uppermost Aquifer |       |              |       |       | Surface Water |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|-------|--------------|------|-------|-------------------|-------|--------------|-------|-------|---------------|------------|
|                                                                                                                                                                                                                                                                                        |              | Upgradient  |       | Downgradient |      |       | Upgradient        |       | Downgradient |       |       | Upstream      | Downstream |
| Date                                                                                                                                                                                                                                                                                   | Limit        | MW-12       | MW-20 | MW-5         | MW-6 | MW-25 | MW-16             | MW-21 | MW-7         | MW-26 | MW-27 | SW-1          | SW-2       |
| Apr-18                                                                                                                                                                                                                                                                                 | 1.0-5.0      | 5.26        | 27.9  | 3.98         | 13.6 | 12.5  | 2.98              | 1.4   | 1.37         | 2.87  | 1.56  | 13.7          | 13.4       |
| Oct-18                                                                                                                                                                                                                                                                                 | 1.0          | 6.92        | 34.1  | 4.26         | 14.1 | 14.5  | 3.39              | 1.53  | 1.49         | 3.06  | 1.81  | 7.22          | 31.8       |
| Apr-19                                                                                                                                                                                                                                                                                 | 1.0-5.0      | 5.77        | 29.7  | 3.96         | 14   | 6.5   | 4.3               | 1.58  | 1.48         | 2.87  | 1.61  | 18.5          | 61.7       |
| Oct-19                                                                                                                                                                                                                                                                                 | 1.0          | 5.58        | 40.5  | 4.11         | 14.4 | 10.4  | 3.45              | 1.86  | 1.38         | 3     | 1.78  | 10.8          | 27.7       |
| Apr-20                                                                                                                                                                                                                                                                                 | 1.0          | 6.08        | 34.3  | 3.79         | 13.1 | 11.6  | 4.66              | 2.05  | 1.38         | 2.91  | 1.73  | 14.5          | 50         |
| Oct-20                                                                                                                                                                                                                                                                                 | 1.0          | 6.31        | 43.7  | 3.93         | 14.5 | 18    | 3.65              | 2.2   | 1.46         | 2.9   | 1.79  | 8.78          | 47.2       |
| Apr-21                                                                                                                                                                                                                                                                                 | 1.0          | 6.73        | 42.9  | 3.85         | 13.9 | 9.36  | 4.37              | 2.57  | 1.44         | 2.94  | 1.8   | 10.7          | 42.1       |
| Oct-21                                                                                                                                                                                                                                                                                 | 1.0          | 7.4         | 45.5  | 4.03         | 11.1 | 22.5  | 3.94              | 2.86  | 1.47         | 3.04  | 1.81  | 18.6          | 46.4       |
| Apr-22                                                                                                                                                                                                                                                                                 | 1.0          | 6.65        | 40    | 3.76         | 13.1 | 28.1  | 4.34              | 2.98  | 1.41         | 3.04  | 1.79  | 13.3          | 60.5       |
| Sep-22                                                                                                                                                                                                                                                                                 | 1.0          | 7.94        | 44.9  | 3.71         | 12.2 | 31.5  | 3.36              | 3.16  | 1.37         | 2.8   | 1.74  | 21.8          | 47.6       |
| Apr-23                                                                                                                                                                                                                                                                                 | 1.0          | 8.24        | 46.7  | 3.62         | 13.9 | 22.1  | 4.44              | 2.88  | 1.51         | 2.84  | 1.8   | 15.1          | 48.4       |
| Aug-23                                                                                                                                                                                                                                                                                 | 1.0          | 9.04        | 48.3  | 3.69         | 13.4 | 34.4  | 4.22              | 4.18  | 1.34         | 2.85  | 1.66  | 26.1          | 49.7       |
| <div> <div>Mean</div> <div>23.35</div> </div> <div> <div>Mean</div> <div>3.2</div> </div> <div> <div>Mean</div> <div>14.93</div> </div> <div> <div>WT UCL</div> <div>58.43</div> </div> <div> <div>UA UCL</div> <div>5.22</div> </div> <div> <div>SW UCL</div> <div>25.96</div> </div> |              |             |       |              |      |       |                   |       |              |       |       |               |            |

## Notes:

CL = Control Limit

NA = Not applicable.

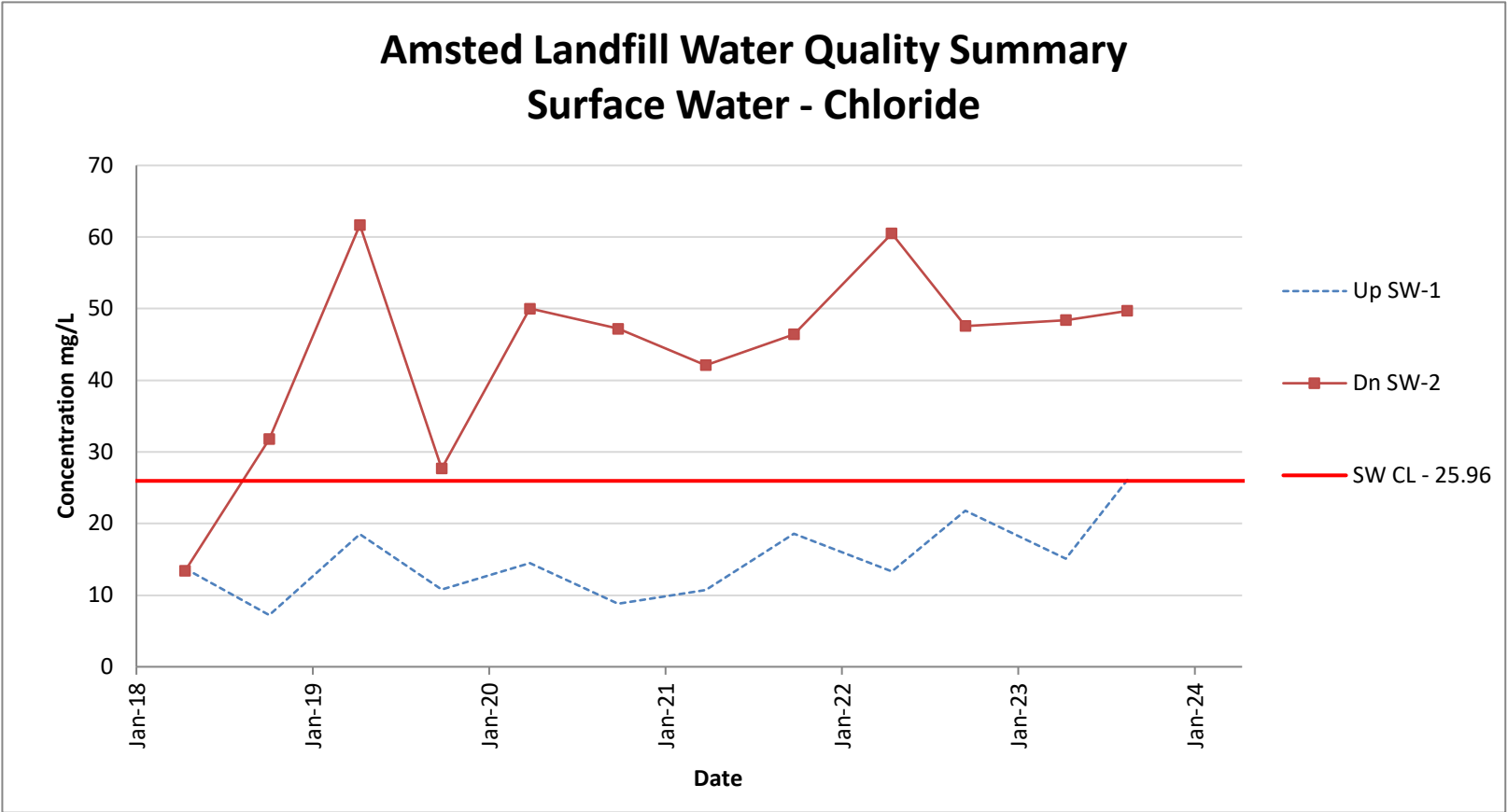
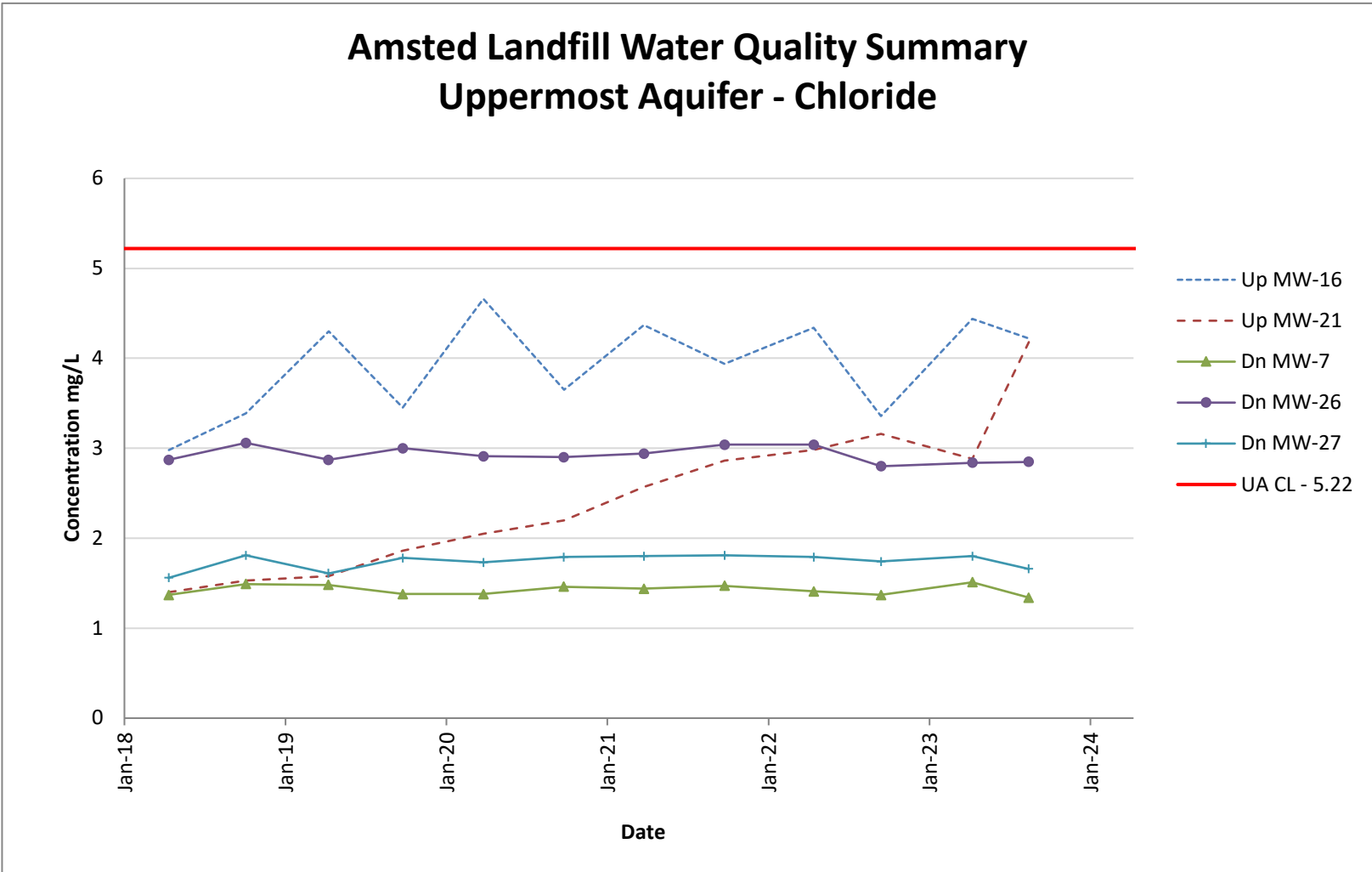
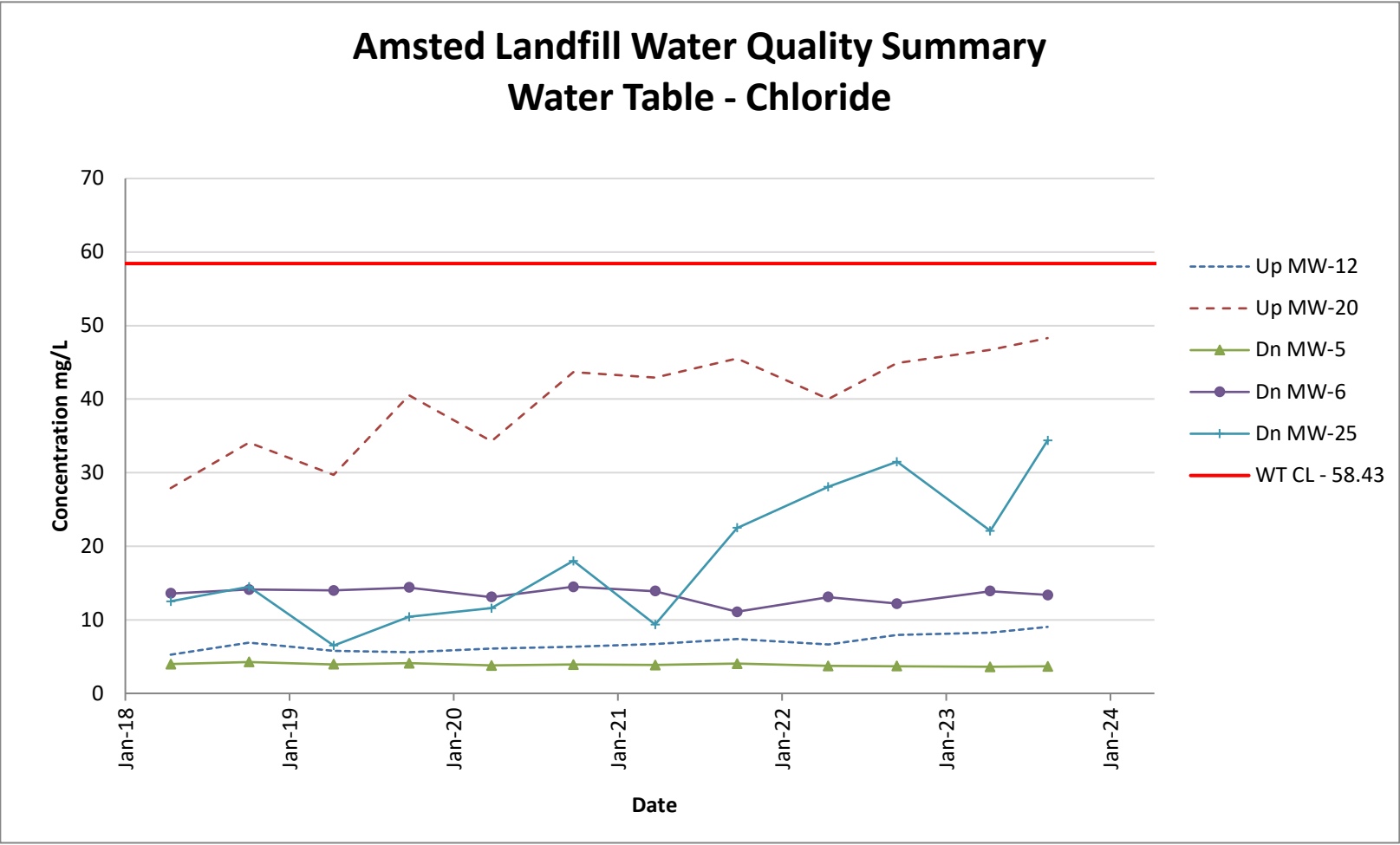
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppermost Aquifer

WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



**Notes:** Up = Upgradient, Dn = Downgradient, SW = Surface Water

## WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

Conductivity, Field (mS/cm)

[illegible]

**Notes:**

CL = Control Limit

NA = Not applicable.

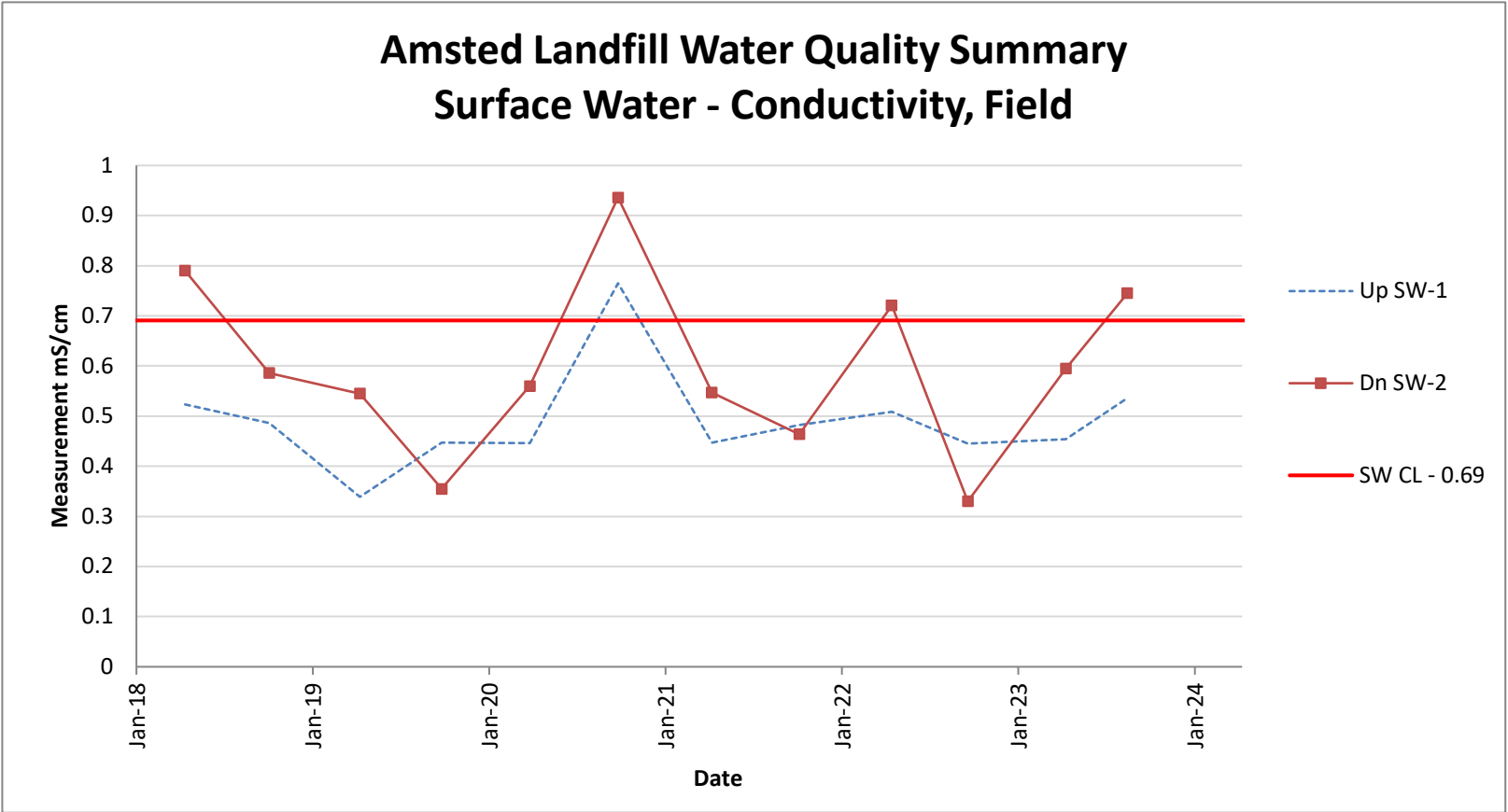
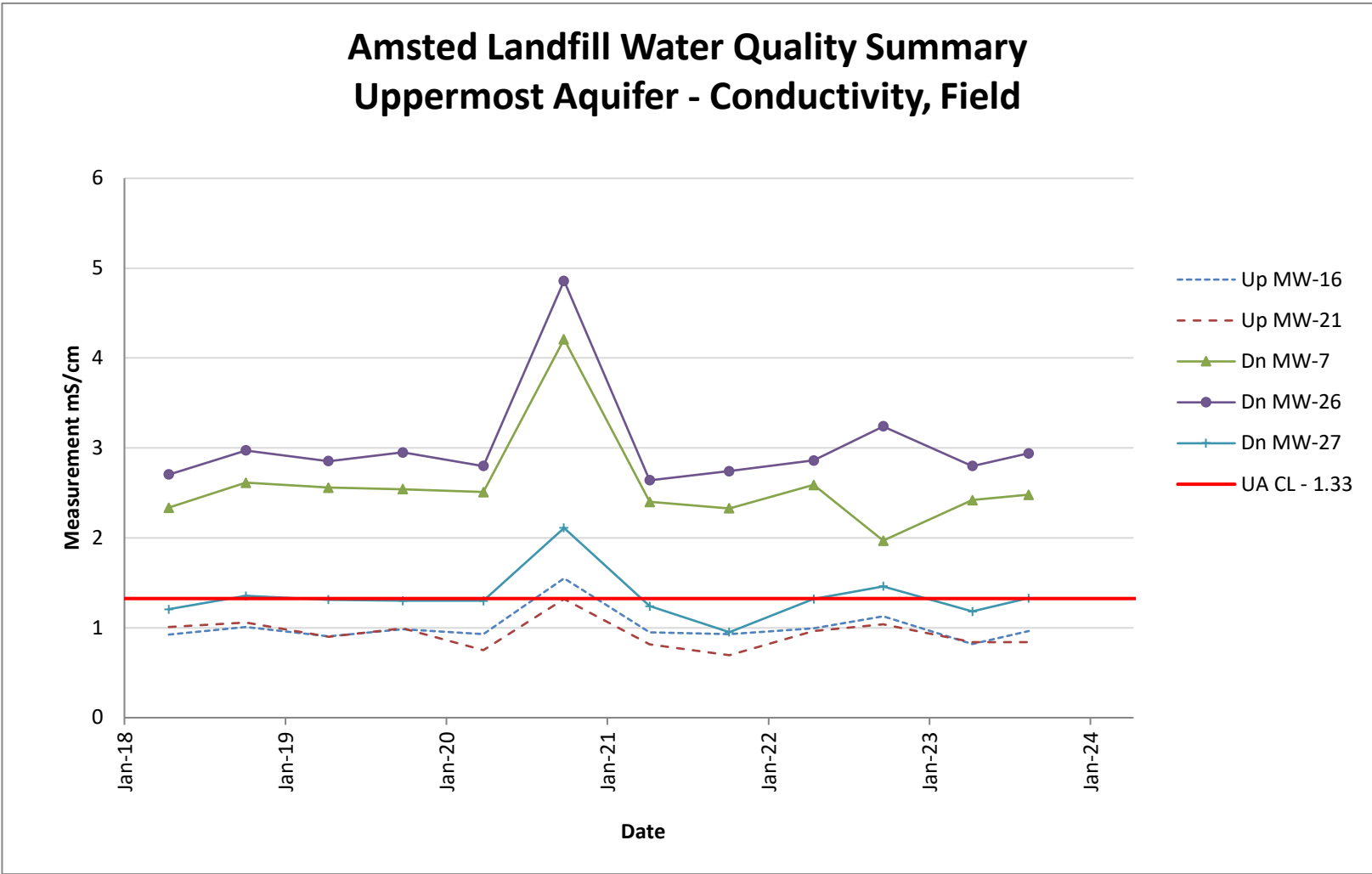
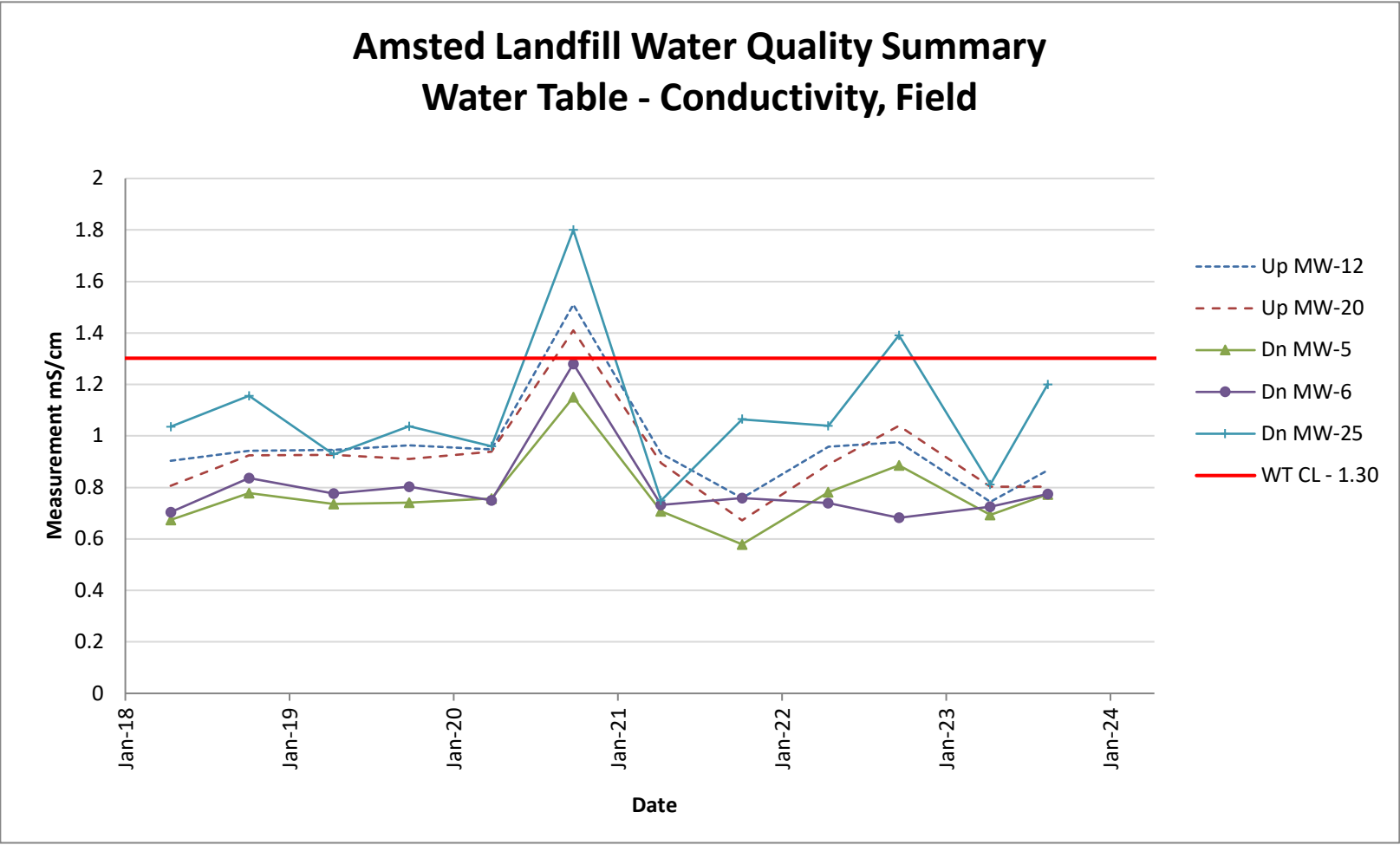
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppemost Aquifer

WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

# WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

Fluoride (mg/L)

|                                                                                                                                                                                                                                                                                    | Quantitation | Water Table  |              |              |              |             | Uppermost Aquifer |              |              |              |              | Surface Water |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------------|--------------|--------------|--------------|--------------|---------------|--------------|
|                                                                                                                                                                                                                                                                                    |              | Upgradient   |              | Downgradient |              |             | Upgradient        |              | Downgradient |              |              | Upstream      | Downstream   |
| Date                                                                                                                                                                                                                                                                               | Limit        | MW-12        | MW-20        | MW-5         | MW-6         | MW-25       | MW-16             | MW-21        | MW-7         | MW-26        | MW-27        | SW-1          | SW-2         |
| Apr-18                                                                                                                                                                                                                                                                             | 0.1          | <b>0.263</b> | <b>0.45</b>  | <b>0.409</b> | <b>0.327</b> | <b>2.53</b> | <b>0.4</b>        | <b>0.36</b>  | <b>0.312</b> | <b>0.201</b> | <b>0.29</b>  | <b>0.636</b>  | <b>0.505</b> |
| Oct-18                                                                                                                                                                                                                                                                             | 0.1          | <b>0.341</b> | <b>0.455</b> | <b>0.443</b> | <b>0.312</b> | <b>1.77</b> | <b>0.412</b>      | <b>0.34</b>  | <b>0.302</b> | <b>0.189</b> | <b>0.283</b> | <b>0.374</b>  | <b>0.326</b> |
| Apr-19                                                                                                                                                                                                                                                                             | 0.1          | <b>0.282</b> | <b>0.479</b> | <b>0.435</b> | <b>0.343</b> | <b>2.53</b> | <b>0.437</b>      | <b>0.355</b> | <b>0.3</b>   | <b>0.37</b>  | <b>0.333</b> | <b>0.988</b>  | <b>0.507</b> |
| Oct-19                                                                                                                                                                                                                                                                             | 0.05         | <b>0.35</b>  | <b>0.532</b> | <b>0.508</b> | <b>0.354</b> | <b>2.01</b> | <b>0.461</b>      | <b>0.393</b> | <b>0.345</b> | <b>0.213</b> | <b>0.34</b>  | <b>0.569</b>  | <b>0.382</b> |
| Apr-20                                                                                                                                                                                                                                                                             | 0.1          | <b>0.293</b> | <b>0.526</b> | <b>0.462</b> | <b>0.267</b> | <b>2.01</b> | <b>0.432</b>      | <b>0.372</b> | <b>0.322</b> | <b>0.255</b> | <b>0.354</b> | <b>0.944</b>  | <b>0.806</b> |
| Oct-20                                                                                                                                                                                                                                                                             | 0.05         | <b>0.331</b> | <b>0.524</b> | <b>0.502</b> | <b>0.351</b> | <b>2.09</b> | <b>0.47</b>       | <b>0.393</b> | <b>0.338</b> | <b>0.234</b> | <b>0.358</b> | <b>1.14</b>   | <b>0.484</b> |
| Apr-21                                                                                                                                                                                                                                                                             | 0.1          | <b>0.315</b> | <b>0.514</b> | <b>0.463</b> | <b>0.346</b> | <b>3.8</b>  | <b>0.469</b>      | <b>0.372</b> | <b>0.347</b> | <b>0.248</b> | <b>0.391</b> | <b>0.742</b>  | <b>0.332</b> |
| Oct-21                                                                                                                                                                                                                                                                             | 0.05         | <b>0.392</b> | <b>0.565</b> | <b>0.517</b> | <b>0.422</b> | <b>2.4</b>  | <b>0.493</b>      | <b>0.387</b> | <b>0.329</b> | <b>0.23</b>  | <b>0.312</b> | <b>0.842</b>  | <b>0.404</b> |
| Apr-22                                                                                                                                                                                                                                                                             | 0.01         | <b>0.325</b> | <b>0.523</b> | <b>0.456</b> | <b>0.379</b> | <b>1.56</b> | <b>0.481</b>      | <b>0.392</b> | <b>0.324</b> | <b>0.245</b> | <b>0.335</b> | <b>0.566</b>  | <b>0.371</b> |
| Sep-22                                                                                                                                                                                                                                                                             | 0.05         | <b>0.353</b> | <b>0.49</b>  | <b>0.461</b> | <b>0.349</b> | <b>2.16</b> | <b>0.436</b>      | <b>0.335</b> | <b>0.288</b> | <b>0.187</b> | <b>0.288</b> | <b>0.901</b>  | <b>0.416</b> |
| Apr-23                                                                                                                                                                                                                                                                             | 0.05         | <b>0.324</b> | <b>0.499</b> | <b>0.446</b> | <b>0.344</b> | <b>2.38</b> | <b>0.463</b>      | <b>0.427</b> | <b>0.309</b> | <b>0.228</b> | <b>0.356</b> | <b>0.82</b>   | <b>0.494</b> |
| Aug-23                                                                                                                                                                                                                                                                             | 0.25         | <b>0.358</b> | <b>0.503</b> | <b>0.471</b> | <b>0.318</b> | <b>1.83</b> | <b>0.464</b>      | <b>0.297</b> | <b>0.331</b> | <b>0.2</b>   | <b>0.303</b> | <b>0.887</b>  | <b>0.561</b> |
| <div> <div>Mean</div> <div>0.42</div> </div> <div> <div>WT UCL</div> <div>0.61</div> </div> <div> <div>Mean</div> <div>0.4</div> </div> <div> <div>UA UCL</div> <div>0.51</div> </div> <div> <div>Mean</div> <div>0.78</div> </div> <div> <div>SW UCL</div> <div>1.21</div> </div> |              |              |              |              |              |             |                   |              |              |              |              |               |              |

## Notes:

CL = Control Limit

NA = Not applicable.

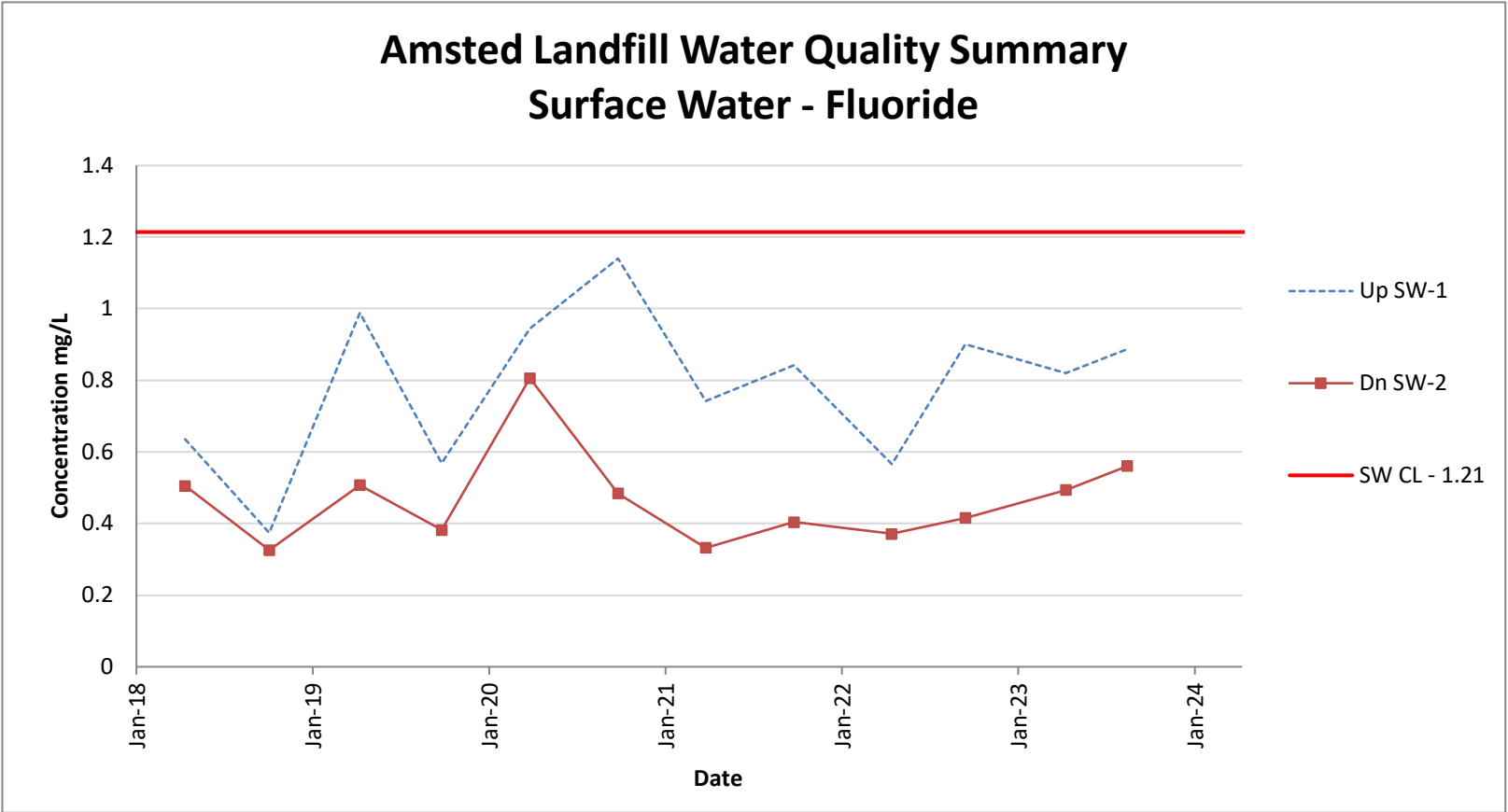
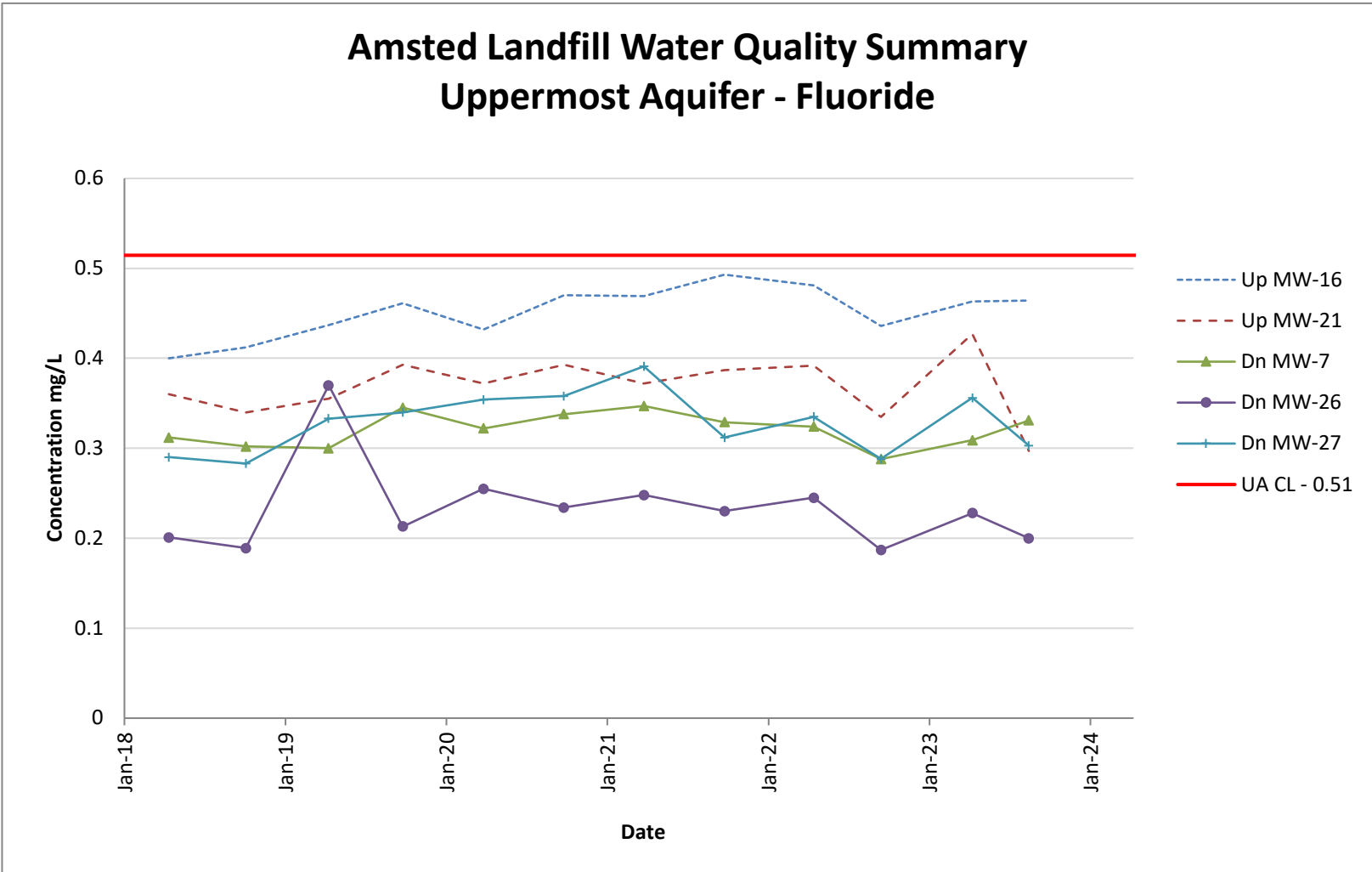
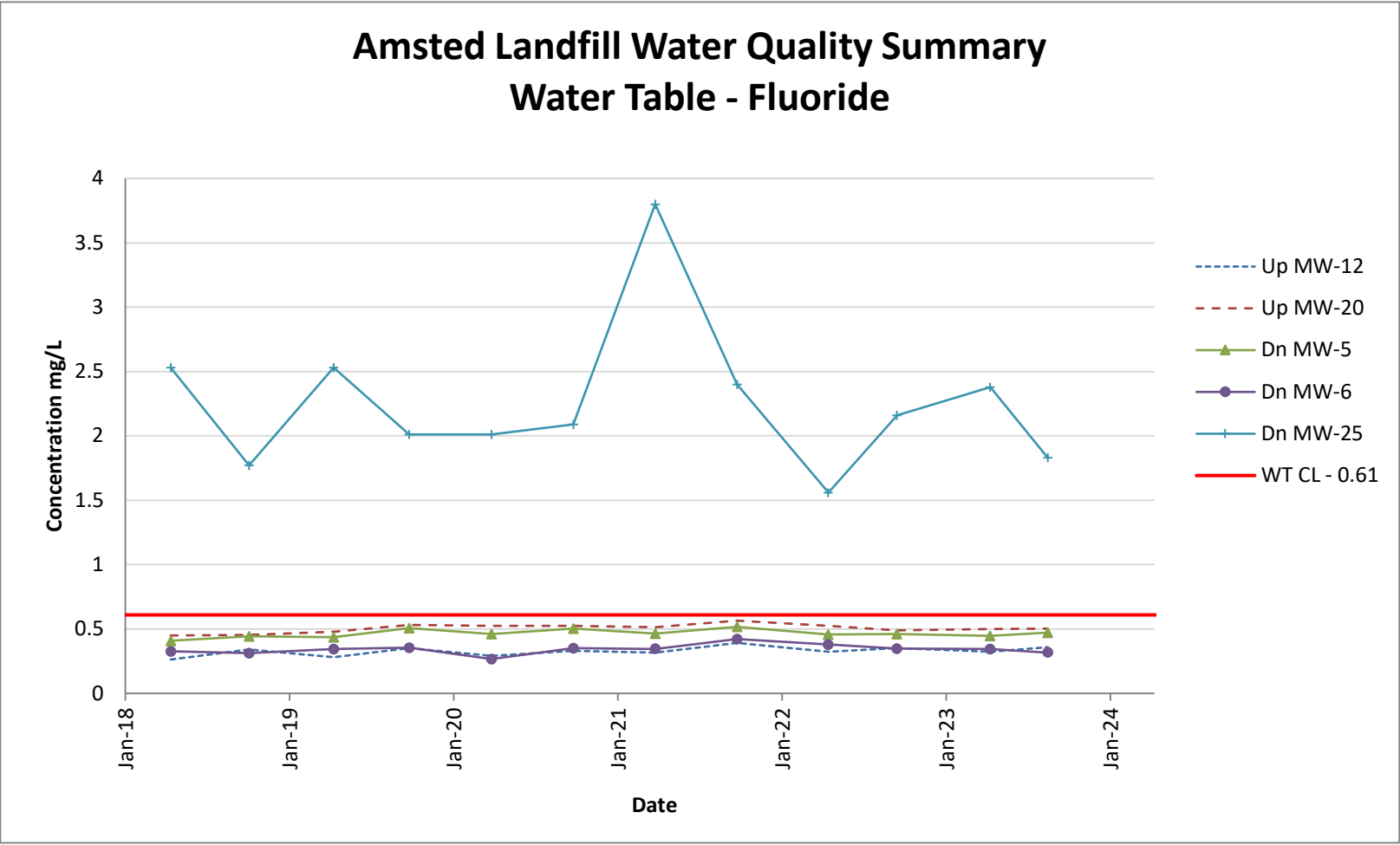
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A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

# WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

Iron (mg/L)

|                                                                                                                                                                                                                                                                                    | Quantitation | Water Table   |               |              |               |               | Uppermost Aquifer |               |              |               |              | Surface Water |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|---------------|--------------|---------------|---------------|-------------------|---------------|--------------|---------------|--------------|---------------|---------------|
|                                                                                                                                                                                                                                                                                    |              | Upgradient    |               | Downgradient |               |               | Upgradient        |               | Downgradient |               |              | Upstream      | Downstream    |
| Date                                                                                                                                                                                                                                                                               | Limit        | MW-12         | MW-20         | MW-5         | MW-6          | MW-25         | MW-16             | MW-21         | MW-7         | MW-26         | MW-27        | SW-1          | SW-2          |
| Apr-18                                                                                                                                                                                                                                                                             | 0.025        | <b>0.0121</b> | <b>0.0254</b> | 0.025        | <b>0.0186</b> | <b>0.0161</b> | 0.025             | 0.025         | 0.025        | <b>0.0186</b> | 0.025        | <b>0.21</b>   | <b>0.0319</b> |
| Oct-18                                                                                                                                                                                                                                                                             | 0.025        | 0.025         | 0.025         | 0.025        | 0.025         | 0.025         | <b>0.0454</b>     | <b>0.0356</b> | <b>0.297</b> | <b>0.5</b>    | <b>0.377</b> | <b>0.379</b>  | <b>0.191</b>  |
| Apr-19                                                                                                                                                                                                                                                                             | 0.025        | R             | R             | R            | R             | R             | R                 | R             | R            | R             | R            | <b>1.35</b>   | <b>1.04</b>   |
| Oct-19                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | 0.1          | 0.1           | 0.1           | 0.1               | 0.1           | <b>0.204</b> | 0.1           | 0.1          | <b>0.298</b>  | 0.1           |
| Apr-20                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | <b>0.0705</b> | 0.1          | 0.1           | 0.1           | <b>0.159</b>      | <b>0.186</b>  | <b>7.93</b>  | <b>1.25</b>   | <b>2.56</b>  | <b>4.06</b>   | <b>1.14</b>   |
| Oct-20                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | 0.1          | 0.1           | 0.1           | 0.1               | 0.1           | <b>0.801</b> | 0.1           | 0.1          | 0.1           | 0.0712        |
| Apr-21                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | 0.1          | 0.1           | 0.1           | <b>0.137</b>      | <b>0.219</b>  | <b>8.8</b>   | <b>1.15</b>   | <b>2.32</b>  | 0.1           | 0.1           |
| Oct-21                                                                                                                                                                                                                                                                             | 0.1          | <b>0.051</b>  | 0.1           | 0.1          | 0.1           | 0.1           | <b>0.216</b>      | <b>0.0768</b> | <b>9.64</b>  | <b>1.58</b>   | <b>2.2</b>   | <b>1.34</b>   | <b>0.408</b>  |
| Apr-22                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | <b>0.052</b> | 0.1           | 0.1           | <b>0.175</b>      | <b>0.246</b>  | <b>8.68</b>  | <b>1.53</b>   | <b>2.62</b>  | 0.1           | 0.1           |
| Sep-22                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | 0.1          | 0.1           | 0.1           | <b>0.113</b>      | 0.1           | <b>9.63</b>  | <b>1.86</b>   | <b>2.56</b>  | <b>1.62</b>   | <b>0.359</b>  |
| Apr-23                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | 0.1          | 0.1           | <b>0.0711</b> | <b>0.819</b>      | <b>0.0792</b> | <b>2.42</b>  | <b>1.85</b>   | <b>3.11</b>  | <b>1.44</b>   | <b>0.682</b>  |
| Aug-23                                                                                                                                                                                                                                                                             | 0.1          | 0.1           | 0.1           | <b>0.104</b> | 0.1           | 0.1           | <b>0.204</b>      | 0.1           | <b>2.51</b>  | <b>1.94</b>   | <b>2.34</b>  | <b>0.276</b>  | 0.1           |
| <div> <div>Mean</div> <div>0.08</div> </div> <div> <div>Mean</div> <div>0.2</div> </div> <div> <div>Mean</div> <div>0.94</div> </div> <div> <div>WT UCL</div> <div>0.15</div> </div> <div> <div>UA UCL</div> <div>0.48</div> </div> <div> <div>SW UCL</div> <div>3.24</div> </div> |              |               |               |              |               |               |                   |               |              |               |              |               |               |

## Notes:

CL = Control Limit

NA = Not applicable.

NS = Not sampled due to insufficient amount of water.

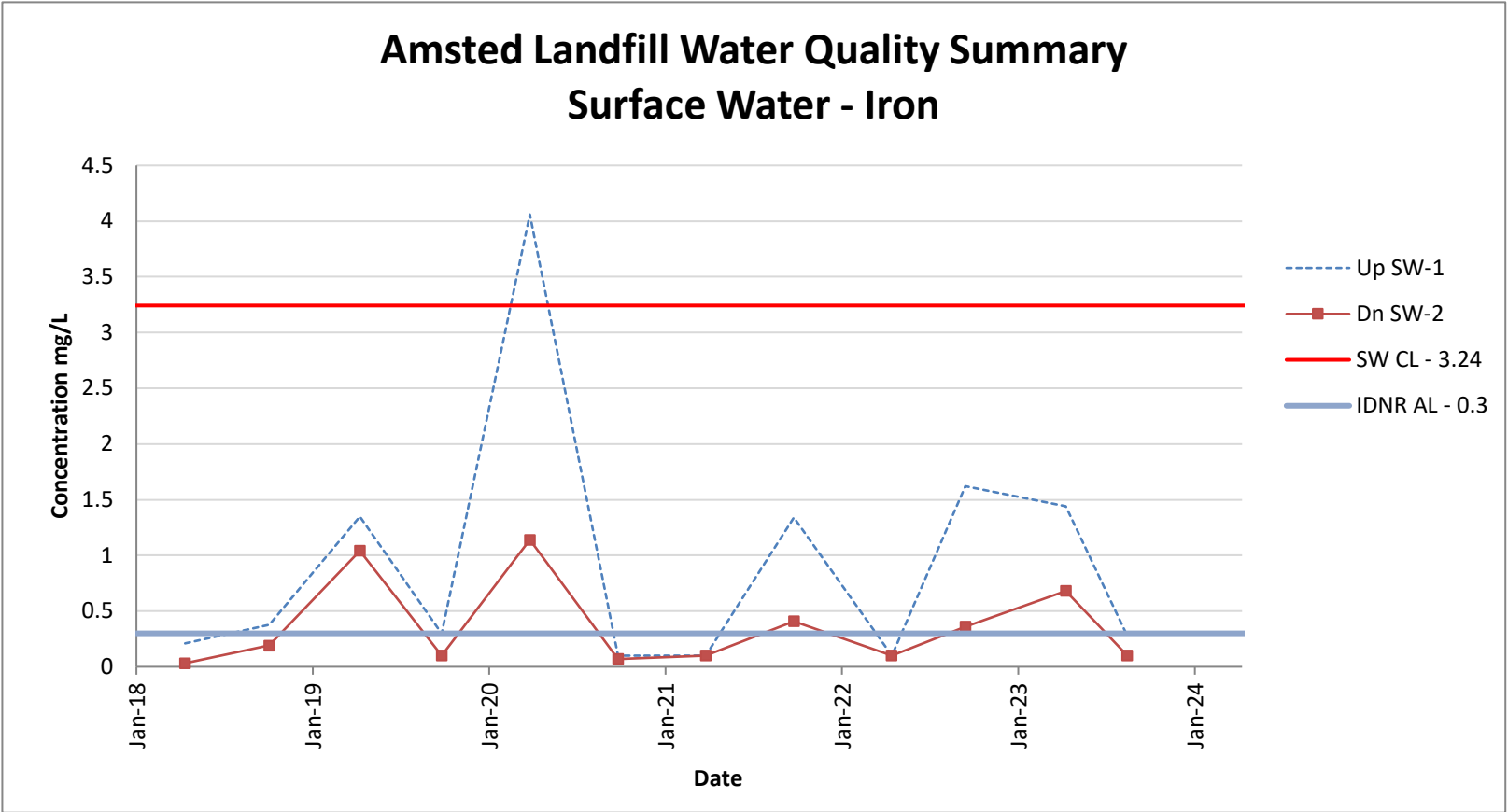
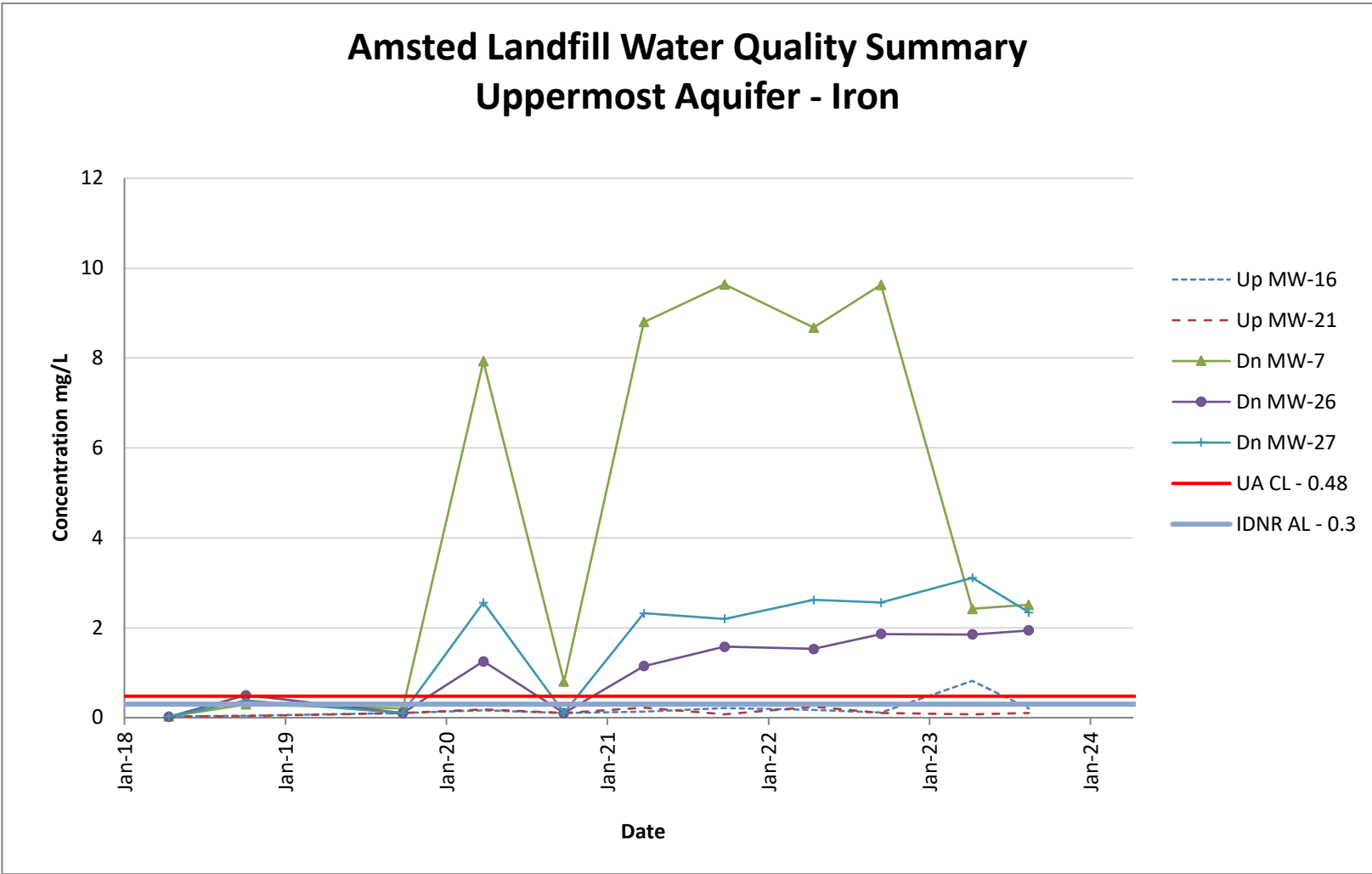
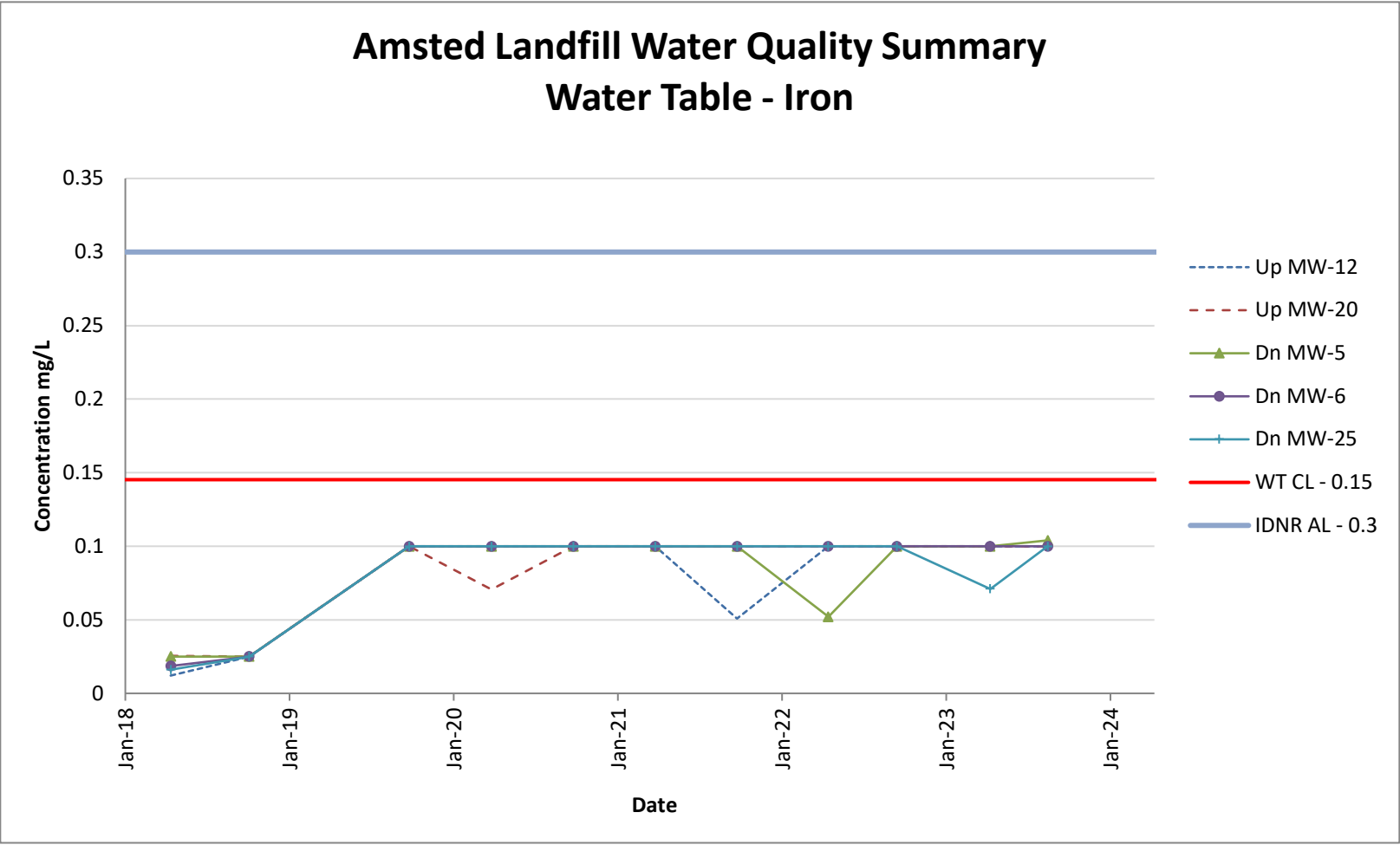
SW = Surface Water

UA = Uppermost Aquifer

WT = Water Table

R = Rejected during validation

A **bolded** value indicates parameter present above method reporting limit.



**Notes:** Up = Upgradient, Dn = Downgradient, SW = Surface Water

WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

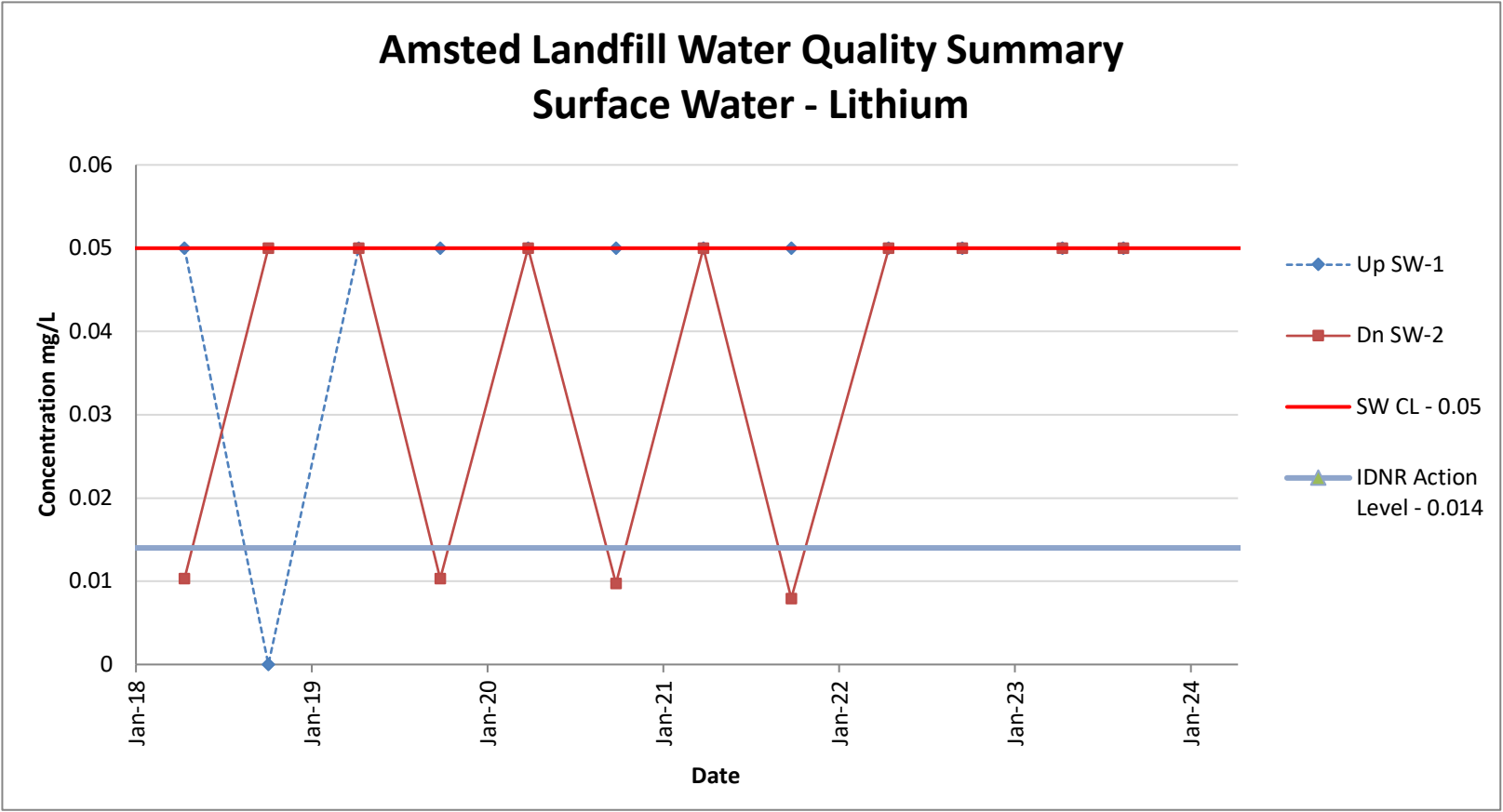
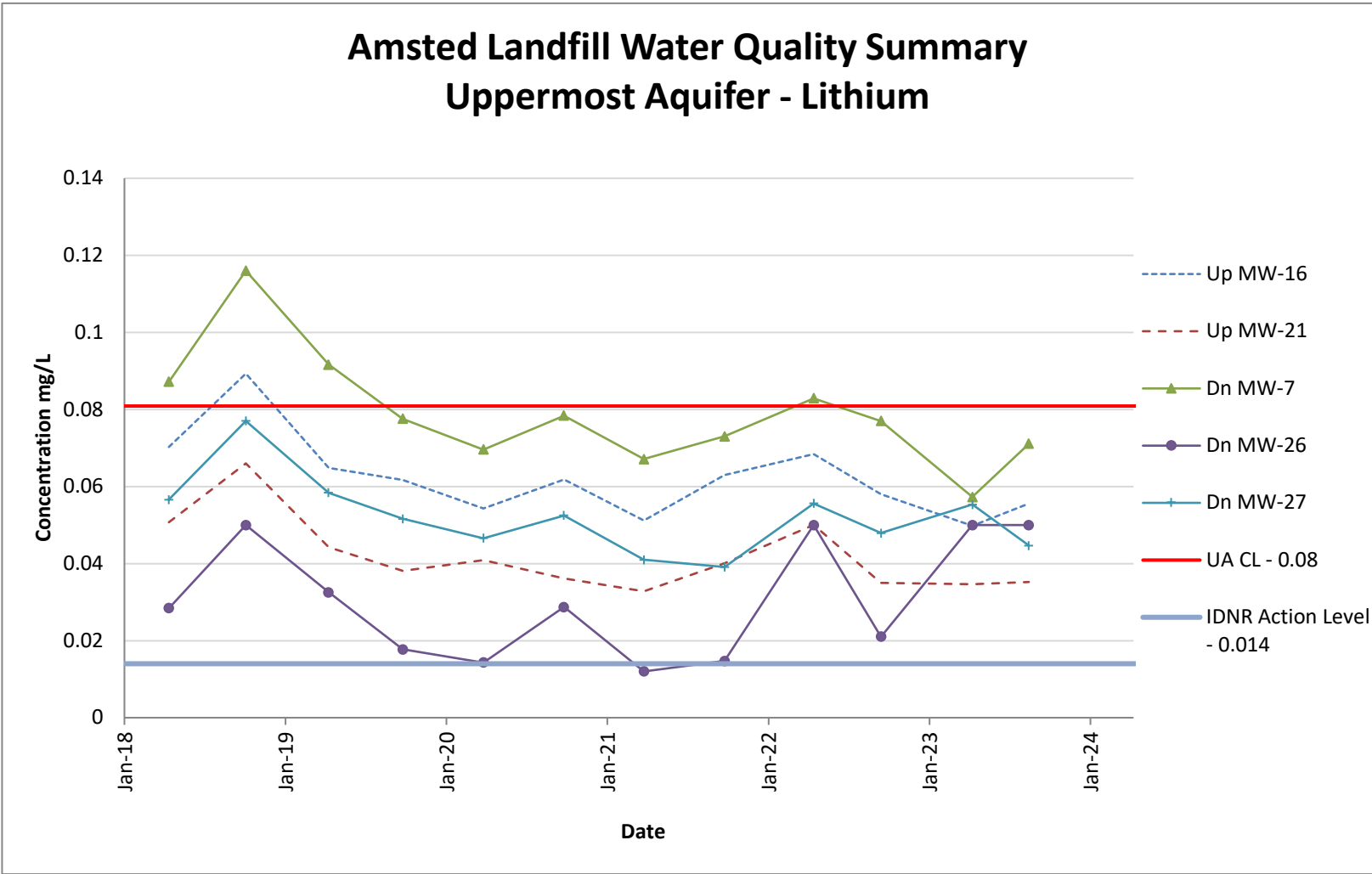
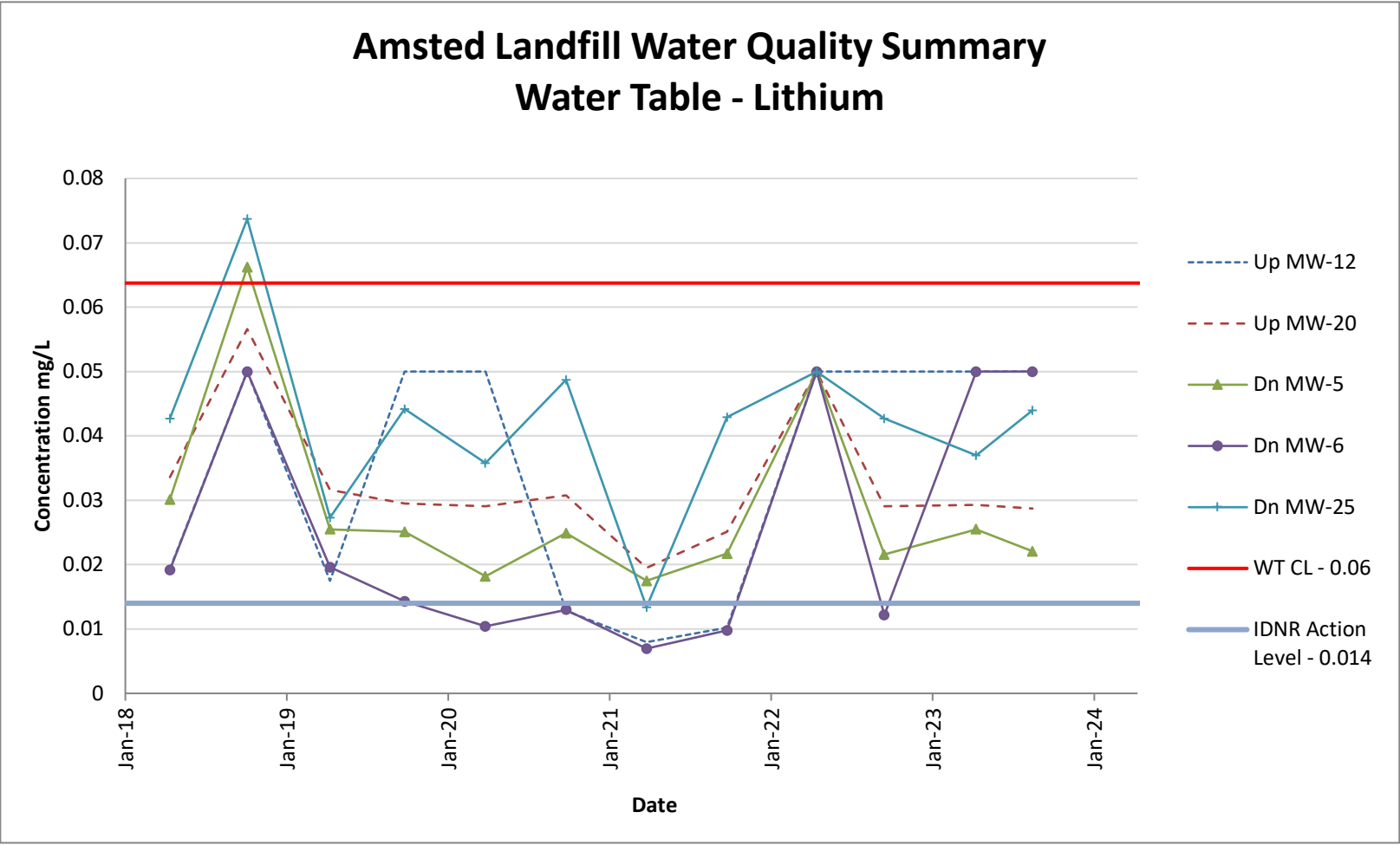
Lithium (mg/L)

|        | Quantitation | Water Table   |               |               |                |               | Uppermost Aquifer |               |               |               |               | Surface Water |                |
|--------|--------------|---------------|---------------|---------------|----------------|---------------|-------------------|---------------|---------------|---------------|---------------|---------------|----------------|
|        |              | Upgradient    |               | Downgradient  |                |               | Upgradient        |               | Downgradient  |               |               | Upstream      | Downstream     |
| Date   | Limit        | MW-12         | MW-20         | MW-5          | MW-6           | MW-25         | MW-16             | MW-21         | MW-7          | MW-26         | MW-27         | SW-1          | SW-2           |
| Apr-18 | 0.05         | <b>0.0193</b> | <b>0.0336</b> | <b>0.0301</b> | <b>0.0192</b>  | <b>0.0427</b> | <b>0.0703</b>     | <b>0.0507</b> | <b>0.0872</b> | <b>0.0284</b> | <b>0.0566</b> | 0.05          | <b>0.0103</b>  |
| Oct-18 | 0.05         | 0.05          | <b>0.0566</b> | <b>0.0662</b> | 0.05           | <b>0.0737</b> | <b>0.0893</b>     | <b>0.066</b>  | <b>0.116</b>  | 0.05          | <b>0.077</b>  | 0.0159        | 0.05           |
| Apr-19 | 0.05         | <b>0.0175</b> | <b>0.0316</b> | <b>0.0255</b> | <b>0.0196</b>  | <b>0.0273</b> | <b>0.0648</b>     | <b>0.0442</b> | <b>0.0916</b> | <b>0.0325</b> | <b>0.0584</b> | 0.05          | 0.05           |
| Oct-19 | 0.05         | 0.05          | <b>0.0295</b> | <b>0.0251</b> | <b>0.0143</b>  | <b>0.0442</b> | <b>0.0617</b>     | <b>0.0381</b> | <b>0.0776</b> | <b>0.0177</b> | <b>0.0516</b> | 0.05          | <b>0.0103</b>  |
| Apr-20 | 0.05         | 0.05          | <b>0.0291</b> | <b>0.0182</b> | <b>0.0104</b>  | <b>0.0358</b> | <b>0.0543</b>     | <b>0.0409</b> | <b>0.0696</b> | <b>0.0143</b> | <b>0.0466</b> | 0.05          | 0.05           |
| Oct-20 | 0.05         | <b>0.0128</b> | <b>0.0308</b> | <b>0.0249</b> | <b>0.013</b>   | <b>0.0487</b> | <b>0.0618</b>     | <b>0.0362</b> | <b>0.0784</b> | <b>0.0287</b> | <b>0.0525</b> | 0.05          | <b>0.00972</b> |
| Apr-21 | 0.05         | 0.00796       | <b>0.0195</b> | <b>0.0175</b> | <b>0.00696</b> | <b>0.0134</b> | <b>0.0512</b>     | <b>0.0328</b> | <b>0.0671</b> | <b>0.012</b>  | <b>0.041</b>  | 0.05          | 0.05           |
| Oct-21 | 0.05         | <b>0.0102</b> | <b>0.0251</b> | <b>0.0217</b> | <b>0.00978</b> | <b>0.0429</b> | <b>0.063</b>      | <b>0.0401</b> | <b>0.073</b>  | <b>0.0147</b> | <b>0.0391</b> | 0.05          | 0.00794        |
| Apr-22 | 0.05         | 0.05          | 0.05          | 0.05          | 0.05           | 0.05          | <b>0.0684</b>     | 0.05          | <b>0.0829</b> | 0.05          | <b>0.0556</b> | 0.05          | 0.05           |
| Sep-22 | 0.05         | 0.05          | <b>0.0291</b> | <b>0.0216</b> | <b>0.0122</b>  | <b>0.0427</b> | <b>0.058</b>      | <b>0.035</b>  | <b>0.077</b>  | <b>0.021</b>  | <b>0.0479</b> | 0.05          | 0.05           |
| Apr-23 | 0.05         | 0.05          | <b>0.0293</b> | <b>0.0255</b> | 0.05           | <b>0.037</b>  | <b>0.0498</b>     | <b>0.0346</b> | <b>0.0573</b> | 0.05          | <b>0.0553</b> | 0.05          | 0.05           |
| Aug-23 | 0.05         | 0.05          | <b>0.0287</b> | <b>0.0221</b> | 0.05           | <b>0.044</b>  | <b>0.0556</b>     | <b>0.0352</b> | <b>0.0711</b> | 0.05          | <b>0.0447</b> | 0.05          | 0.05           |
|        |              |               |               |               |                |               |                   |               |               |               |               |               |                |
|        |              | Mean          | 0.03          |               |                |               | Mean              | 0.05          |               |               |               | Mean          | 0.05           |
|        |              | WT UCL        | 0.06          |               |                |               | UA UCL            | 0.0809        |               |               |               | SW UCL        | 0.05           |

Notes:

- CL = Control Limit
- NA = Not applicable.
- NS = Not sampled due to insufficient amount of water.
- SW = Surface Water
- UA = Uppemost Aquifer
- WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

# WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

Manganese (mg/L)

|                                                                                                                                                                                                                                                                                       | Quantitation | Water Table    |                |                |               |                | Uppermost Aquifer |               |               |             |              | Surface Water |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------|----------------|----------------|---------------|----------------|-------------------|---------------|---------------|-------------|--------------|---------------|---------------|
|                                                                                                                                                                                                                                                                                       |              | Upgradient     |                | Downgradient   |               |                | Upgradient        |               | Downgradient  |             |              | Upstream      | Downstream    |
| Date                                                                                                                                                                                                                                                                                  | Limit        | MW-12          | MW-20          | MW-5           | MW-6          | MW-25          | MW-16             | MW-21         | MW-7          | MW-26       | MW-27        | SW-1          | SW-2          |
| Apr-18                                                                                                                                                                                                                                                                                | 0.004        | <b>0.00344</b> | 0.004          | <b>0.0145</b>  | <b>0.124</b>  | <b>0.012</b>   | <b>0.477</b>      | <b>0.553</b>  | <b>0.0844</b> | <b>4</b>    | <b>0.139</b> | <b>0.375</b>  | <b>0.506</b>  |
| Oct-18                                                                                                                                                                                                                                                                                | 0.08         | 0.08           | 0.08           | <b>0.08</b>    | <b>0.549</b>  | <b>0.277</b>   | <b>0.091</b>      | 0.0695        | <b>2.33</b>   | <b>5.14</b> | <b>0.186</b> | <b>0.184</b>  | <b>0.188</b>  |
| Apr-19                                                                                                                                                                                                                                                                                | 0.004-0.0200 | 0.004          | 0.004          | <b>0.00777</b> | <b>0.0786</b> | <b>0.0301</b>  | <b>0.0971</b>     | <b>0.0676</b> | <b>0.0783</b> | <b>2.63</b> | <b>0.138</b> | <b>0.51</b>   | <b>0.35</b>   |
| Oct-19                                                                                                                                                                                                                                                                                | 0.005        | 0.005          | 0.005          | <b>0.00788</b> | <b>0.2</b>    | <b>0.0792</b>  | <b>0.0723</b>     | <b>0.0475</b> | <b>1.76</b>   | <b>3.45</b> | <b>0.134</b> | <b>0.275</b>  | <b>0.091</b>  |
| Apr-20                                                                                                                                                                                                                                                                                | 0.005        | <b>0.00282</b> | <b>0.00268</b> | <b>0.0901</b>  | <b>0.0909</b> | <b>0.0545</b>  | <b>0.0578</b>     | <b>0.0436</b> | <b>1.28</b>   | <b>2.62</b> | <b>0.147</b> | <b>0.817</b>  | <b>0.417</b>  |
| Oct-20                                                                                                                                                                                                                                                                                | 0.005        | <b>0.00643</b> | 0.005          | <b>0.0648</b>  | <b>0.436</b>  | <b>0.0241</b>  | <b>0.0742</b>     | <b>0.0486</b> | <b>1.49</b>   | <b>3.07</b> | <b>0.128</b> | <b>0.533</b>  | <b>0.292</b>  |
| Apr-21                                                                                                                                                                                                                                                                                | 0.005        | 0.005          | <b>0.005</b>   | <b>0.0337</b>  | <b>0.0557</b> | <b>0.0167</b>  | <b>0.0755</b>     | <b>0.0512</b> | <b>1.3</b>    | <b>2.72</b> | <b>0.114</b> | <b>0.254</b>  | <b>0.0882</b> |
| Oct-21                                                                                                                                                                                                                                                                                | 0.01         | 0.01           | 0.01           | <b>0.0449</b>  | <b>0.703</b>  | <b>0.0297</b>  | <b>0.0735</b>     | <b>0.0217</b> | <b>1.49</b>   | <b>2.5</b>  | <b>0.135</b> | <b>0.245</b>  | <b>0.195</b>  |
| Apr-22                                                                                                                                                                                                                                                                                | 0.01         | 0.01           | 0.01           | <b>0.0245</b>  | <b>0.0729</b> | <b>0.0937</b>  | <b>0.126</b>      | <b>0.079</b>  | <b>1.46</b>   | <b>2.67</b> | <b>0.131</b> | <b>0.34</b>   | <b>0.624</b>  |
| Sep-22                                                                                                                                                                                                                                                                                | 0.01         | 0.01           | 0.01           | <b>0.171</b>   | <b>0.253</b>  | <b>0.0223</b>  | <b>0.181</b>      | <b>0.0444</b> | <b>1.58</b>   | <b>3.39</b> | <b>0.22</b>  | <b>0.572</b>  | <b>0.164</b>  |
| Apr-23                                                                                                                                                                                                                                                                                | 0.005        | 0.005          | 0.005          | 0.005          | <b>0.0149</b> | <b>0.00376</b> | <b>0.0595</b>     | <b>0.161</b>  | <b>0.0543</b> | <b>3.35</b> | <b>0.153</b> | <b>0.497</b>  | <b>0.741</b>  |
| Aug-23                                                                                                                                                                                                                                                                                | 0.005        | 0.005          | 0.005          | 0.0196         | <b>0.575</b>  | <b>0.00912</b> | <b>0.11</b>       | <b>0.0216</b> | <b>1.41</b>   | <b>2.83</b> | <b>0.162</b> | <b>0.71</b>   | <b>0.229</b>  |
| <div> <div>Mean</div> <div>0.013</div> </div> <div> <div>WT UCL</div> <div>0.055</div> </div> <div> <div>Mean</div> <div>0.11</div> </div> <div> <div>UA UCL</div> <div>0.37</div> </div> <div> <div>Mean</div> <div>0.44</div> </div> <div> <div>SW UCL</div> <div>0.84</div> </div> |              |                |                |                |               |                |                   |               |               |             |              |               |               |

## Notes:

CL = Control Limit

NA = Not applicable.

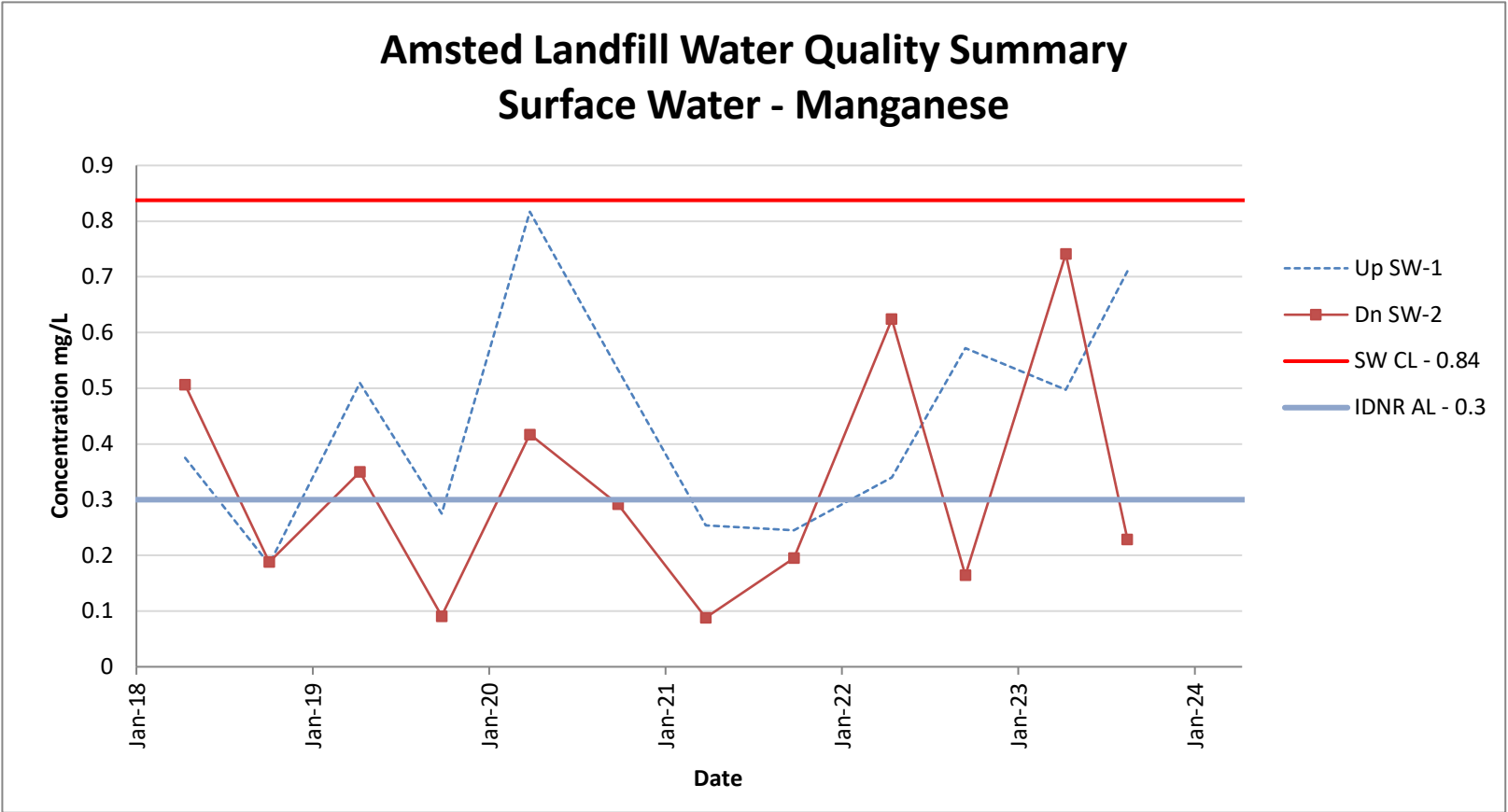
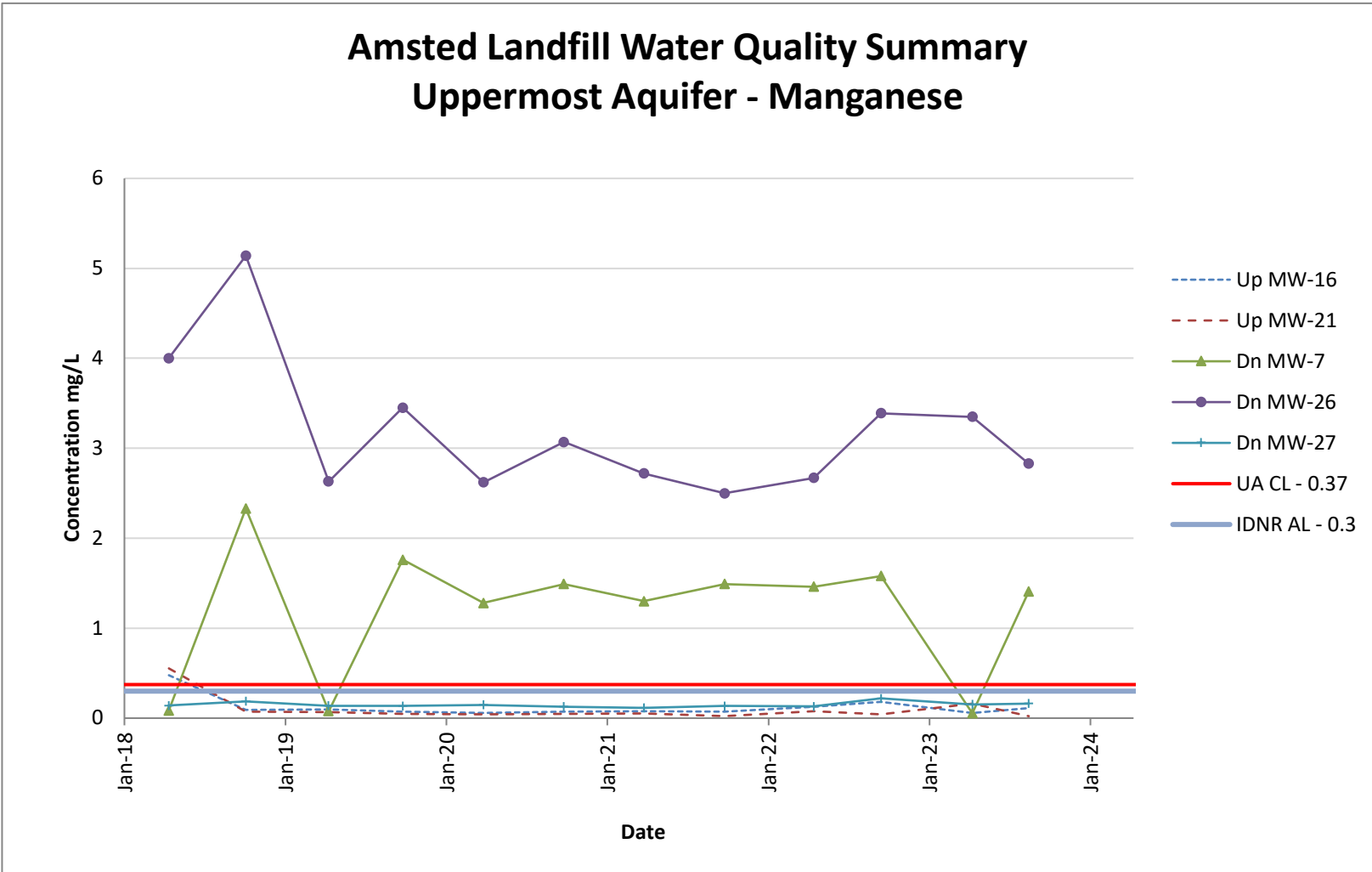
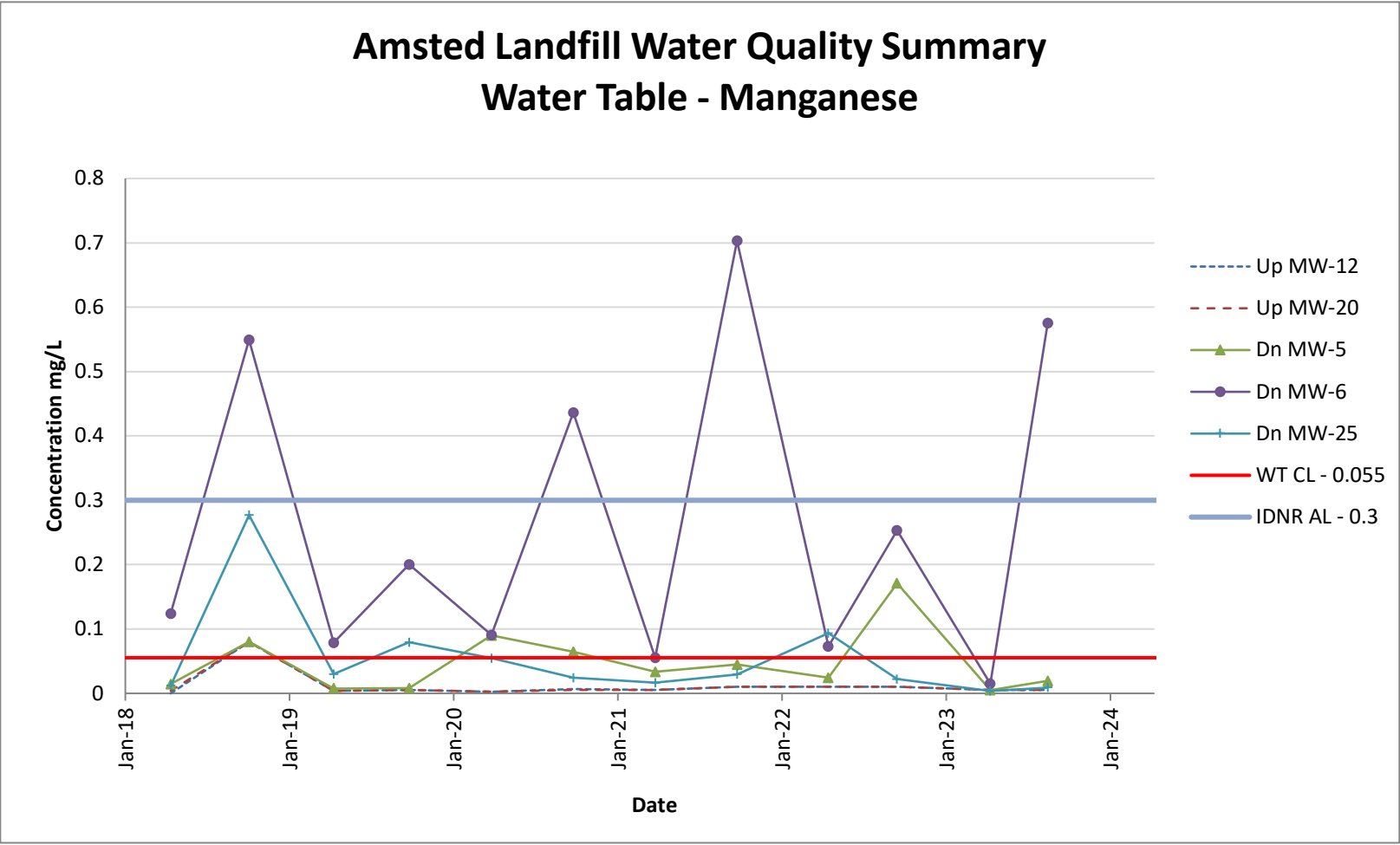
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppermost Aquifer

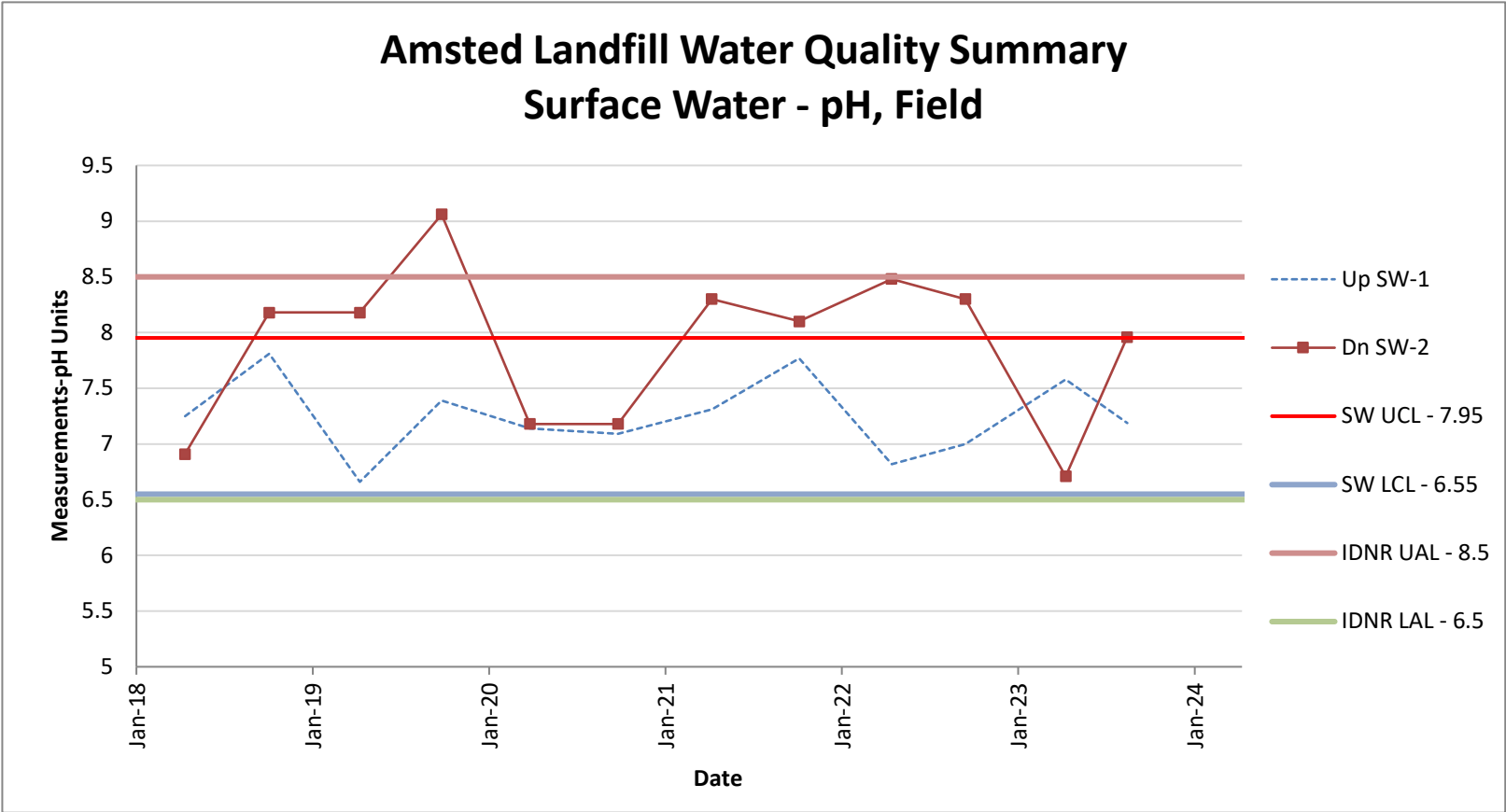
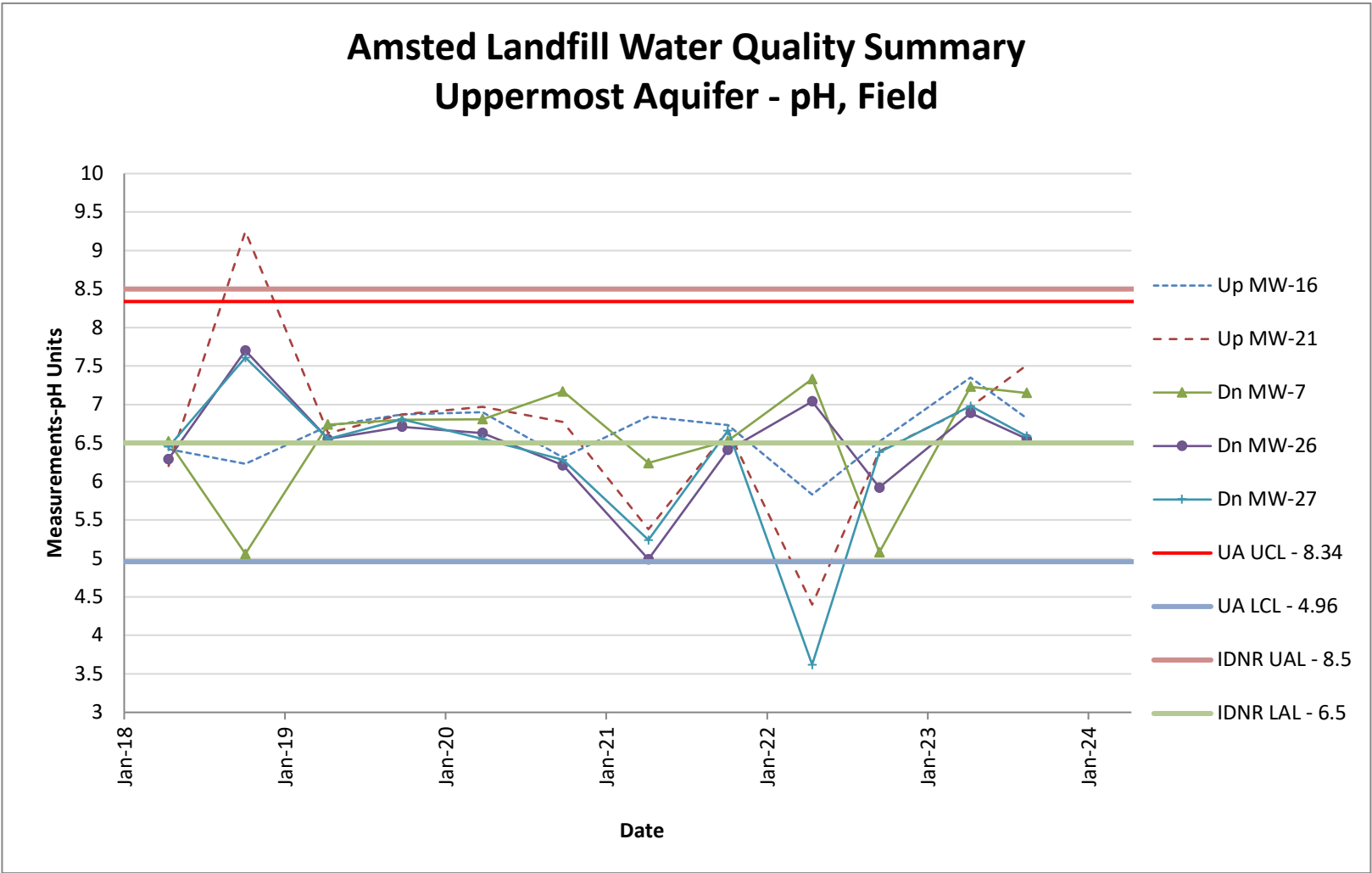
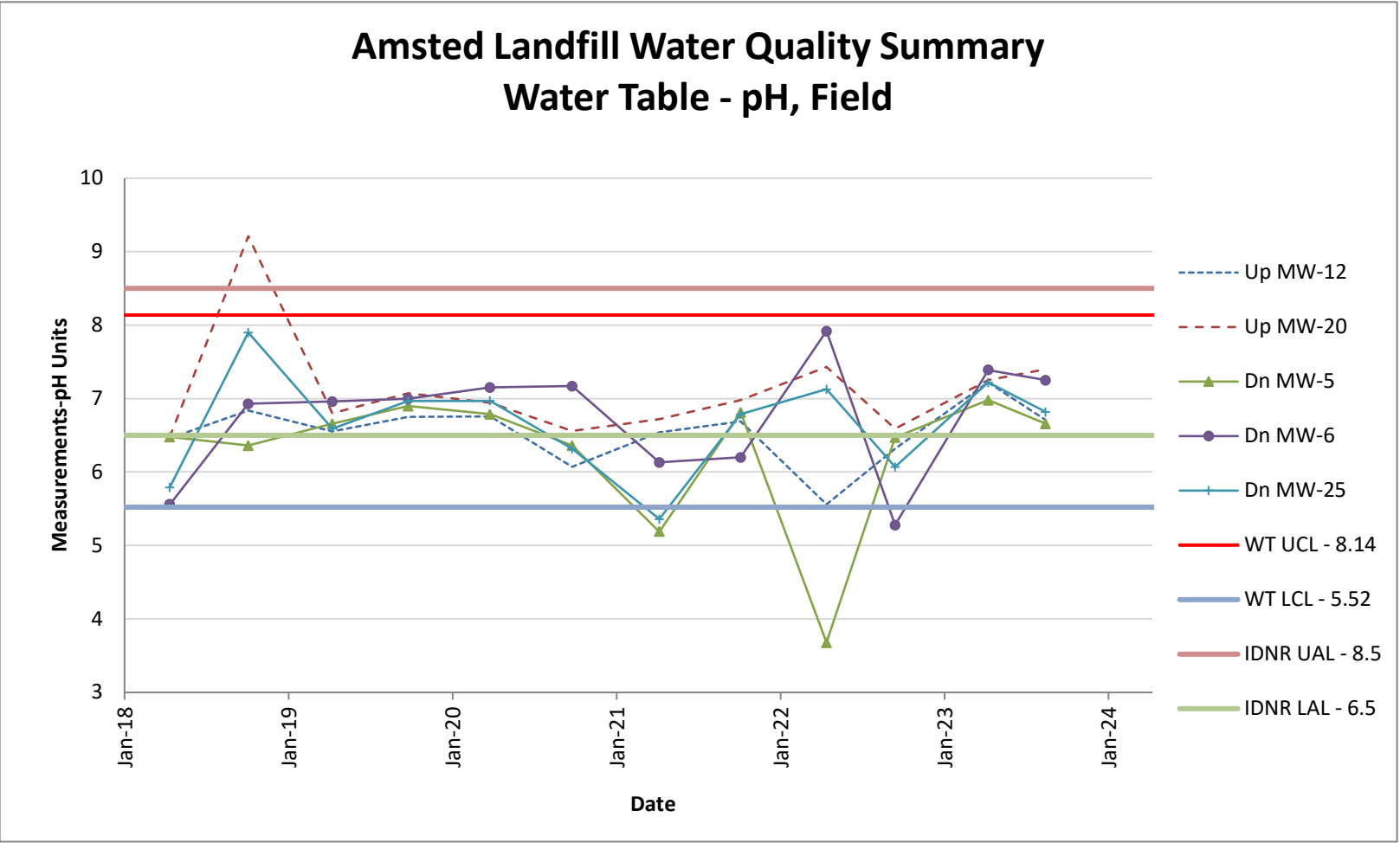
WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



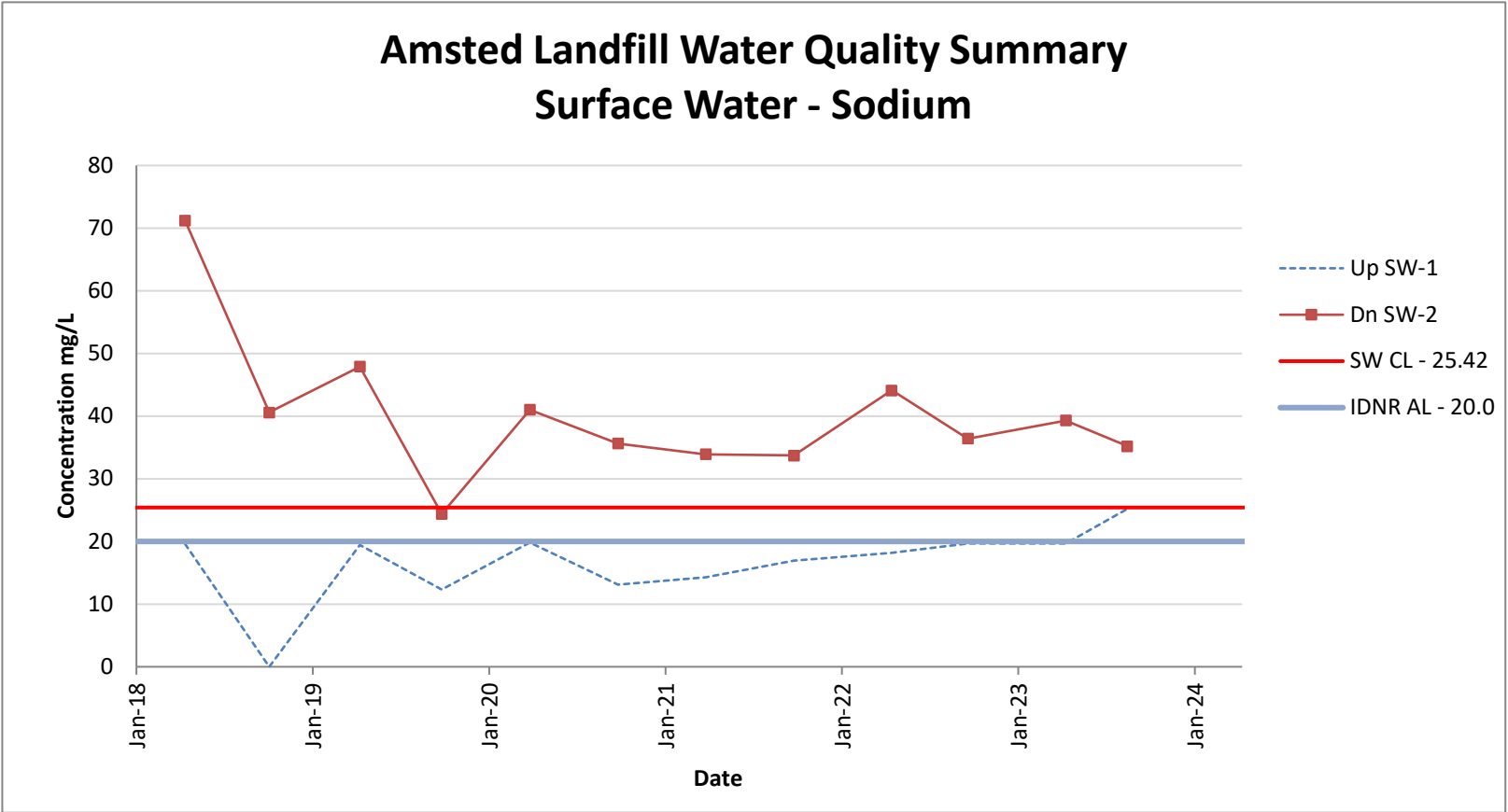
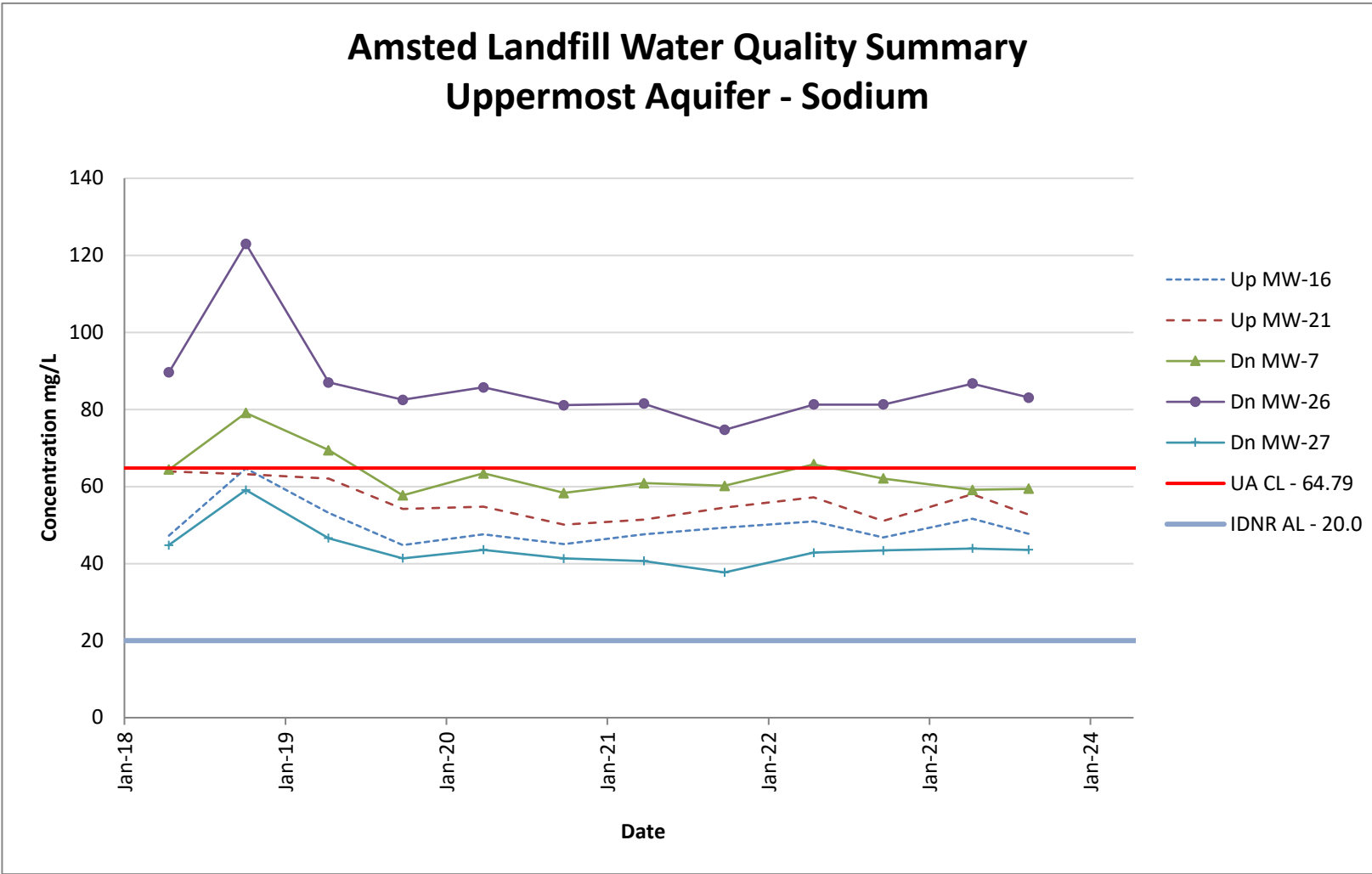
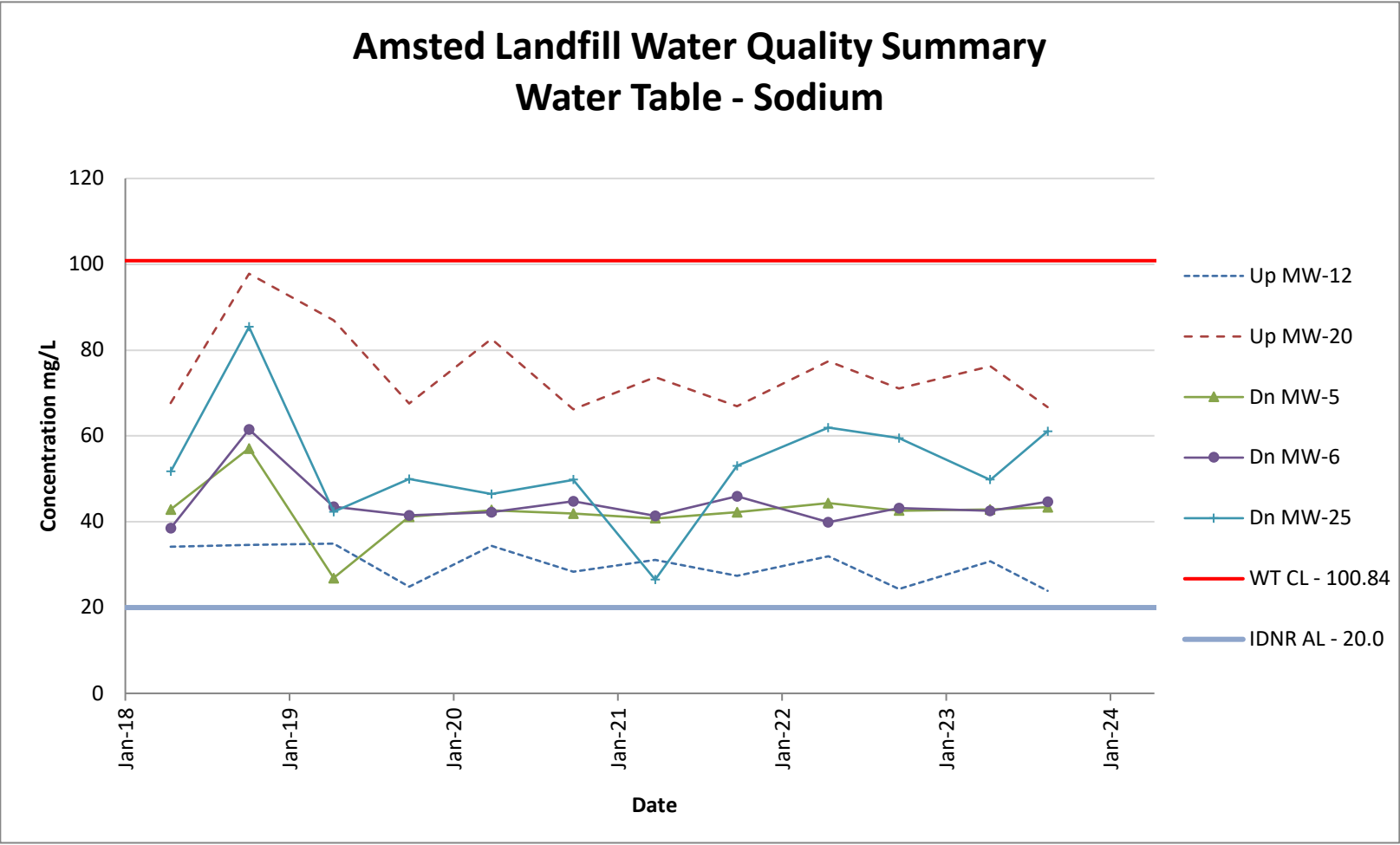
**Notes:** Up = Upgradient, Dn = Downgradient, SW = Surface Water





**Notes:** Up = Upgradient, Dn = Downgradient, SW = Surface Water





Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

**WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL**

**Strontium (mg/L)**

|                                                                                                                                                                                                                                                                                      | <b>Quantitation</b> | <b>Water Table</b> |              |                     |              |              | <b>Uppermost Aquifer</b> |              |                     |             |              | <b>Surface Water</b> |                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------|---------------------|--------------|--------------|--------------------------|--------------|---------------------|-------------|--------------|----------------------|-------------------|
|                                                                                                                                                                                                                                                                                      |                     | <u>Upgradient</u>  |              | <u>Downgradient</u> |              |              | <u>Upgradient</u>        |              | <u>Downgradient</u> |             |              | <u>Upstream</u>      | <u>Downstream</u> |
| <b>Date</b>                                                                                                                                                                                                                                                                          | <b>Limit</b>        | MW-12              | MW-20        | MW-5                | MW-6         | MW-25        | MW-16                    | MW-21        | MW-7                | MW-26       | MW-27        | SW-1                 | SW-2              |
| Apr-18                                                                                                                                                                                                                                                                               | 0.05                | <b>0.513</b>       | <b>0.329</b> | <b>0.291</b>        | <b>0.349</b> | <b>0.504</b> | <b>0.523</b>             | <b>0.719</b> | <b>1.85</b>         | <b>2.16</b> | <b>0.826</b> | <b>0.252</b>         | <b>0.254</b>      |
| Oct-18                                                                                                                                                                                                                                                                               | 0.05                | <b>0.535</b>       | <b>0.338</b> | <b>0.282</b>        | <b>0.365</b> | <b>0.56</b>  | <b>0.496</b>             | <b>0.449</b> | <b>1.82</b>         | <b>2.03</b> | <b>0.787</b> | <b>0.201</b>         | <b>0.237</b>      |
| Apr-19                                                                                                                                                                                                                                                                               | 0.05                | <b>0.494</b>       | <b>0.336</b> | <b>0.292</b>        | <b>0.362</b> | <b>0.483</b> | <b>0.485</b>             | <b>0.463</b> | <b>1.83</b>         | <b>1.92</b> | <b>0.826</b> | <b>0.209</b>         | <b>0.258</b>      |
| Oct-19                                                                                                                                                                                                                                                                               | 0.05                | <b>0.594</b>       | <b>0.354</b> | <b>0.288</b>        | <b>0.393</b> | <b>0.542</b> | <b>0.489</b>             | <b>0.441</b> | <b>1.83</b>         | <b>2.1</b>  | <b>0.828</b> | <b>0.174</b>         | <b>0.169</b>      |
| Apr-20                                                                                                                                                                                                                                                                               | 0.05                | <b>0.562</b>       | <b>0.376</b> | <b>0.31</b>         | <b>0.394</b> | <b>0.541</b> | <b>0.498</b>             | <b>0.477</b> | <b>1.93</b>         | <b>2.18</b> | <b>0.845</b> | <b>0.253</b>         | <b>0.217</b>      |
| Oct-20                                                                                                                                                                                                                                                                               | 0.05                | <b>0.542</b>       | <b>0.315</b> | <b>0.265</b>        | <b>0.355</b> | <b>0.551</b> | <b>0.451</b>             | <b>0.41</b>  | <b>1.67</b>         | <b>1.82</b> | <b>0.733</b> | <b>0.206</b>         | <b>0.203</b>      |
| Apr-21                                                                                                                                                                                                                                                                               | 0.05                | <b>0.443</b>       | <b>0.302</b> | <b>0.267</b>        | <b>0.328</b> | <b>0.363</b> | <b>0.44</b>              | <b>0.406</b> | <b>1.57</b>         | <b>1.7</b>  | <b>0.681</b> | <b>0.202</b>         | <b>0.13</b>       |
| Oct-21                                                                                                                                                                                                                                                                               | 0.05                | <b>0.557</b>       | <b>0.299</b> | <b>0.251</b>        | <b>0.355</b> | <b>0.592</b> | <b>0.513</b>             | <b>0.44</b>  | <b>1.74</b>         | <b>1.59</b> | <b>0.611</b> | <b>0.168</b>         | <b>0.177</b>      |
| Apr-22                                                                                                                                                                                                                                                                               | 0.05                | <b>0.474</b>       | <b>0.324</b> | <b>0.295</b>        | <b>0.33</b>  | <b>0.548</b> | <b>0.488</b>             | <b>0.464</b> | <b>1.79</b>         | <b>1.88</b> | <b>0.7</b>   | <b>0.23</b>          | <b>0.255</b>      |
| Sep-22                                                                                                                                                                                                                                                                               | 0.05                | <b>0.492</b>       | <b>0.345</b> | <b>0.276</b>        | <b>0.357</b> | <b>0.563</b> | <b>0.484</b>             | <b>0.421</b> | <b>1.78</b>         | <b>1.92</b> | <b>0.753</b> | <b>0.213</b>         | <b>0.156</b>      |
| Apr-23                                                                                                                                                                                                                                                                               | 0.05                | <b>0.49</b>        | <b>0.349</b> | <b>0.3</b>          | <b>0.377</b> | <b>0.476</b> | <b>0.525</b>             | <b>0.556</b> | <b>1.81</b>         | <b>2.08</b> | <b>0.797</b> | <b>0.219</b>         | <b>0.251</b>      |
| Aug-23                                                                                                                                                                                                                                                                               | 0.05                | <b>0.513</b>       | <b>0.367</b> | <b>0.296</b>        | <b>0.386</b> | <b>0.571</b> | <b>0.497</b>             | <b>0.458</b> | <b>1.8</b>          | <b>1.97</b> | <b>0.764</b> | <b>0.165</b>         | <b>0.223</b>      |
| <div> <div>Mean</div> <div>0.427</div> </div> <div> <div>WT UCL</div> <div>0.62</div> </div> <div> <div>Mean</div> <div>0.48</div> </div> <div> <div>UA UCL</div> <div>0.61</div> </div> <div> <div>Mean</div> <div>0.21</div> </div> <div> <div>SW UCL</div> <div>0.27</div> </div> |                     |                    |              |                     |              |              |                          |              |                     |             |              |                      |                   |

**Notes:**

CL = Control Limit

NA = Not applicable.

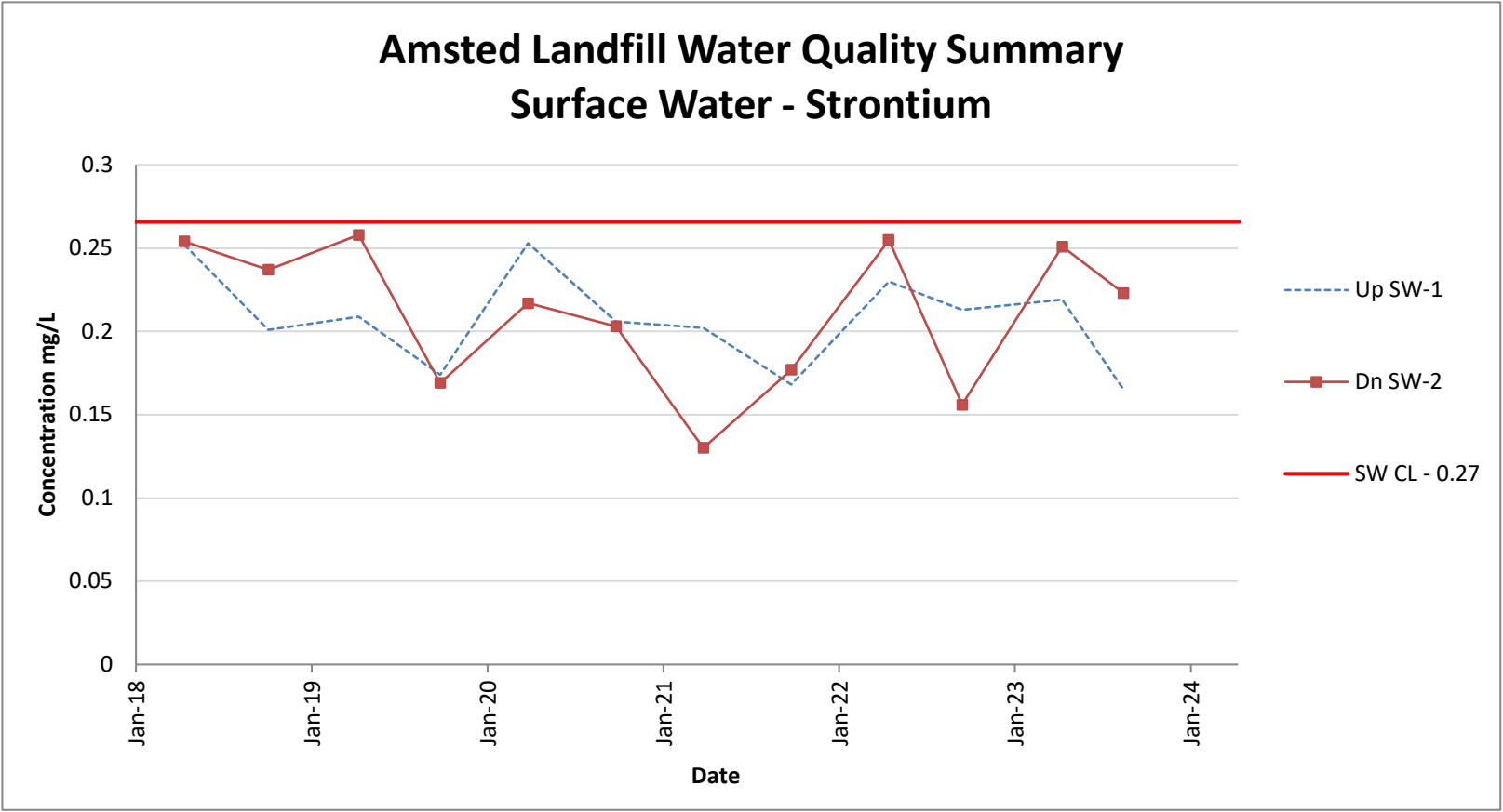
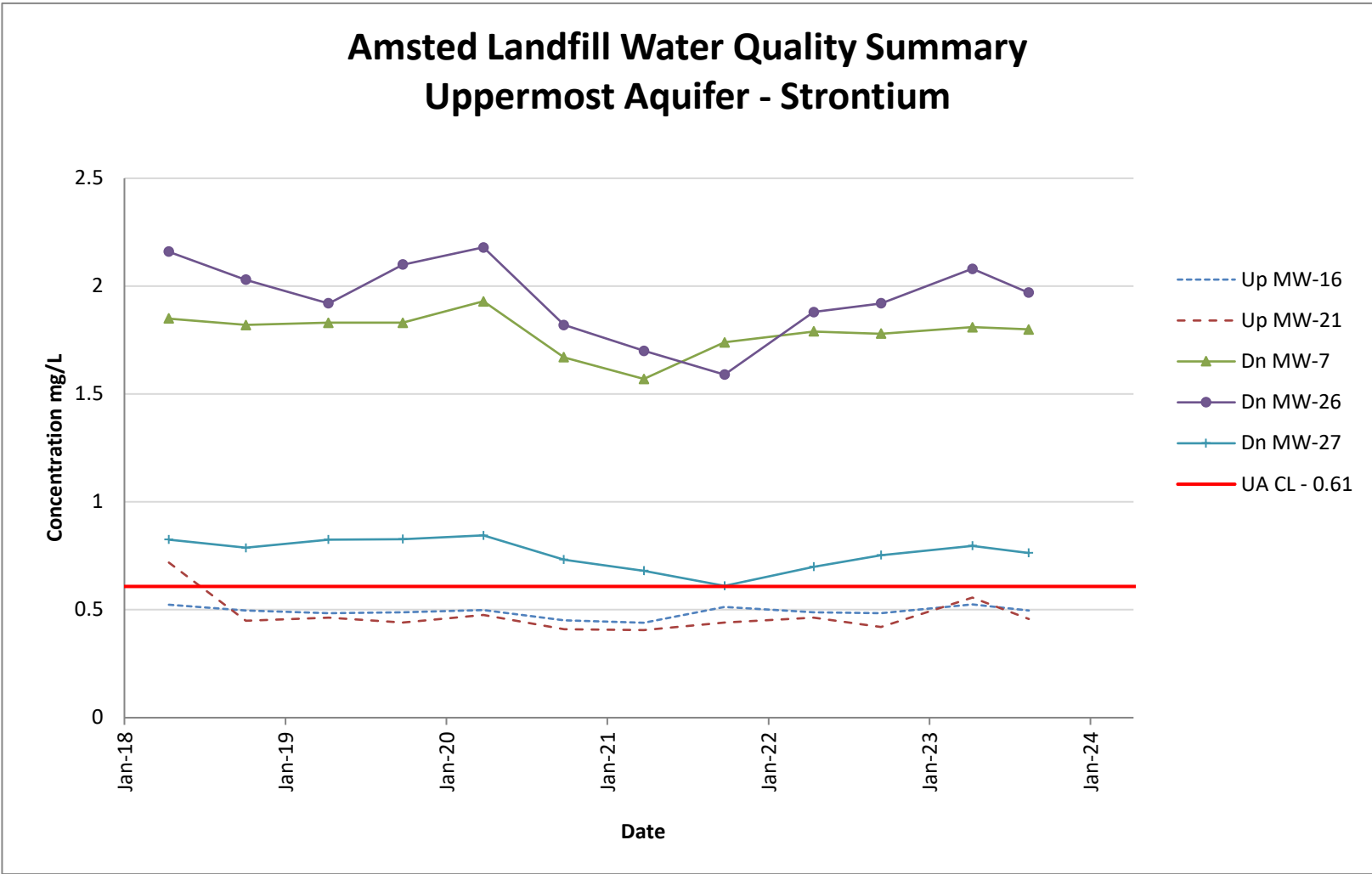
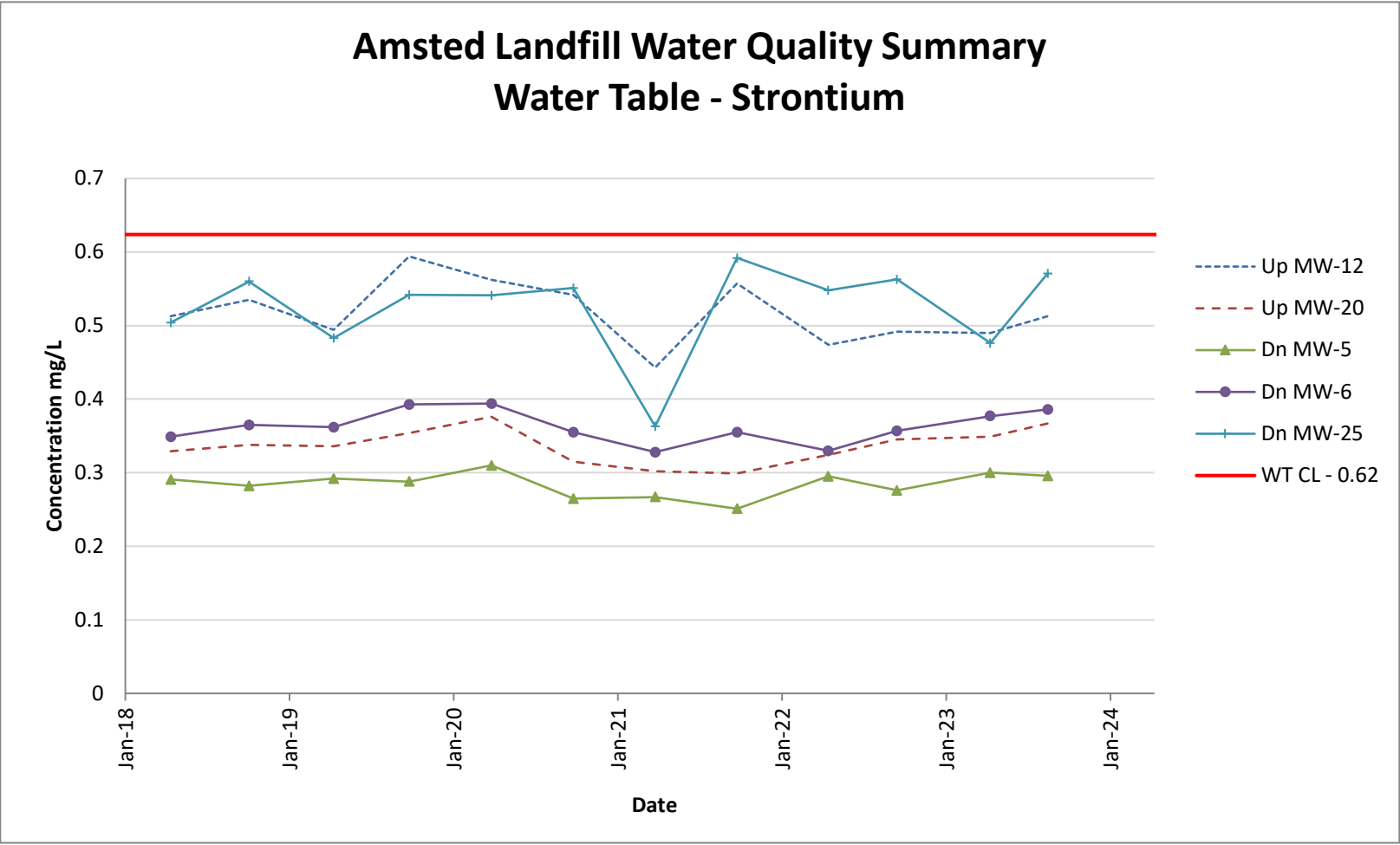
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppermost Aquifer

WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

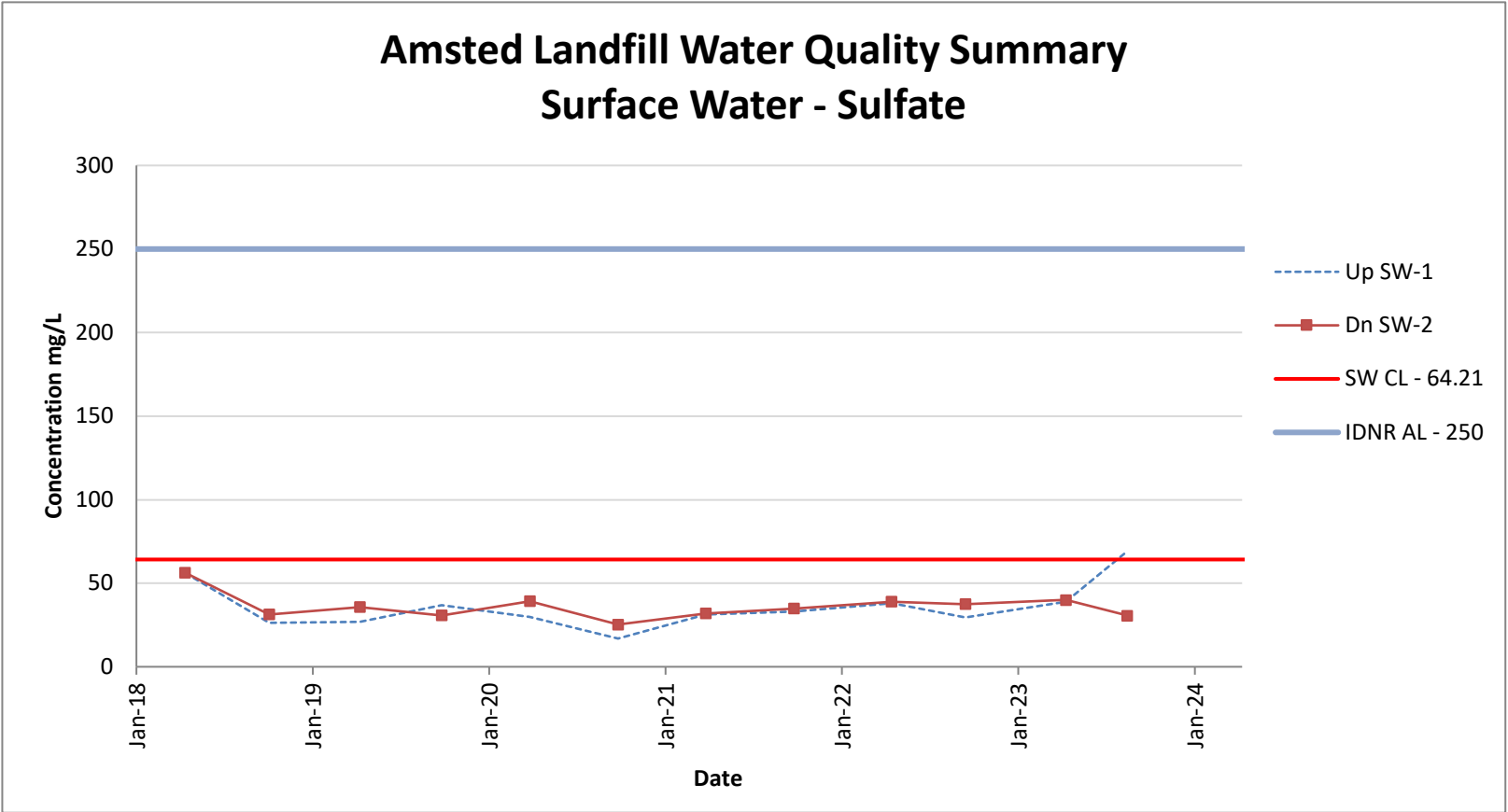
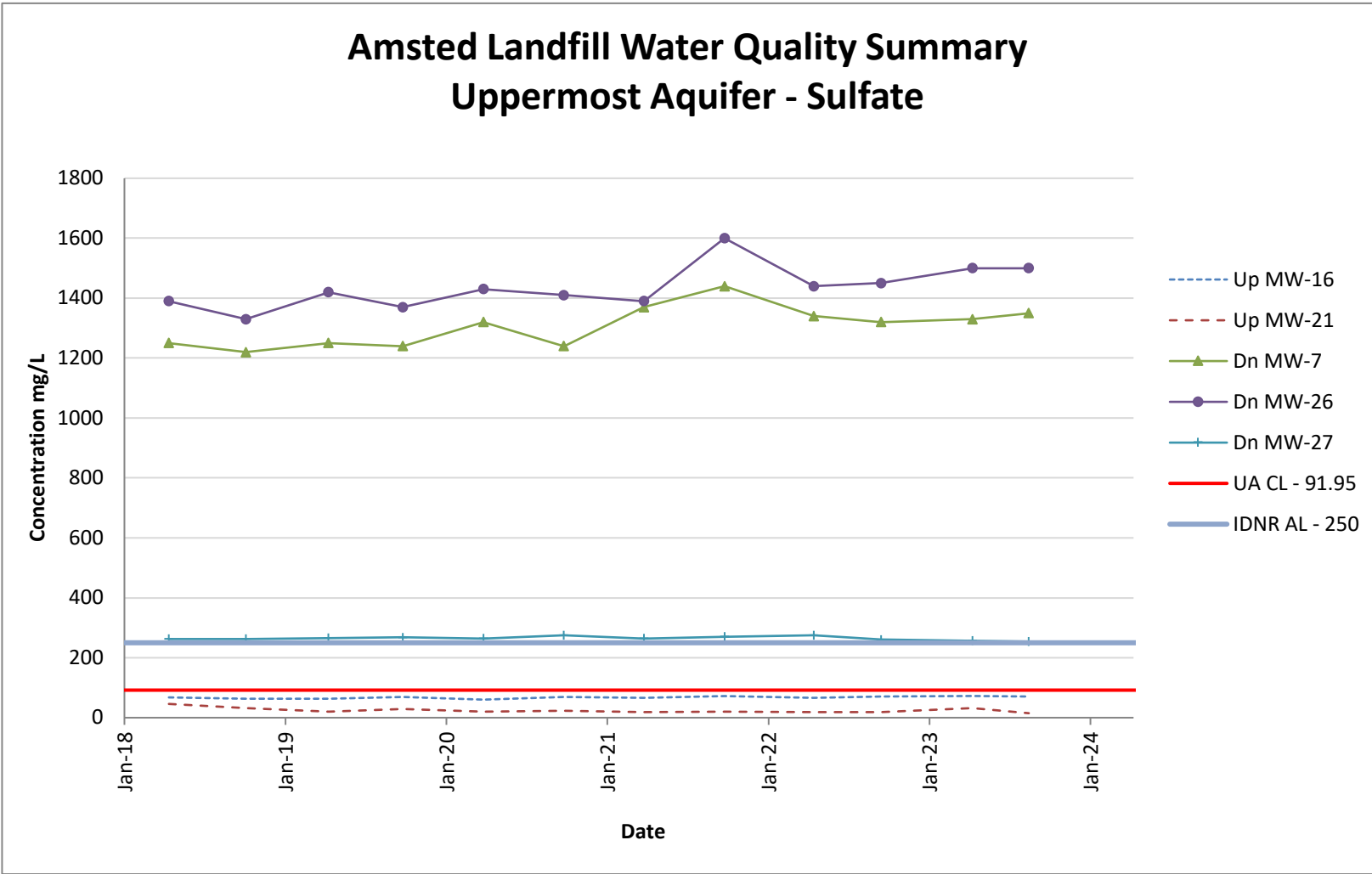
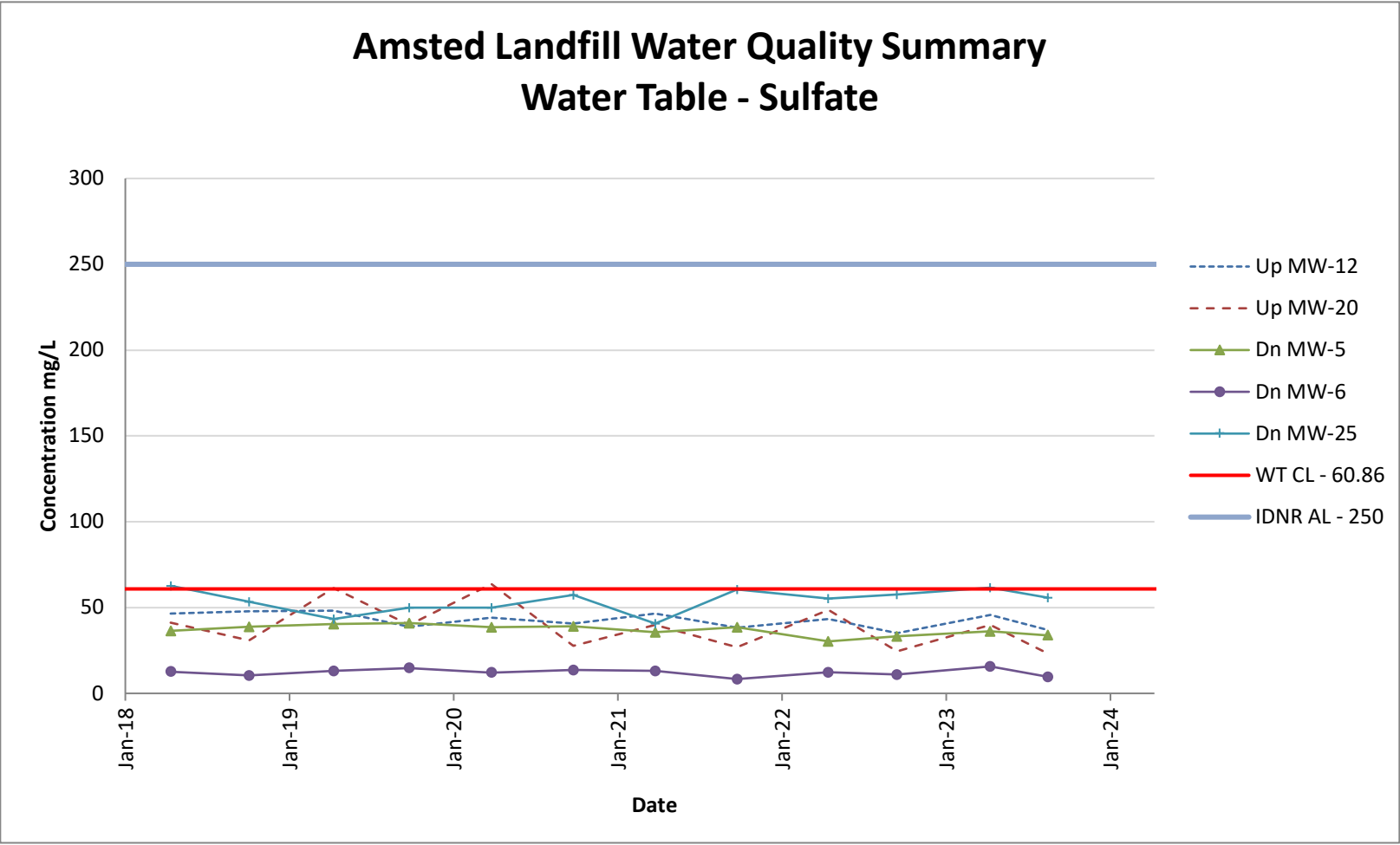
Sulfate (mg/L)

|        | Quantitation | Water Table |        |              |      |       | Uppermost Aquifer |       |              |       |       | Surface Water |            |
|--------|--------------|-------------|--------|--------------|------|-------|-------------------|-------|--------------|-------|-------|---------------|------------|
|        |              | Upgradient  |        | Downgradient |      |       | Upgradient        |       | Downgradient |       |       | Upstream      | Downstream |
| Date   | Limit        | MW-12       | MW-20  | MW-5         | MW-6 | MW-25 | MW-16             | MW-21 | MW-7         | MW-26 | MW-27 | SW-1          | SW-2       |
| Apr-18 | 1.0-50       | 46.6        | 41.3   | 36.4         | 12.7 | 62.7  | 67.1              | 45.9  | 1250         | 1390  | 263   | 56.2          | 56.3       |
| Oct-18 | 1.0-100      | 47.8        | 30.9   | 38.7         | 10.5 | 53.3  | 62.6              | 31.9  | 1220         | 1330  | 263   | 26.3          | 31.4       |
| Apr-19 | 1.0-100      | 48.2        | 61.3   | 40.4         | 13   | 43.2  | 63                | 20.7  | 1,250        | 1,420 | 266   | 27            | 35.7       |
| Oct-19 | 1.0-10.0     | 38.9        | 40     | 41           | 14.8 | 49.9  | 69.8              | 29.1  | 1,240        | 1,370 | 268   | 37            | 30.7       |
| Apr-20 | 1.0-25.0     | 44          | 63.7   | 38.5         | 12.2 | 50    | 60.2              | 19.7  | 1320         | 1430  | 264   | 29.7          | 39.2       |
| Oct-20 | 1.0-10.0     | 40.7        | 27.8   | 39           | 13.7 | 57.3  | 69.8              | 23.5  | 1240         | 1410  | 275   | 16.9          | 25.3       |
| Apr-21 | 1.0-10.0     | 46.4        | 39.8   | 35.7         | 13.2 | 40.7  | 65.7              | 18.5  | 1370         | 1390  | 264   | 31.3          | 32         |
| Oct-21 | 1.0-10.0     | 38.4        | 26.9   | 38.5         | 8.35 | 60.6  | 71.9              | 19.7  | 1440         | 1600  | 270   | 33.1          | 34.9       |
| Apr-22 | 1.0-10.0     | 43.3        | 48.7   | 30.3         | 12.3 | 55.3  | 66.8              | 18.2  | 1340         | 1440  | 275   | 38            | 38.9       |
| Sep-22 | 1.0-10.0     | 35.1        | 24.6   | 33.2         | 11   | 57.7  | 70.3              | 17.9  | 1320         | 1450  | 261   | 29.5          | 37.4       |
| Apr-23 | 1.0-10.0     | 45.6        | 40     | 36.1         | 15.7 | 61.5  | 72.4              | 32.3  | 1330         | 1500  | 257   | 38.8          | 40         |
| Aug-23 | 1.0-10.0     | 37          | 23.3   | 33.9         | 9.62 | 55.8  | 70                | 14.9  | 1350         | 1500  | 254   | 69.2          | 30.6       |
|        |              |             |        |              |      |       |                   |       |              |       |       |               |            |
|        |              | Mean        | 40.846 |              |      |       | Mean              | 45.91 |              |       |       | Mean          | 36.08      |
|        |              | WT UCL      | 60.86  |              |      |       | UA UCL            | 91.95 |              |       |       | SW UCL        | 64.21      |

Notes:

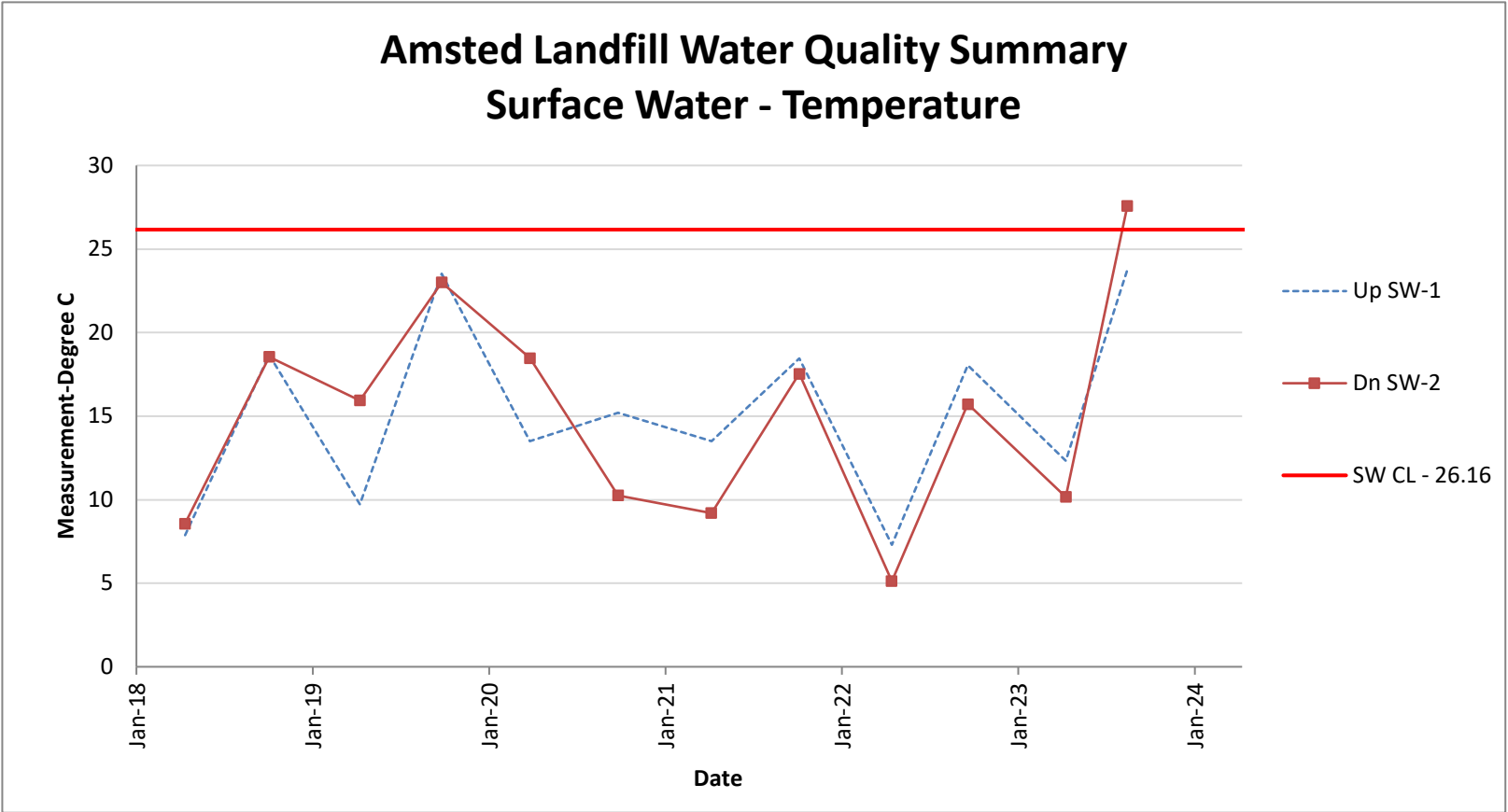
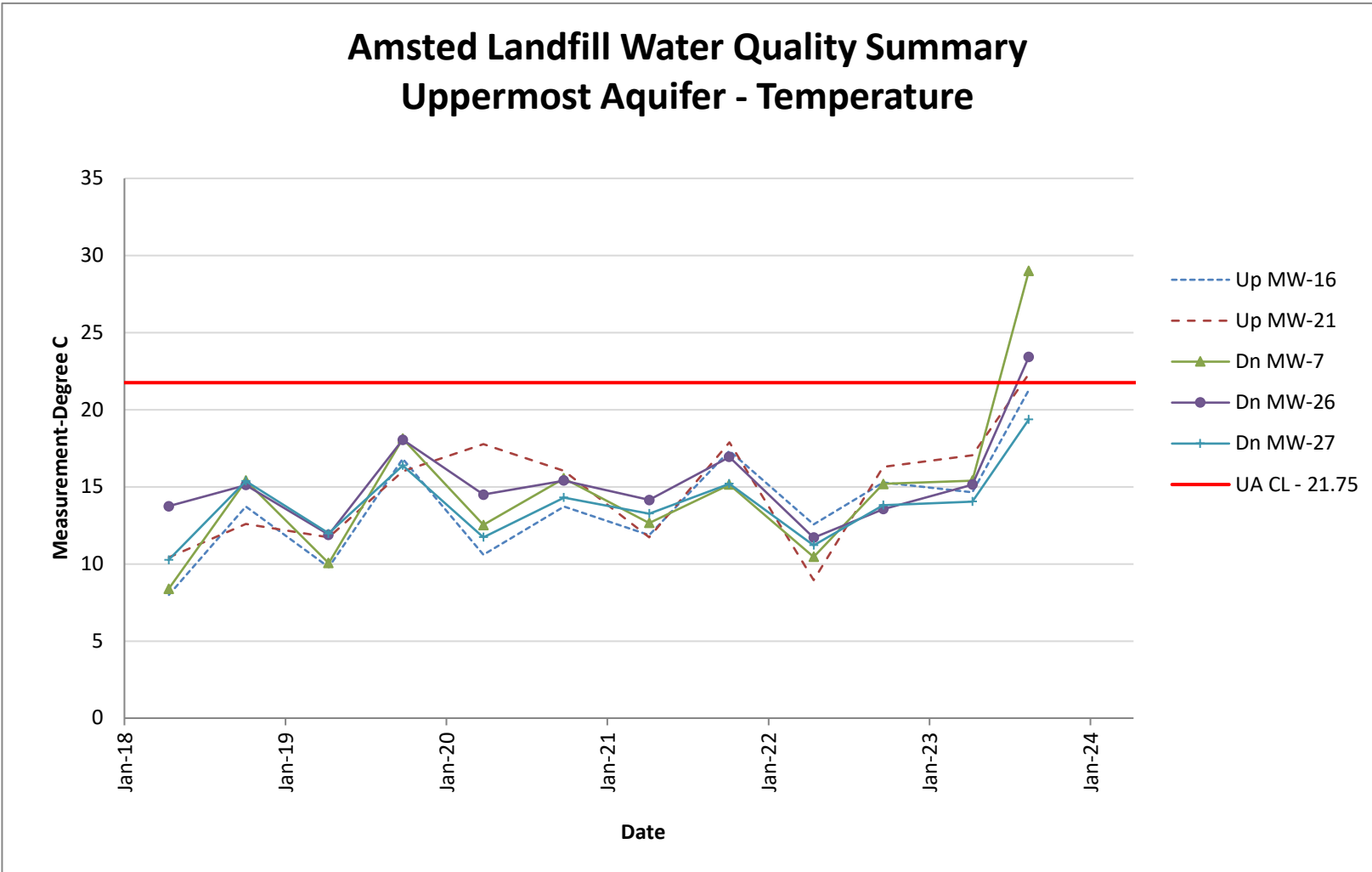
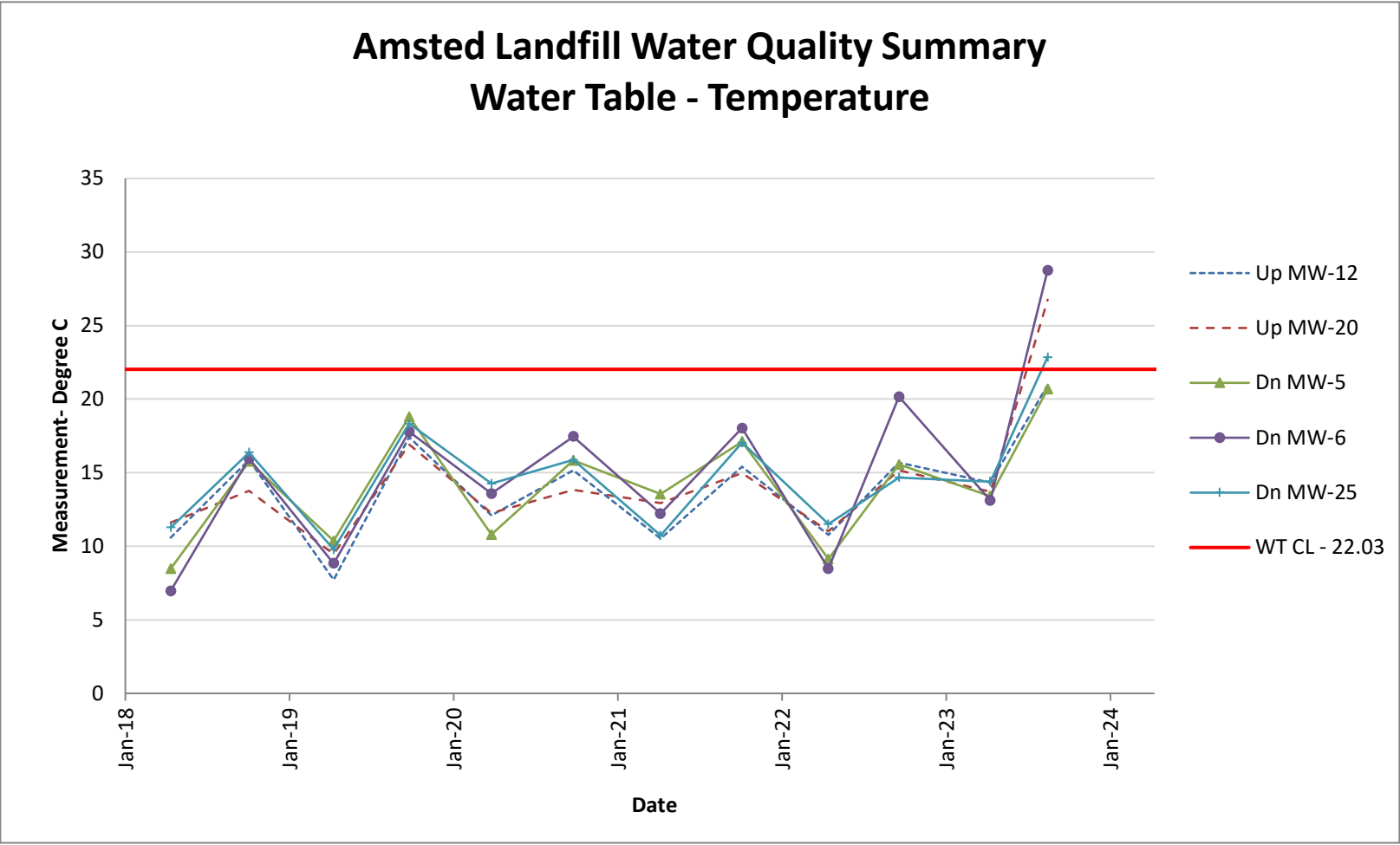
- CL = Control Limit
- NA = Not applicable.
- NS = Not sampled due to insufficient amount of water.
- SW = Surface Water
- UA = Uppemost Aquifer
- WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water





Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

## WATER QUALITY DATA - AMSTED FOUNDRY WASTE LANDFILL

### Total Organic Halogens (mg/L)

[illegible]

**Notes:**

CL = Control Limit

NA = Not applicable.

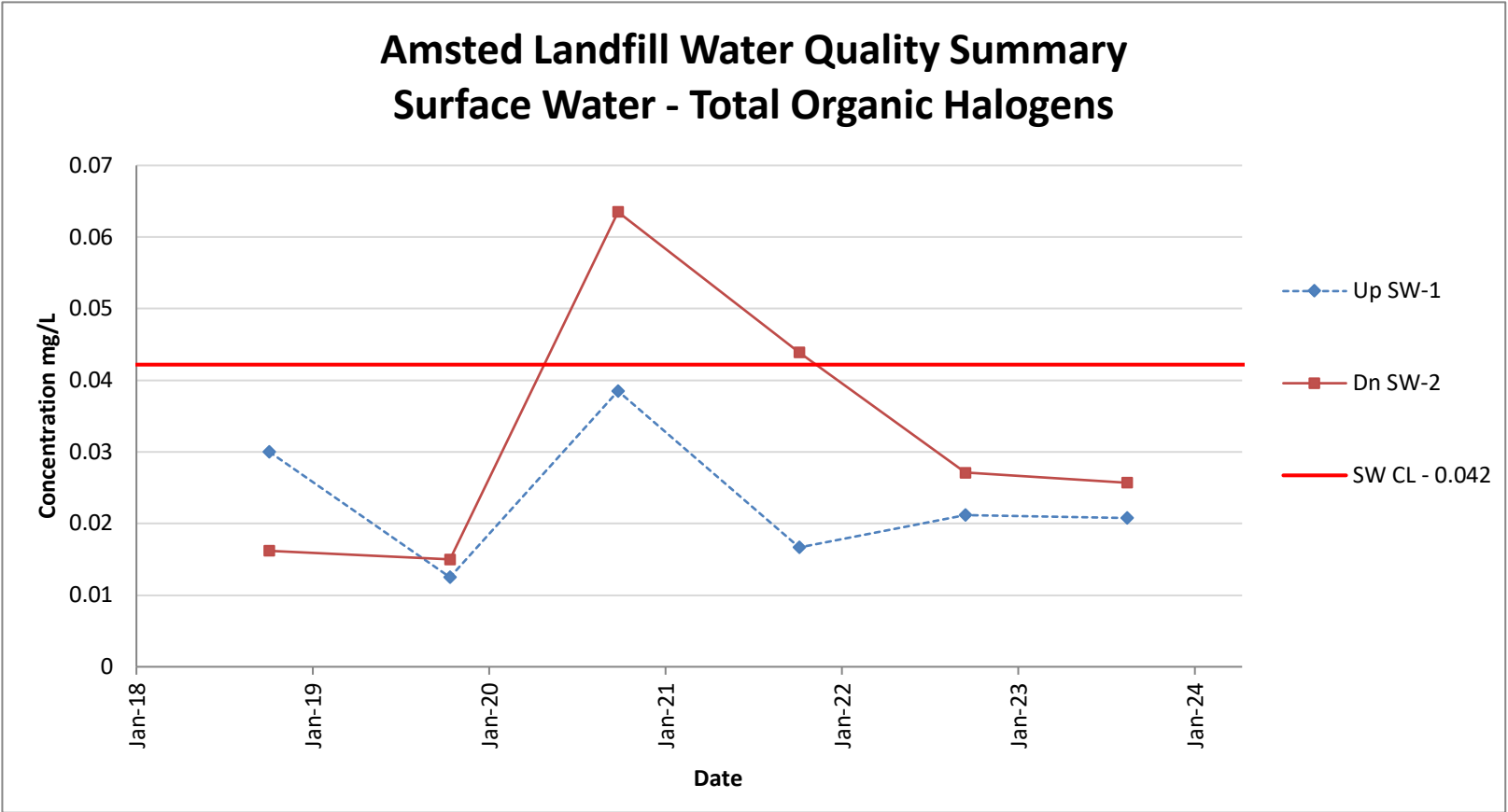
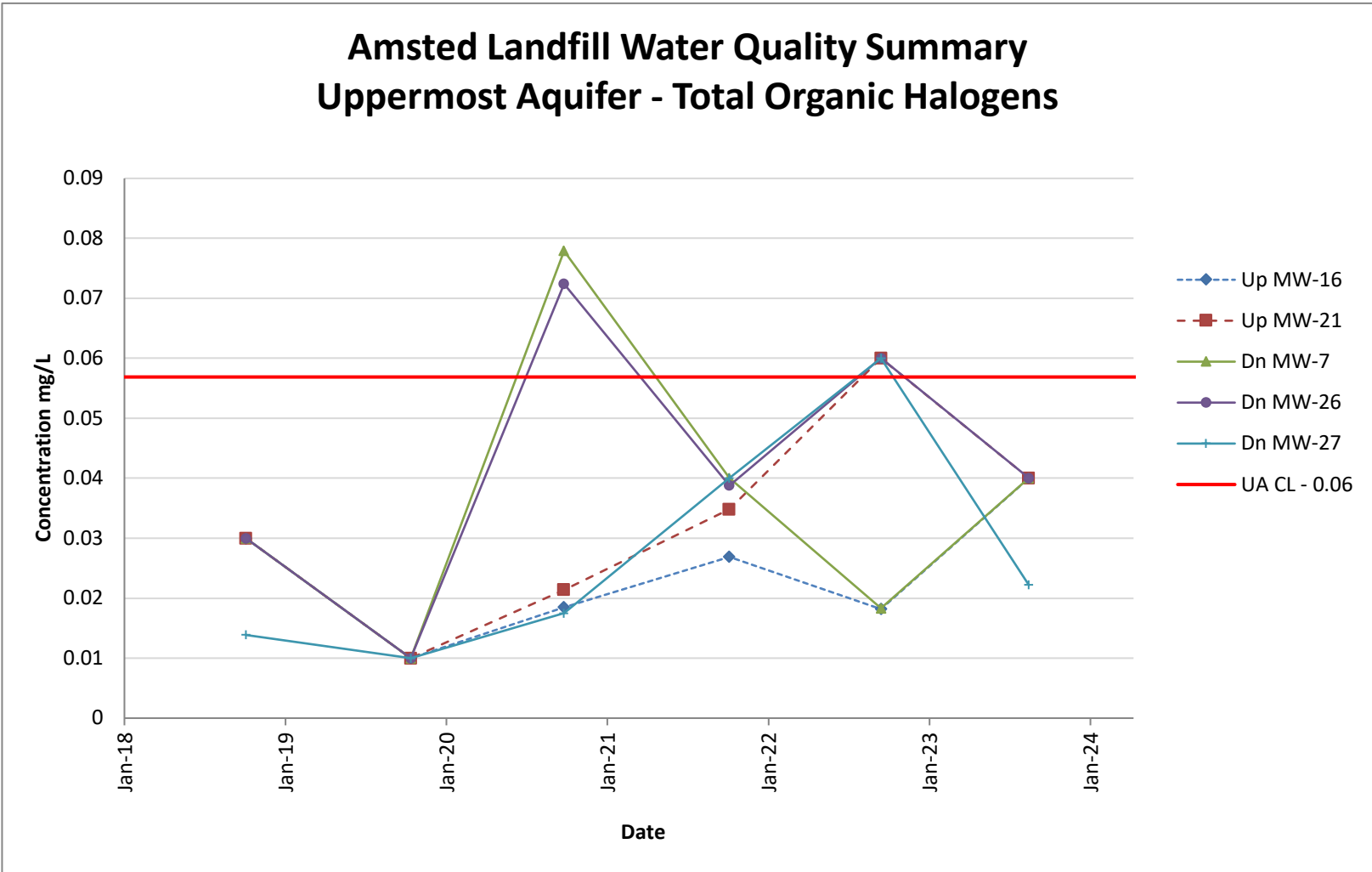
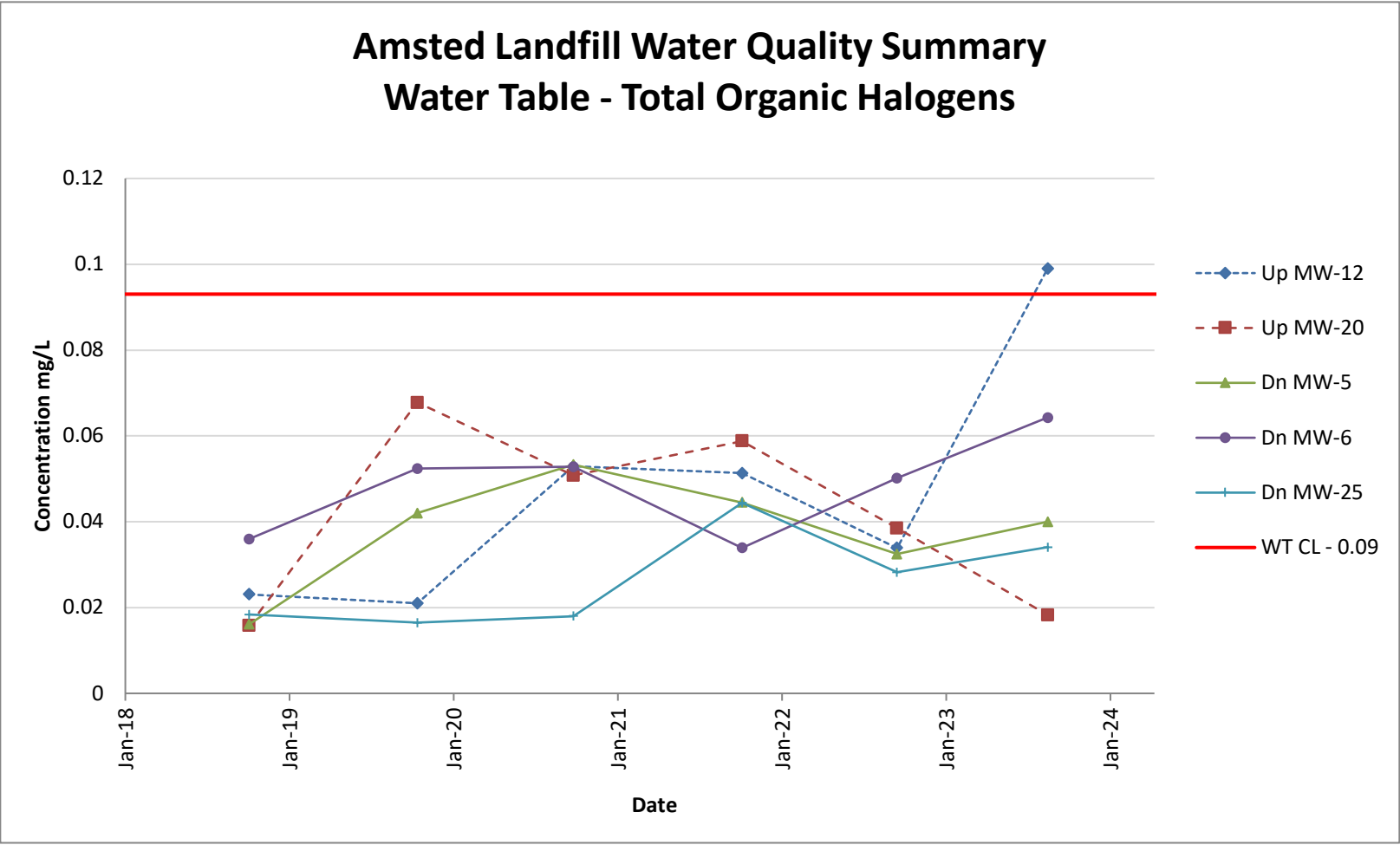
NS = Not sampled due to insufficient amount of water.

SW = Surface Water

UA = Uppemost Aquifer

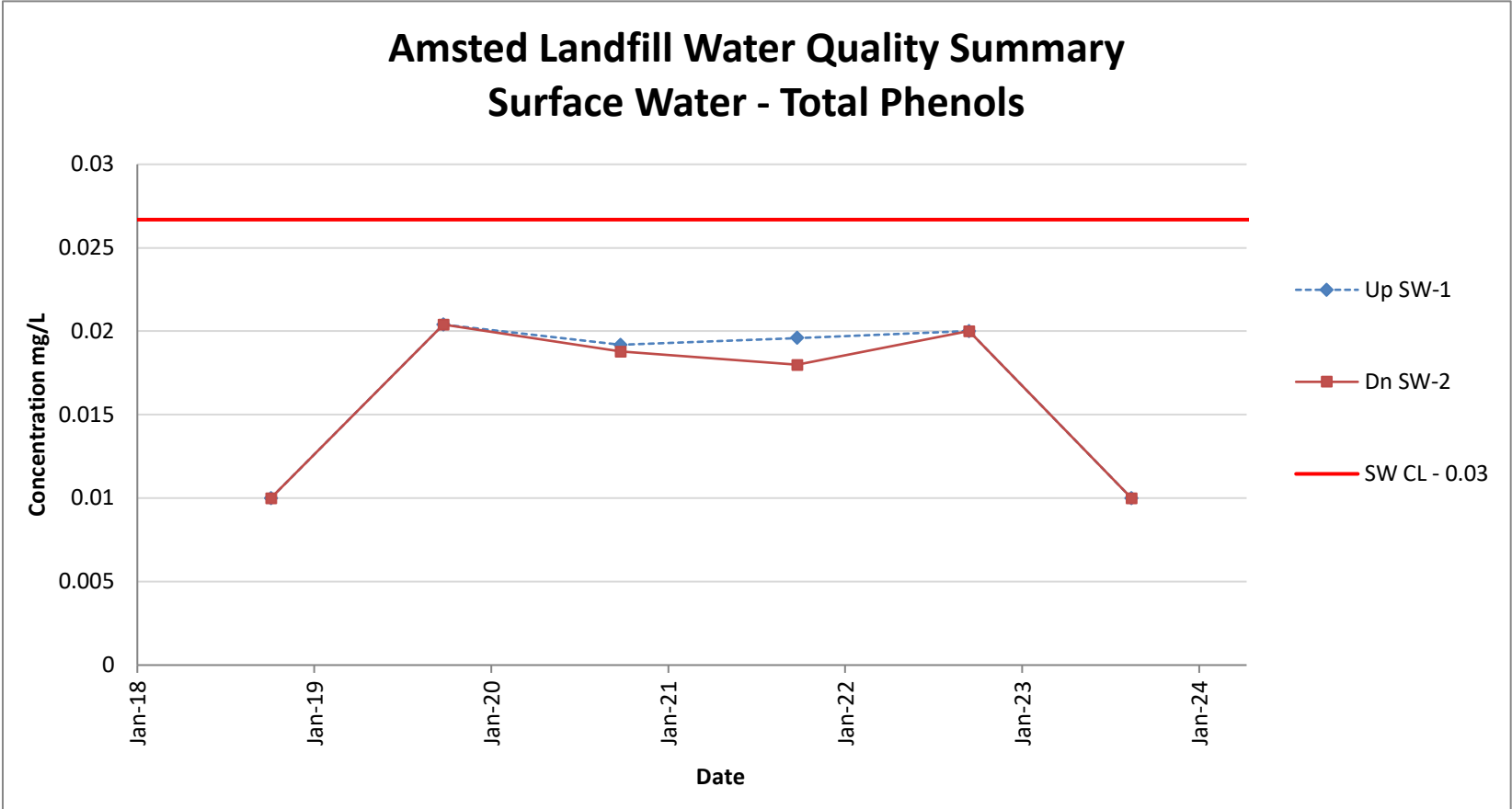
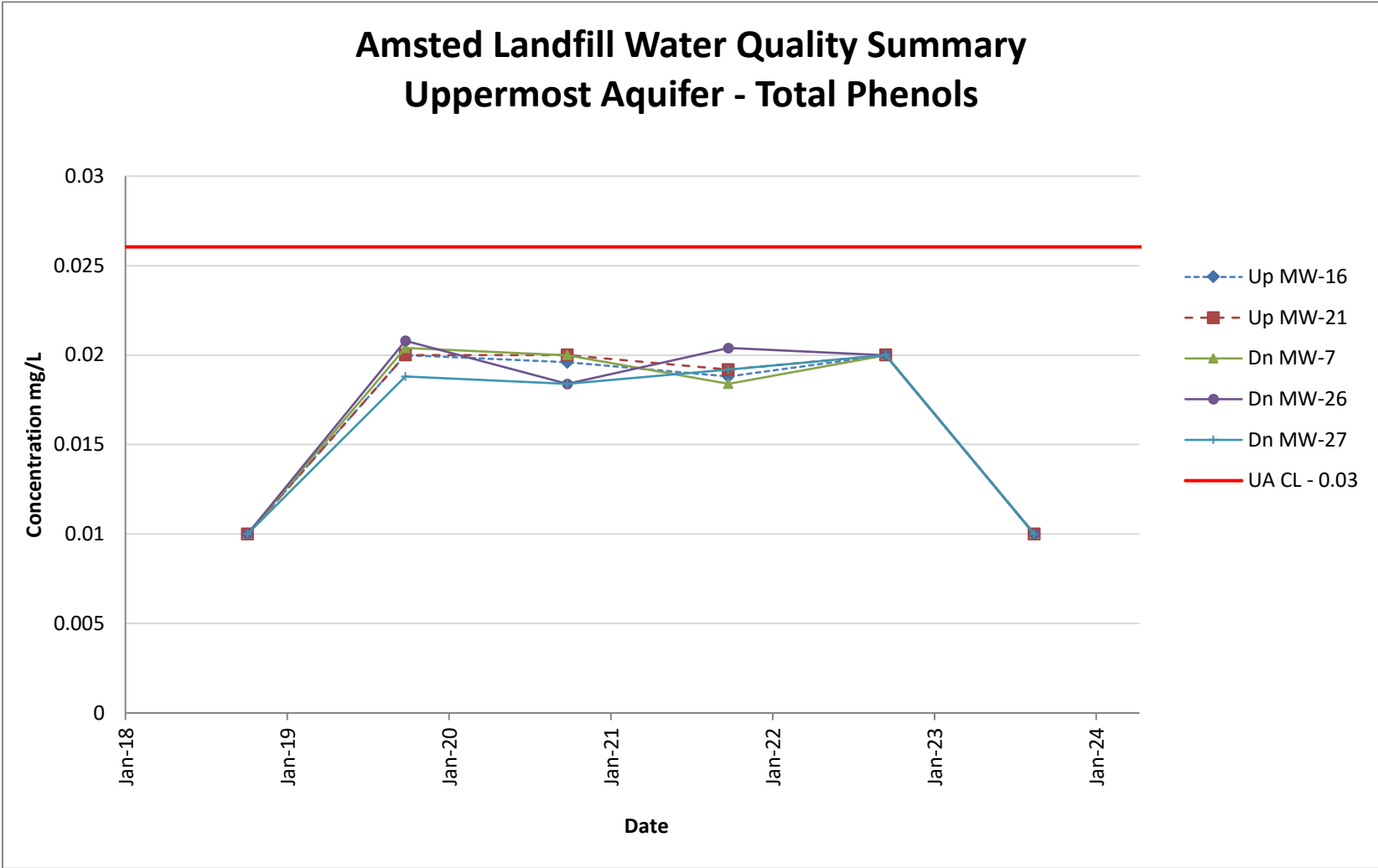
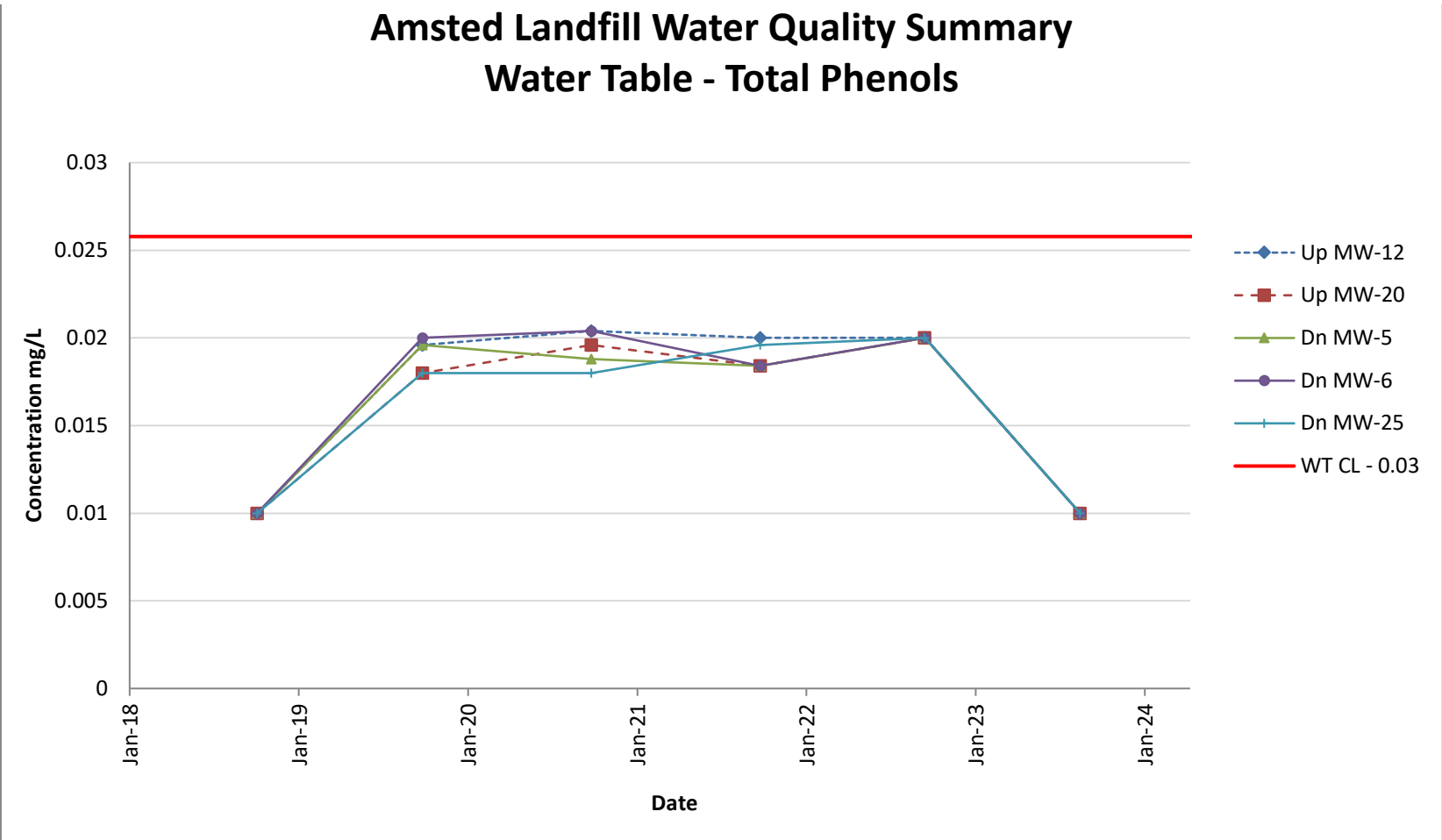
WT = Water Table

A **bolded** value indicates parameter present above method reporting limit.



**Notes:** Up = Upgradient, Dn = Downgradient, SW = Surface Water





Notes: Up = Upgradient, Dn = Downgradient, SW = Surface Water

## **APPENDIX E**

### **ChemStat Output**

## Concentrations (ppb)

Parameter: Iron, Dissolved

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 130

Total Non-Detect: 67

Percent Non-Detects: 51.5385%

Total Background Measurements: 0

There are 0 background locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

There are 12 compliance locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

|       |    |              |            |        |        |
|-------|----|--------------|------------|--------|--------|
| MW-05 | 11 | 9 (81.8182%) | 4/18/2018  | ND<25  | ND<25  |
|       |    |              | 10/10/2018 | ND<25  | ND<25  |
|       |    |              | 10/1/2019  | ND<100 | ND<100 |
|       |    |              | 4/9/2020   | ND<100 | ND<100 |
|       |    |              | 10/1/2020  | ND<100 | ND<100 |
|       |    |              | 4/14/2021  | ND<100 | ND<100 |
|       |    |              | 10/13/2021 | ND<100 | ND<100 |
|       |    |              | 4/20/2022  | 52     | 52     |
|       |    |              | 9/28/2022  | ND<100 | ND<100 |
|       |    |              | 4/19/2023  | ND<100 | ND<100 |
|       |    |              | 8/24/2023  | 104    | 104    |

|       |    |               |            |        |        |
|-------|----|---------------|------------|--------|--------|
| MW-06 | 11 | 10 (90.9091%) | 4/18/2018  | 18.6   | 18.6   |
|       |    |               | 10/10/2018 | ND<25  | ND<25  |
|       |    |               | 10/2/2019  | ND<100 | ND<100 |
|       |    |               | 4/8/2020   | ND<100 | ND<100 |
|       |    |               | 9/30/2020  | ND<100 | ND<100 |
|       |    |               | 4/13/2021  | ND<100 | ND<100 |
|       |    |               | 10/14/2021 | ND<100 | ND<100 |
|       |    |               | 4/20/2022  | ND<100 | ND<100 |
|       |    |               | 9/27/2022  | ND<100 | ND<100 |
|       |    |               | 4/18/2023  | ND<100 | ND<100 |
|       |    |               | 8/23/2023  | ND<100 | ND<100 |

|       |    |              |            |       |       |
|-------|----|--------------|------------|-------|-------|
| MW-07 | 11 | 1 (9.09091%) | 4/18/2018  | ND<25 | ND<25 |
|       |    |              | 10/10/2018 | 297   | 297   |
|       |    |              | 10/2/2019  | 204   | 204   |
|       |    |              | 4/8/2020   | 7930  | 7930  |
|       |    |              | 9/30/2020  | 801   | 801   |
|       |    |              | 4/13/2021  | 8800  | 8800  |
|       |    |              | 10/14/2021 | 9640  | 9640  |
|       |    |              | 4/20/2022  | 8680  | 8680  |
|       |    |              | 9/27/2022  | 9630  | 9630  |
|       |    |              | 4/18/2023  | 2420  | 2420  |
|       |    |              | 8/23/2023  | 2510  | 2510  |

|       |    |              |           |        |        |
|-------|----|--------------|-----------|--------|--------|
| MW-12 | 11 | 9 (81.8182%) | 4/17/2018 | 12.1   | 12.1   |
|       |    |              | 10/9/2018 | ND<25  | ND<25  |
|       |    |              | 10/2/2019 | ND<100 | ND<100 |
|       |    |              | 4/8/2020  | ND<100 | ND<100 |
|       |    |              | 10/1/2020 | ND<100 | ND<100 |

|       |    |              |            |        |        |
|-------|----|--------------|------------|--------|--------|
|       |    |              | 4/15/2021  | ND<100 | ND<100 |
|       |    |              | 10/14/2021 | 51     | 51     |
|       |    |              | 4/19/2022  | ND<100 | ND<100 |
|       |    |              | 9/28/2022  | ND<100 | ND<100 |
|       |    |              | 4/18/2023  | ND<100 | ND<100 |
|       |    |              | 8/24/2023  | ND<100 | ND<100 |
| MW-16 | 11 | 3 (27.2727%) | 4/17/2018  | ND<25  | ND<25  |
|       |    |              | 10/9/2018  | 45.4   | 45.4   |
|       |    |              | 10/2/2019  | ND<100 | ND<100 |
|       |    |              | 4/9/2020   | 159    | 159    |
|       |    |              | 10/1/2020  | ND<100 | ND<100 |
|       |    |              | 4/15/2021  | 137    | 137    |
|       |    |              | 10/14/2021 | 216    | 216    |
|       |    |              | 4/19/2022  | 175    | 175    |
|       |    |              | 9/28/2022  | 113    | 113    |
|       |    |              | 4/18/2023  | 819    | 819    |
|       |    |              | 8/24/2023  | 204    | 204    |
| MW-20 | 11 | 9 (81.8182%) | 4/17/2018  | 25.4   | 25.4   |
|       |    |              | 10/10/2018 | ND<25  | ND<25  |
|       |    |              | 10/2/2019  | ND<100 | ND<100 |
|       |    |              | 4/9/2020   | 70.5   | 70.5   |
|       |    |              | 10/2/2020  | ND<100 | ND<100 |
|       |    |              | 4/15/2021  | ND<100 | ND<100 |
|       |    |              | 10/12/2021 | ND<100 | ND<100 |
|       |    |              | 4/20/2022  | ND<100 | ND<100 |
|       |    |              | 9/28/2022  | ND<100 | ND<100 |
|       |    |              | 4/19/2023  | ND<100 | ND<100 |
|       |    |              | 8/23/2023  | ND<100 | ND<100 |
| MW-21 | 11 | 5 (45.4545%) | 4/17/2018  | ND<25  | ND<25  |
|       |    |              | 10/10/2018 | 35.6   | 35.6   |
|       |    |              | 10/1/2019  | ND<100 | ND<100 |
|       |    |              | 4/7/2020   | 186    | 186    |
|       |    |              | 9/30/2020  | ND<100 | ND<100 |
|       |    |              | 4/14/2021  | 219    | 219    |
|       |    |              | 10/12/2021 | 76.8   | 76.8   |
|       |    |              | 4/20/2022  | 246    | 246    |
|       |    |              | 9/29/2022  | ND<100 | ND<100 |
|       |    |              | 4/18/2023  | 79.2   | 79.2   |
|       |    |              | 8/23/2023  | ND<100 | ND<100 |
| MW-25 | 11 | 9 (81.8182%) | 4/17/2018  | 16.1   | 16.1   |
|       |    |              | 10/9/2018  | ND<25  | ND<25  |
|       |    |              | 10/1/2019  | ND<100 | ND<100 |
|       |    |              | 4/8/2020   | ND<100 | ND<100 |
|       |    |              | 10/1/2020  | ND<100 | ND<100 |
|       |    |              | 4/14/2021  | ND<100 | ND<100 |
|       |    |              | 10/13/2021 | ND<100 | ND<100 |
|       |    |              | 4/19/2022  | ND<100 | ND<100 |
|       |    |              | 9/29/2022  | ND<100 | ND<100 |
|       |    |              | 4/19/2023  | 71.1   | 71.1   |
|       |    |              | 8/24/2023  | ND<100 | ND<100 |
| MW-26 | 11 | 2 (18.1818%) | 4/17/2018  | 18.6   | 18.6   |
|       |    |              | 10/9/2018  | 500    | 500    |

|       |    |              |            |        |        |
|-------|----|--------------|------------|--------|--------|
|       |    |              | 10/1/2019  | ND<100 | ND<100 |
|       |    |              | 4/8/2020   | 1250   | 1250   |
|       |    |              | 10/1/2020  | ND<100 | ND<100 |
|       |    |              | 4/14/2021  | 1150   | 1150   |
|       |    |              | 10/13/2021 | 1580   | 1580   |
|       |    |              | 4/19/2022  | 1530   | 1530   |
|       |    |              | 9/29/2022  | 1860   | 1860   |
|       |    |              | 4/19/2023  | 1850   | 1850   |
|       |    |              | 8/24/2023  | 1940   | 1940   |
| <hr/> |    |              |            |        |        |
| MW-27 | 11 | 3 (27.2727%) | 4/18/2018  | ND<25  | ND<25  |
|       |    |              | 10/9/2018  | 377    | 377    |
|       |    |              | 10/1/2019  | ND<100 | ND<100 |
|       |    |              | 4/9/2020   | 2560   | 2560   |
|       |    |              | 10/1/2020  | ND<100 | ND<100 |
|       |    |              | 4/14/2021  | 2320   | 2320   |
|       |    |              | 10/13/2021 | 2200   | 2200   |
|       |    |              | 4/20/2022  | 2620   | 2620   |
|       |    |              | 9/28/2022  | 2560   | 2560   |
|       |    |              | 4/19/2023  | 3110   | 3110   |
|       |    |              | 8/24/2023  | 2340   | 2340   |
| <hr/> |    |              |            |        |        |
| SW-01 | 10 | 3 (30%)      | 4/16/2018  | 210    | 210    |
|       |    |              | 10/8/2018  | 379    | 379    |
|       |    |              | 4/13/2019  | 1350   | 1350   |
|       |    |              | 9/30/2019  | 298    | 298    |
|       |    |              | 4/7/2020   | 4060   | 4060   |
|       |    |              | 10/2/2020  | ND<100 | ND<100 |
|       |    |              | 4/13/2021  | ND<100 | ND<100 |
|       |    |              | 10/14/2021 | 1340   | 1340   |
|       |    |              | 4/19/2022  | ND<100 | ND<100 |
|       |    |              | 8/22/2023  | 276    | 276    |
| <hr/> |    |              |            |        |        |
| SW-02 | 10 | 4 (40%)      | 4/16/2018  | 31.9   | 31.9   |
|       |    |              | 10/8/2018  | 191    | 191    |
|       |    |              | 4/13/2019  | 1040   | 1040   |
|       |    |              | 9/30/2019  | ND<100 | ND<100 |
|       |    |              | 4/7/2020   | 1140   | 1140   |
|       |    |              | 10/2/2020  | 71.2   | 71.2   |
|       |    |              | 4/13/2021  | ND<100 | ND<100 |
|       |    |              | 10/14/2021 | 408    | 408    |
|       |    |              | 4/19/2022  | ND<100 | ND<100 |
|       |    |              | 8/22/2023  | ND<100 | ND<100 |

There are 0 unused locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

## Dixon's Test for Outliers

Parameter: Iron, Dissolved

Location: MW-07

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 11 Measurements...

5% Level of Significance

| Iteration | Highest   | Lowest    | Critical | Outlier |
|-----------|-----------|-----------|----------|---------|
| 1         | 0.0890208 | 0.0283186 | 0.576    | None    |

| Loc. | Date | Conc. | Outlier |
|------|------|-------|---------|
|------|------|-------|---------|

|       |            |       |       |
|-------|------------|-------|-------|
| MW-07 | 4/18/2018  | ND<25 | FALSE |
|       | 10/10/2018 | 297   | FALSE |
|       | 10/2/2019  | 204   | FALSE |
|       | 4/8/2020   | 7930  | FALSE |
|       | 9/30/2020  | 801   | FALSE |
|       | 4/13/2021  | 8800  | FALSE |
|       | 10/14/2021 | 9640  | FALSE |
|       | 4/20/2022  | 8680  | FALSE |
|       | 9/27/2022  | 9630  | FALSE |
|       | 4/18/2023  | 2420  | FALSE |
|       | 8/23/2023  | 2510  | FALSE |

## Shapiro-Wilks Test of Normality

Parameter: Iron, Dissolved

Location: MW-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 5 for 11 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 25   | 9640     | 9615          | 0.5601   | 5385.36 |
| 2  | 204  | 9630     | 9426          | 0.3315   | 3124.72 |
| 3  | 297  | 8800     | 8503          | 0.226    | 1921.68 |
| 4  | 801  | 8680     | 7879          | 0.1429   | 1125.91 |
| 5  | 2420 | 7930     | 5510          | 0.0695   | 382.945 |
| 6  | 2510 | 2510     | 0             |          |         |
| 7  | 7930 | 2420     | -5510         |          |         |
| 8  | 8680 | 801      | -7879         |          |         |
| 9  | 8800 | 297      | -8503         |          |         |
| 10 | 9630 | 204      | -9426         |          |         |
| 11 | 9640 | 25       | -9615         |          |         |

---

Sum of b values = 11940.6

Sample Standard Deviation = 4223.64

W Statistic = 0.799243

**5% Critical value of 0.85 exceeds 0.799243**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.792 is less than 0.799243

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Iron, Dissolved**  
**Location: MW-07**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 297       | ND<25     | 272            | 1                | 0                |
| 204       | ND<25     | 179            | 2                | 0                |
| 7930      | ND<25     | 7905           | 3                | 0                |
| 801       | ND<25     | 776            | 4                | 0                |
| 8800      | ND<25     | 8775           | 5                | 0                |
| 9640      | ND<25     | 9615           | 6                | 0                |
| 8680      | ND<25     | 8655           | 7                | 0                |
| 9630      | ND<25     | 9605           | 8                | 0                |
| 2420      | ND<25     | 2395           | 9                | 0                |
| 2510      | ND<25     | 2485           | 10               | 0                |
|           |           |                |                  |                  |
| 204       | 297       | -93            | 10               | 1                |
| 7930      | 297       | 7633           | 11               | 1                |
| 801       | 297       | 504            | 12               | 1                |
| 8800      | 297       | 8503           | 13               | 1                |
| 9640      | 297       | 9343           | 14               | 1                |
| 8680      | 297       | 8383           | 15               | 1                |
| 9630      | 297       | 9333           | 16               | 1                |
| 2420      | 297       | 2123           | 17               | 1                |
| 2510      | 297       | 2213           | 18               | 1                |
|           |           |                |                  |                  |
| 7930      | 204       | 7726           | 19               | 1                |
| 801       | 204       | 597            | 20               | 1                |
| 8800      | 204       | 8596           | 21               | 1                |
| 9640      | 204       | 9436           | 22               | 1                |
| 8680      | 204       | 8476           | 23               | 1                |
| 9630      | 204       | 9426           | 24               | 1                |
| 2420      | 204       | 2216           | 25               | 1                |
| 2510      | 204       | 2306           | 26               | 1                |
|           |           |                |                  |                  |
| 801       | 7930      | -7129          | 26               | 2                |
| 8800      | 7930      | 870            | 27               | 2                |
| 9640      | 7930      | 1710           | 28               | 2                |
| 8680      | 7930      | 750            | 29               | 2                |
| 9630      | 7930      | 1700           | 30               | 2                |
| 2420      | 7930      | -5510          | 30               | 3                |
| 2510      | 7930      | -5420          | 30               | 4                |
|           |           |                |                  |                  |
| 8800      | 801       | 7999           | 31               | 4                |
| 9640      | 801       | 8839           | 32               | 4                |
| 8680      | 801       | 7879           | 33               | 4                |
| 9630      | 801       | 8829           | 34               | 4                |
| 2420      | 801       | 1619           | 35               | 4                |
| 2510      | 801       | 1709           | 36               | 4                |
|           |           |                |                  |                  |
| 9640      | 8800      | 840            | 37               | 4                |
| 8680      | 8800      | -120           | 37               | 5                |

|      |      |       |    |    |
|------|------|-------|----|----|
| 9630 | 8800 | 830   | 38 | 5  |
| 2420 | 8800 | -6380 | 38 | 6  |
| 2510 | 8800 | -6290 | 38 | 7  |
| 8680 | 9640 | -960  | 38 | 8  |
| 9630 | 9640 | -10   | 38 | 9  |
| 2420 | 9640 | -7220 | 38 | 10 |
| 2510 | 9640 | -7130 | 38 | 11 |
| 9630 | 8680 | 950   | 39 | 11 |
| 2420 | 8680 | -6260 | 39 | 12 |
| 2510 | 8680 | -6170 | 39 | 13 |
| 2420 | 9630 | -7210 | 39 | 14 |
| 2510 | 9630 | -7120 | 39 | 15 |
| 2510 | 2420 | 90    | 40 | 15 |

S Statistic = 40 - 15 = 25

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/18/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 10/2/2019                                   | 1            |         |
| 4/8/2020                                    | 1            |         |
| 9/30/2020                                   | 1            |         |
| 4/13/2021                                   | 1            |         |
| 10/14/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/27/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 2970

b = 8910

c = 220

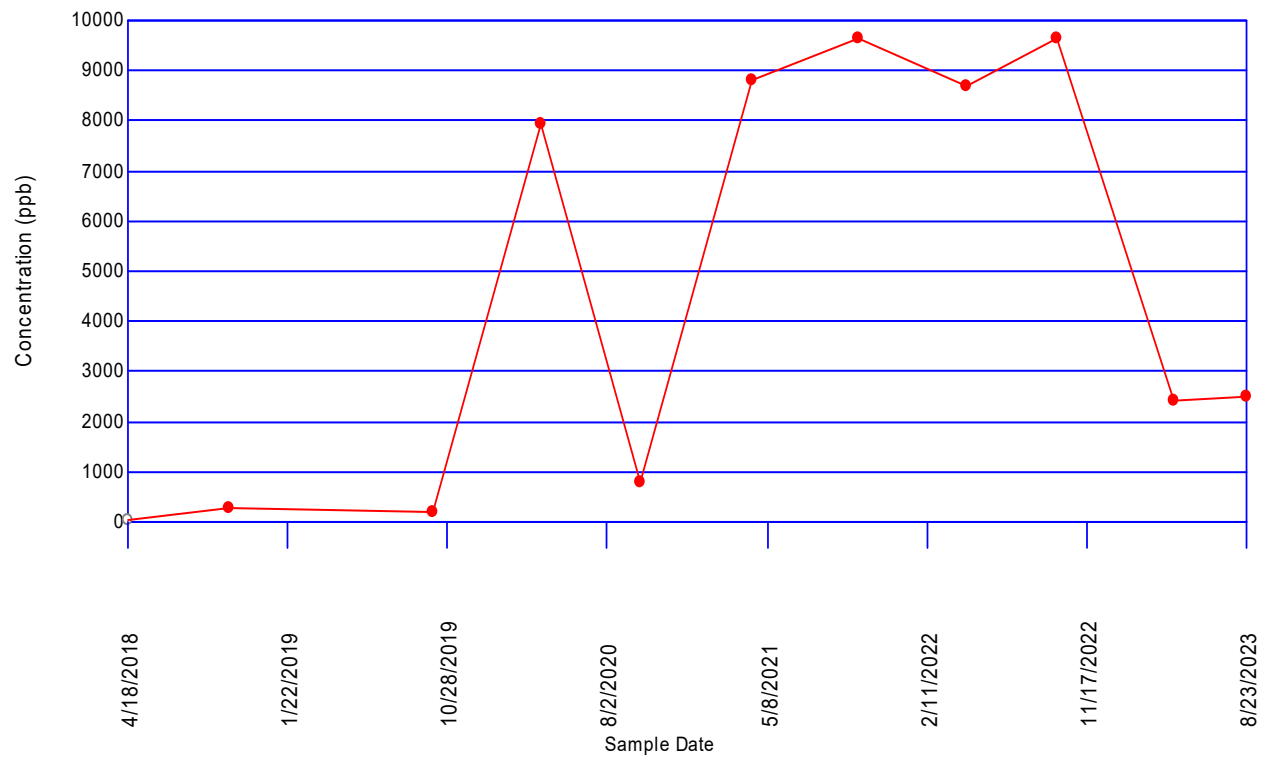
Group Variance = 165

Z-Score = 1.8684

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|1.8684| <= 1.97737 indicating no evidence of a trend

**Iron, Dissolved**  
**Time-Series Graph of MW-07**



## Dixon's Test for Outliers

Parameter: Iron, Dissolved

Location: MW-16

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 11 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.794984 | 0.39267  | 0.576    | 819     |
| 2         | 0.07034  | 0.113966 | 0.477    | None    |

| Loc.  | Date       | Conc.  | Outlier |
|-------|------------|--------|---------|
| MW-16 | 4/17/2018  | ND<25  | FALSE   |
|       | 10/9/2018  | 45.4   | FALSE   |
|       | 10/2/2019  | ND<100 | FALSE   |
|       | 4/9/2020   | 159    | FALSE   |
|       | 10/1/2020  | ND<100 | FALSE   |
|       | 4/15/2021  | 137    | FALSE   |
|       | 10/14/2021 | 216    | FALSE   |
|       | 4/19/2022  | 175    | FALSE   |
|       | 9/28/2022  | 113    | FALSE   |
|       | 4/18/2023  | 819    | TRUE    |
|       | 8/24/2023  | 204    | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Iron, Dissolved

Location: MW-16

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 5 for 11 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 25   | 819      | 794           | 0.5601   | 444.719 |
| 2  | 45.4 | 216      | 170.6         | 0.3315   | 56.5539 |
| 3  | 100  | 204      | 104           | 0.226    | 23.504  |
| 4  | 100  | 175      | 75            | 0.1429   | 10.7175 |
| 5  | 113  | 159      | 46            | 0.0695   | 3.197   |
| 6  | 137  | 137      | 0             |          |         |
| 7  | 159  | 113      | -46           |          |         |
| 8  | 175  | 100      | -75           |          |         |
| 9  | 204  | 100      | -104          |          |         |
| 10 | 216  | 45.4     | -170.6        |          |         |
| 11 | 819  | 25       | -794          |          |         |

---

Sum of b values = 538.692

Sample Standard Deviation = 216.972

W Statistic = 0.616413

**5% Critical value of 0.85 exceeds 0.616413**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.792 exceeds 0.616413**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Iron, Dissolved**  
**Location: MW-16**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 45.4      | ND<25     | 20.4           | 1                | 0                |
| ND<100    | ND<25     | 75             | 2                | 0                |
| 159       | ND<25     | 134            | 3                | 0                |
| ND<100    | ND<25     | 75             | 4                | 0                |
| 137       | ND<25     | 112            | 5                | 0                |
| 216       | ND<25     | 191            | 6                | 0                |
| 175       | ND<25     | 150            | 7                | 0                |
| 113       | ND<25     | 88             | 8                | 0                |
| 819       | ND<25     | 794            | 9                | 0                |
| 204       | ND<25     | 179            | 10               | 0                |
|           |           |                |                  |                  |
| ND<100    | 45.4      | 54.6           | 11               | 0                |
| 159       | 45.4      | 113.6          | 12               | 0                |
| ND<100    | 45.4      | 54.6           | 13               | 0                |
| 137       | 45.4      | 91.6           | 14               | 0                |
| 216       | 45.4      | 170.6          | 15               | 0                |
| 175       | 45.4      | 129.6          | 16               | 0                |
| 113       | 45.4      | 67.6           | 17               | 0                |
| 819       | 45.4      | 773.6          | 18               | 0                |
| 204       | 45.4      | 158.6          | 19               | 0                |
|           |           |                |                  |                  |
| 159       | ND<100    | 59             | 20               | 0                |
| ND<100    | ND<100    | 0              | 20               | 0                |
| 137       | ND<100    | 37             | 21               | 0                |
| 216       | ND<100    | 116            | 22               | 0                |
| 175       | ND<100    | 75             | 23               | 0                |
| 113       | ND<100    | 13             | 24               | 0                |
| 819       | ND<100    | 719            | 25               | 0                |
| 204       | ND<100    | 104            | 26               | 0                |
|           |           |                |                  |                  |
| ND<100    | 159       | -59            | 26               | 1                |
| 137       | 159       | -22            | 26               | 2                |
| 216       | 159       | 57             | 27               | 2                |
| 175       | 159       | 16             | 28               | 2                |
| 113       | 159       | -46            | 28               | 3                |
| 819       | 159       | 660            | 29               | 3                |
| 204       | 159       | 45             | 30               | 3                |
|           |           |                |                  |                  |
| 137       | ND<100    | 37             | 31               | 3                |
| 216       | ND<100    | 116            | 32               | 3                |
| 175       | ND<100    | 75             | 33               | 3                |
| 113       | ND<100    | 13             | 34               | 3                |
| 819       | ND<100    | 719            | 35               | 3                |
| 204       | ND<100    | 104            | 36               | 3                |
|           |           |                |                  |                  |
| 216       | 137       | 79             | 37               | 3                |
| 175       | 137       | 38             | 38               | 3                |

|     |     |      |    |   |
|-----|-----|------|----|---|
| 113 | 137 | -24  | 38 | 4 |
| 819 | 137 | 682  | 39 | 4 |
| 204 | 137 | 67   | 40 | 4 |
| 175 | 216 | -41  | 40 | 5 |
| 113 | 216 | -103 | 40 | 6 |
| 819 | 216 | 603  | 41 | 6 |
| 204 | 216 | -12  | 41 | 7 |
| 113 | 175 | -62  | 41 | 8 |
| 819 | 175 | 644  | 42 | 8 |
| 204 | 175 | 29   | 43 | 8 |
| 819 | 113 | 706  | 44 | 8 |
| 204 | 113 | 91   | 45 | 8 |
| 204 | 819 | -615 | 45 | 9 |

S Statistic = 45 - 9 = 36

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 100   | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 10/2/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/15/2021   | 1            |
| 10/14/2021  | 1            |
| 4/19/2022   | 1            |
| 9/28/2022   | 1            |
| 4/18/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 2970

b = 8910

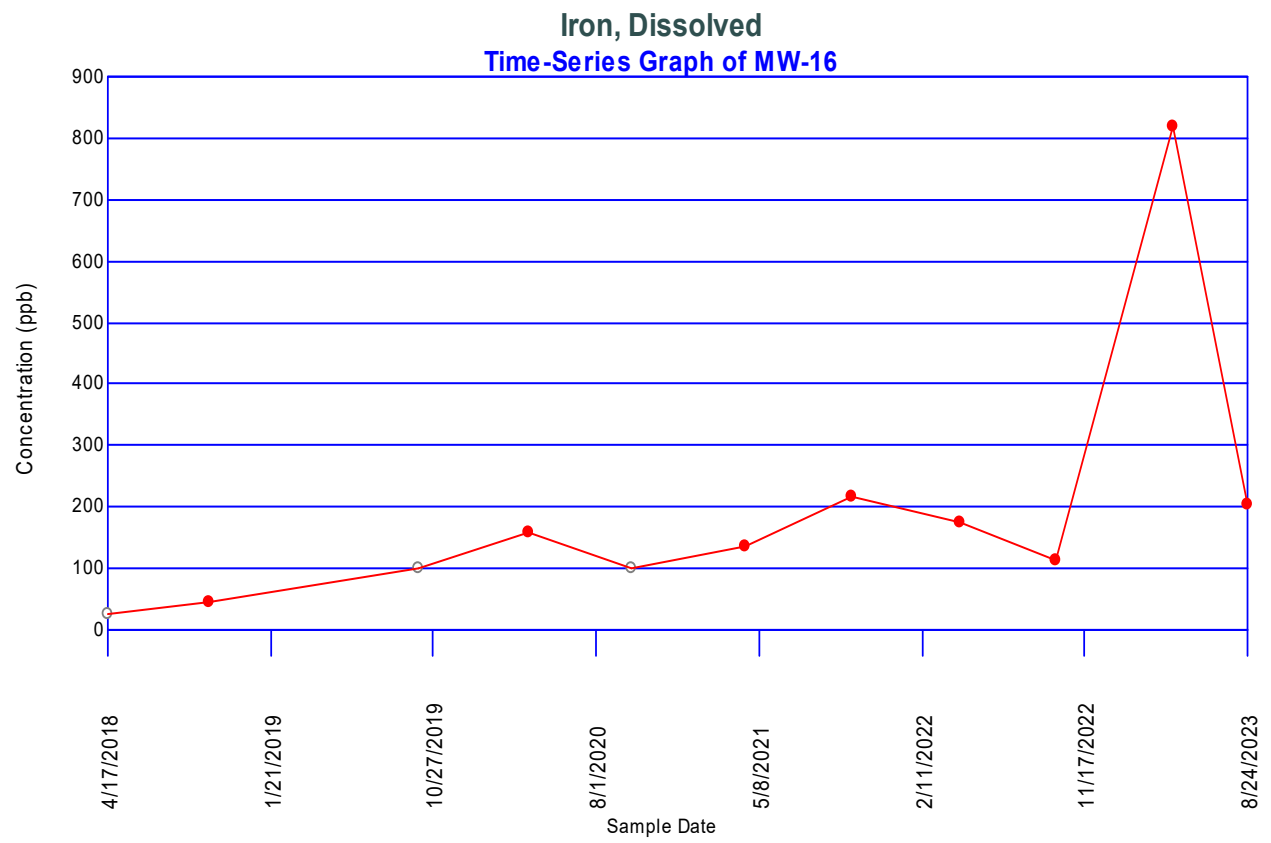
c = 220

Group Variance = 164

Z-Score = 2.73304

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**|2.73304| > 1.97737 indicating a trend**



## Dixon's Test for Outliers

Parameter: Iron, Dissolved

Location: MW-26

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 11 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest    | Critical | Outlier |
|-----------|----------|-----------|----------|---------|
| 1         | 0.048913 | 0.0442055 | 0.576    | None    |

| Loc.  | Date       | Conc.  | Outlier |
|-------|------------|--------|---------|
| MW-26 | 4/17/2018  | 18.6   | FALSE   |
|       | 10/9/2018  | 500    | FALSE   |
|       | 10/1/2019  | ND<100 | FALSE   |
|       | 4/8/2020   | 1250   | FALSE   |
|       | 10/1/2020  | ND<100 | FALSE   |
|       | 4/14/2021  | 1150   | FALSE   |
|       | 10/13/2021 | 1580   | FALSE   |
|       | 4/19/2022  | 1530   | FALSE   |
|       | 9/29/2022  | 1860   | FALSE   |
|       | 4/19/2023  | 1850   | FALSE   |
|       | 8/24/2023  | 1940   | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Iron, Dissolved

Location: MW-26

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 5 for 11 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 18.6 | 1940     | 1921.4        | 0.5601   | 1076.18 |
| 2  | 100  | 1860     | 1760          | 0.3315   | 583.44  |
| 3  | 100  | 1850     | 1750          | 0.226    | 395.5   |
| 4  | 500  | 1580     | 1080          | 0.1429   | 154.332 |
| 5  | 1150 | 1530     | 380           | 0.0695   | 26.41   |
| 6  | 1250 | 1250     | 0             |          |         |
| 7  | 1530 | 1150     | -380          |          |         |
| 8  | 1580 | 500      | -1080         |          |         |
| 9  | 1850 | 100      | -1750         |          |         |
| 10 | 1860 | 100      | -1760         |          |         |
| 11 | 1940 | 18.6     | -1921.4       |          |         |

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Sum of b values = 2235.86

Sample Standard Deviation = 762.297

W Statistic = 0.86028

5% Critical value of 0.85 is less than 0.86028

Data is normally distributed at 95% level of significance

1% Critical value of 0.792 is less than 0.86028

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Iron, Dissolved**  
**Location: MW-26**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 500       | 18.6      | 481.4          | 1                | 0                |
| ND<100    | 18.6      | 81.4           | 2                | 0                |
| 1250      | 18.6      | 1231.4         | 3                | 0                |
| ND<100    | 18.6      | 81.4           | 4                | 0                |
| 1150      | 18.6      | 1131.4         | 5                | 0                |
| 1580      | 18.6      | 1561.4         | 6                | 0                |
| 1530      | 18.6      | 1511.4         | 7                | 0                |
| 1860      | 18.6      | 1841.4         | 8                | 0                |
| 1850      | 18.6      | 1831.4         | 9                | 0                |
| 1940      | 18.6      | 1921.4         | 10               | 0                |
|           |           |                |                  |                  |
| ND<100    | 500       | -400           | 10               | 1                |
| 1250      | 500       | 750            | 11               | 1                |
| ND<100    | 500       | -400           | 11               | 2                |
| 1150      | 500       | 650            | 12               | 2                |
| 1580      | 500       | 1080           | 13               | 2                |
| 1530      | 500       | 1030           | 14               | 2                |
| 1860      | 500       | 1360           | 15               | 2                |
| 1850      | 500       | 1350           | 16               | 2                |
| 1940      | 500       | 1440           | 17               | 2                |
|           |           |                |                  |                  |
| 1250      | ND<100    | 1150           | 18               | 2                |
| ND<100    | ND<100    | 0              | 18               | 2                |
| 1150      | ND<100    | 1050           | 19               | 2                |
| 1580      | ND<100    | 1480           | 20               | 2                |
| 1530      | ND<100    | 1430           | 21               | 2                |
| 1860      | ND<100    | 1760           | 22               | 2                |
| 1850      | ND<100    | 1750           | 23               | 2                |
| 1940      | ND<100    | 1840           | 24               | 2                |
|           |           |                |                  |                  |
| ND<100    | 1250      | -1150          | 24               | 3                |
| 1150      | 1250      | -100           | 24               | 4                |
| 1580      | 1250      | 330            | 25               | 4                |
| 1530      | 1250      | 280            | 26               | 4                |
| 1860      | 1250      | 610            | 27               | 4                |
| 1850      | 1250      | 600            | 28               | 4                |
| 1940      | 1250      | 690            | 29               | 4                |
|           |           |                |                  |                  |
| 1150      | ND<100    | 1050           | 30               | 4                |
| 1580      | ND<100    | 1480           | 31               | 4                |
| 1530      | ND<100    | 1430           | 32               | 4                |
| 1860      | ND<100    | 1760           | 33               | 4                |
| 1850      | ND<100    | 1750           | 34               | 4                |
| 1940      | ND<100    | 1840           | 35               | 4                |
|           |           |                |                  |                  |
| 1580      | 1150      | 430            | 36               | 4                |
| 1530      | 1150      | 380            | 37               | 4                |

|      |      |     |    |   |
|------|------|-----|----|---|
| 1860 | 1150 | 710 | 38 | 4 |
| 1850 | 1150 | 700 | 39 | 4 |
| 1940 | 1150 | 790 | 40 | 4 |
| 1530 | 1580 | -50 | 40 | 5 |
| 1860 | 1580 | 280 | 41 | 5 |
| 1850 | 1580 | 270 | 42 | 5 |
| 1940 | 1580 | 360 | 43 | 5 |
| 1860 | 1530 | 330 | 44 | 5 |
| 1850 | 1530 | 320 | 45 | 5 |
| 1940 | 1530 | 410 | 46 | 5 |
| 1850 | 1860 | -10 | 46 | 6 |
| 1940 | 1860 | 80  | 47 | 6 |
| 1940 | 1850 | 90  | 48 | 6 |

S Statistic = 48 - 6 = 42

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 100   | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 10/1/2019   | 1            |
| 4/8/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/19/2022   | 1            |
| 9/29/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 2970

b = 8910

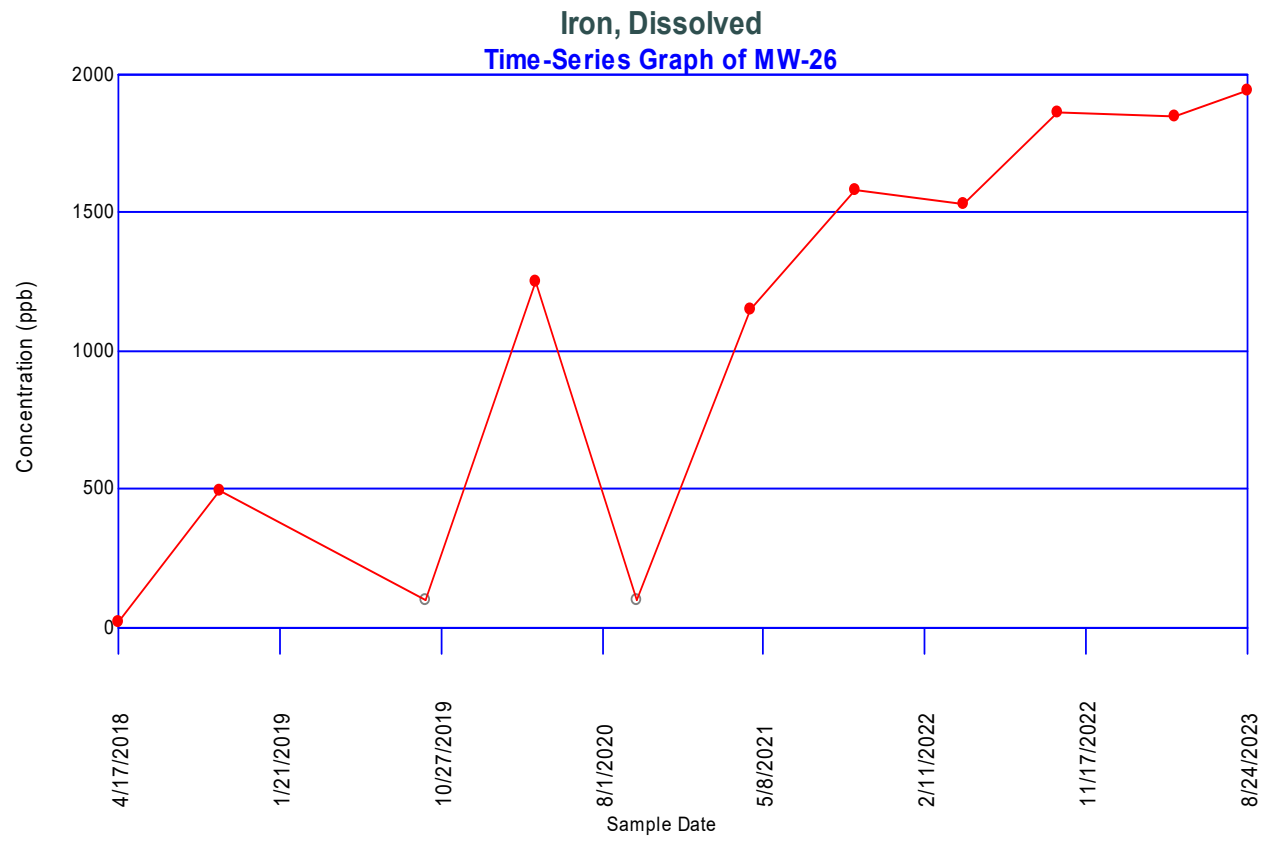
c = 220

Group Variance = 164

Z-Score = 3.20156

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**|3.20156| > 1.97737 indicating a trend**



## Dixon's Test for Outliers

Parameter: Iron, Dissolved

Location: MW-27

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 11 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest    | Critical | Outlier |
|-----------|----------|-----------|----------|---------|
| 1         | 0.182724 | 0.0289017 | 0.576    | None    |

| Loc. | Date | Conc. | Outlier |
|------|------|-------|---------|
|------|------|-------|---------|

|       |            |        |       |
|-------|------------|--------|-------|
| MW-27 | 4/18/2018  | ND<25  | FALSE |
|       | 10/9/2018  | 377    | FALSE |
|       | 10/1/2019  | ND<100 | FALSE |
|       | 4/9/2020   | 2560   | FALSE |
|       | 10/1/2020  | ND<100 | FALSE |
|       | 4/14/2021  | 2320   | FALSE |
|       | 10/13/2021 | 2200   | FALSE |
|       | 4/20/2022  | 2620   | FALSE |
|       | 9/28/2022  | 2560   | FALSE |
|       | 4/19/2023  | 3110   | FALSE |
|       | 8/24/2023  | 2340   | FALSE |

## Shapiro-Wilks Test of Normality

Parameter: Iron, Dissolved

Location: MW-27

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 5 for 11 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 25   | 3110     | 3085          | 0.5601   | 1727.91 |
| 2  | 100  | 2620     | 2520          | 0.3315   | 835.38  |
| 3  | 100  | 2560     | 2460          | 0.226    | 555.96  |
| 4  | 377  | 2560     | 2183          | 0.1429   | 311.951 |
| 5  | 2200 | 2340     | 140           | 0.0695   | 9.73    |
| 6  | 2320 | 2320     | 0             |          |         |
| 7  | 2340 | 2200     | -140          |          |         |
| 8  | 2560 | 377      | -2183         |          |         |
| 9  | 2560 | 100      | -2460         |          |         |
| 10 | 2620 | 100      | -2520         |          |         |
| 11 | 3110 | 25       | -3085         |          |         |

---

Sum of b values = 3440.93

Sample Standard Deviation = 1225.56

W Statistic = 0.788284

**5% Critical value of 0.85 exceeds 0.788284**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.792 exceeds 0.788284**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Iron, Dissolved**  
**Location: MW-27**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 377       | ND<25     | 352            | 1                | 0                |
| ND<100    | ND<25     | 75             | 2                | 0                |
| 2560      | ND<25     | 2535           | 3                | 0                |
| ND<100    | ND<25     | 75             | 4                | 0                |
| 2320      | ND<25     | 2295           | 5                | 0                |
| 2200      | ND<25     | 2175           | 6                | 0                |
| 2620      | ND<25     | 2595           | 7                | 0                |
| 2560      | ND<25     | 2535           | 8                | 0                |
| 3110      | ND<25     | 3085           | 9                | 0                |
| 2340      | ND<25     | 2315           | 10               | 0                |
| ND<100    | 377       | -277           | 10               | 1                |
| 2560      | 377       | 2183           | 11               | 1                |
| ND<100    | 377       | -277           | 11               | 2                |
| 2320      | 377       | 1943           | 12               | 2                |
| 2200      | 377       | 1823           | 13               | 2                |
| 2620      | 377       | 2243           | 14               | 2                |
| 2560      | 377       | 2183           | 15               | 2                |
| 3110      | 377       | 2733           | 16               | 2                |
| 2340      | 377       | 1963           | 17               | 2                |
| 2560      | ND<100    | 2460           | 18               | 2                |
| ND<100    | ND<100    | 0              | 18               | 2                |
| 2320      | ND<100    | 2220           | 19               | 2                |
| 2200      | ND<100    | 2100           | 20               | 2                |
| 2620      | ND<100    | 2520           | 21               | 2                |
| 2560      | ND<100    | 2460           | 22               | 2                |
| 3110      | ND<100    | 3010           | 23               | 2                |
| 2340      | ND<100    | 2240           | 24               | 2                |
| ND<100    | 2560      | -2460          | 24               | 3                |
| 2320      | 2560      | -240           | 24               | 4                |
| 2200      | 2560      | -360           | 24               | 5                |
| 2620      | 2560      | 60             | 25               | 5                |
| 2560      | 2560      | 0              | 25               | 5                |
| 3110      | 2560      | 550            | 26               | 5                |
| 2340      | 2560      | -220           | 26               | 6                |
| 2320      | ND<100    | 2220           | 27               | 6                |
| 2200      | ND<100    | 2100           | 28               | 6                |
| 2620      | ND<100    | 2520           | 29               | 6                |
| 2560      | ND<100    | 2460           | 30               | 6                |
| 3110      | ND<100    | 3010           | 31               | 6                |
| 2340      | ND<100    | 2240           | 32               | 6                |
| 2200      | 2320      | -120           | 32               | 7                |
| 2620      | 2320      | 300            | 33               | 7                |

|      |      |      |    |    |
|------|------|------|----|----|
| 2560 | 2320 | 240  | 34 | 7  |
| 3110 | 2320 | 790  | 35 | 7  |
| 2340 | 2320 | 20   | 36 | 7  |
| 2620 | 2200 | 420  | 37 | 7  |
| 2560 | 2200 | 360  | 38 | 7  |
| 3110 | 2200 | 910  | 39 | 7  |
| 2340 | 2200 | 140  | 40 | 7  |
| 2560 | 2620 | -60  | 40 | 8  |
| 3110 | 2620 | 490  | 41 | 8  |
| 2340 | 2620 | -280 | 41 | 9  |
| 3110 | 2560 | 550  | 42 | 9  |
| 2340 | 2560 | -220 | 42 | 10 |
| 2340 | 3110 | -770 | 42 | 11 |

S Statistic = 42 - 11 = 31

---

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 100   | 2       |
| 2          | 2560  | 2       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/9/2018   | 1            |
| 10/1/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/20/2022   | 1            |
| 9/28/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

---

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 2970

b = 8910

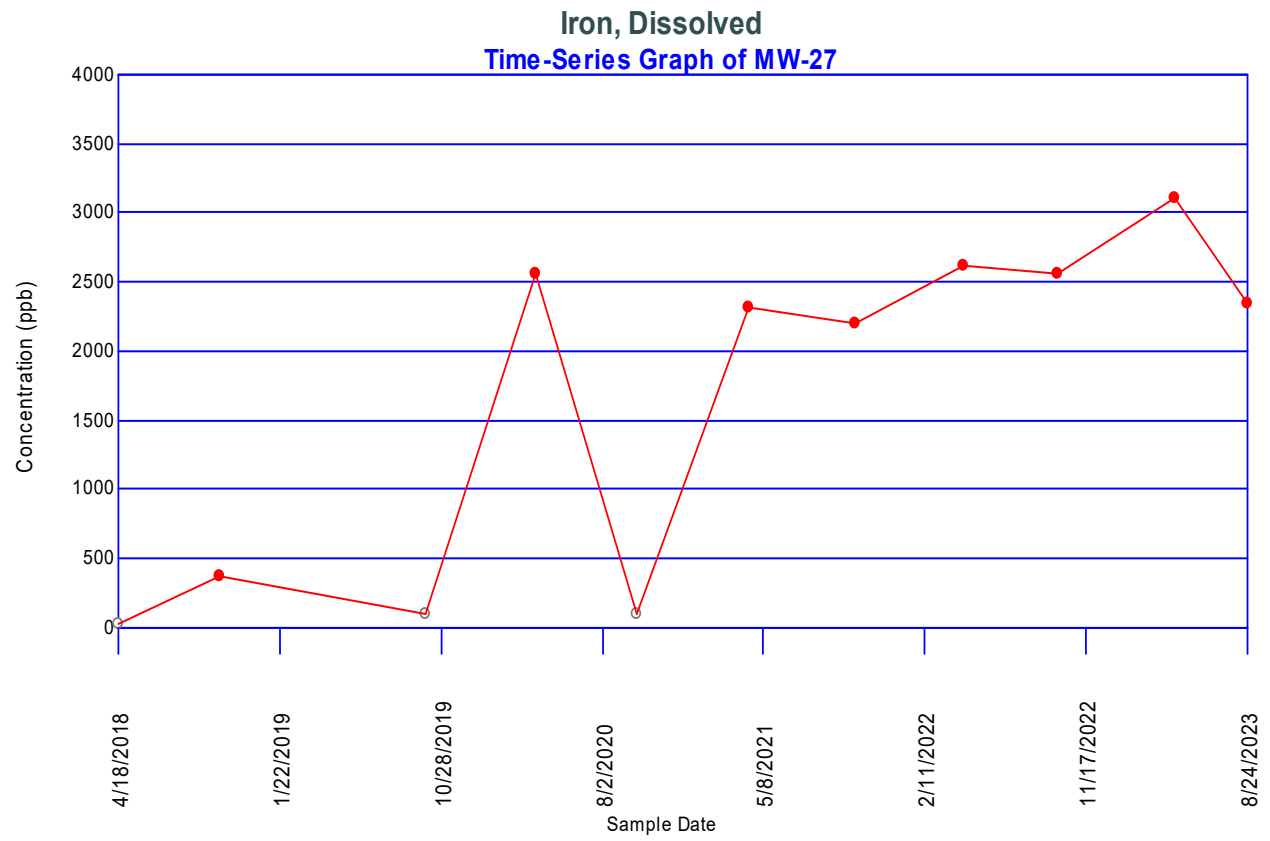
c = 220

Group Variance = 163

Z-Score = 2.34978

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

**|2.34978| > 1.97737 indicating a trend**



## Dixon's Test for Outliers

Parameter: Iron, Dissolved

Location: SW-01

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 10 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest | Critical | Outlier |
|-----------|----------|--------|----------|---------|
| 1         | 0.684343 | 0      | 0.477    | 4060    |
| 2         | 0.008    | 0      | 0.512    | None    |

| Loc.  | Date       | Conc.  | Outlier |
|-------|------------|--------|---------|
| SW-01 | 4/16/2018  | 210    | FALSE   |
|       | 10/8/2018  | 379    | FALSE   |
|       | 4/13/2019  | 1350   | FALSE   |
|       | 9/30/2019  | 298    | FALSE   |
|       | 4/7/2020   | 4060   | TRUE    |
|       | 10/2/2020  | ND<100 | FALSE   |
|       | 4/13/2021  | ND<100 | FALSE   |
|       | 10/14/2021 | 1340   | FALSE   |
|       | 4/19/2022  | ND<100 | FALSE   |
|       | 8/22/2023  | 276    | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Iron, Dissolved

Location: SW-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 5 for 10 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 100  | 4060     | 3960          | 0.5739   | 2272.64 |
| 2  | 100  | 1350     | 1250          | 0.3291   | 411.375 |
| 3  | 100  | 1340     | 1240          | 0.2141   | 265.484 |
| 4  | 210  | 379      | 169           | 0.1224   | 20.6856 |
| 5  | 276  | 298      | 22            | 0.0399   | 0.8778  |
| 6  | 298  | 276      | -22           |          |         |
| 7  | 379  | 210      | -169          |          |         |
| 8  | 1340 | 100      | -1240         |          |         |
| 9  | 1350 | 100      | -1250         |          |         |
| 10 | 4060 | 100      | -3960         |          |         |

---

Sum of b values = 2971.07

Sample Standard Deviation = 1235.54

W Statistic = 0.642491

**5% Critical value of 0.842 exceeds 0.642491**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.781 exceeds 0.642491**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Iron, Dissolved**  
**Location: SW-01**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 379       | 210       | 169            | 1                | 0                |
| 1350      | 210       | 1140           | 2                | 0                |
| 298       | 210       | 88             | 3                | 0                |
| 4060      | 210       | 3850           | 4                | 0                |
| ND<100    | 210       | -110           | 4                | 1                |
| ND<100    | 210       | -110           | 4                | 2                |
| 1340      | 210       | 1130           | 5                | 2                |
| ND<100    | 210       | -110           | 5                | 3                |
| 276       | 210       | 66             | 6                | 3                |
|           |           |                |                  |                  |
| 1350      | 379       | 971            | 7                | 3                |
| 298       | 379       | -81            | 7                | 4                |
| 4060      | 379       | 3681           | 8                | 4                |
| ND<100    | 379       | -279           | 8                | 5                |
| ND<100    | 379       | -279           | 8                | 6                |
| 1340      | 379       | 961            | 9                | 6                |
| ND<100    | 379       | -279           | 9                | 7                |
| 276       | 379       | -103           | 9                | 8                |
|           |           |                |                  |                  |
| 298       | 1350      | -1052          | 9                | 9                |
| 4060      | 1350      | 2710           | 10               | 9                |
| ND<100    | 1350      | -1250          | 10               | 10               |
| ND<100    | 1350      | -1250          | 10               | 11               |
| 1340      | 1350      | -10            | 10               | 12               |
| ND<100    | 1350      | -1250          | 10               | 13               |
| 276       | 1350      | -1074          | 10               | 14               |
|           |           |                |                  |                  |
| 4060      | 298       | 3762           | 11               | 14               |
| ND<100    | 298       | -198           | 11               | 15               |
| ND<100    | 298       | -198           | 11               | 16               |
| 1340      | 298       | 1042           | 12               | 16               |
| ND<100    | 298       | -198           | 12               | 17               |
| 276       | 298       | -22            | 12               | 18               |
|           |           |                |                  |                  |
| ND<100    | 4060      | -3960          | 12               | 19               |
| ND<100    | 4060      | -3960          | 12               | 20               |
| 1340      | 4060      | -2720          | 12               | 21               |
| ND<100    | 4060      | -3960          | 12               | 22               |
| 276       | 4060      | -3784          | 12               | 23               |
|           |           |                |                  |                  |
| ND<100    | ND<100    | 0              | 12               | 23               |
| 1340      | ND<100    | 1240           | 13               | 23               |
| ND<100    | ND<100    | 0              | 13               | 23               |
| 276       | ND<100    | 176            | 14               | 23               |
|           |           |                |                  |                  |
| 1340      | ND<100    | 1240           | 15               | 23               |
| ND<100    | ND<100    | 0              | 15               | 23               |

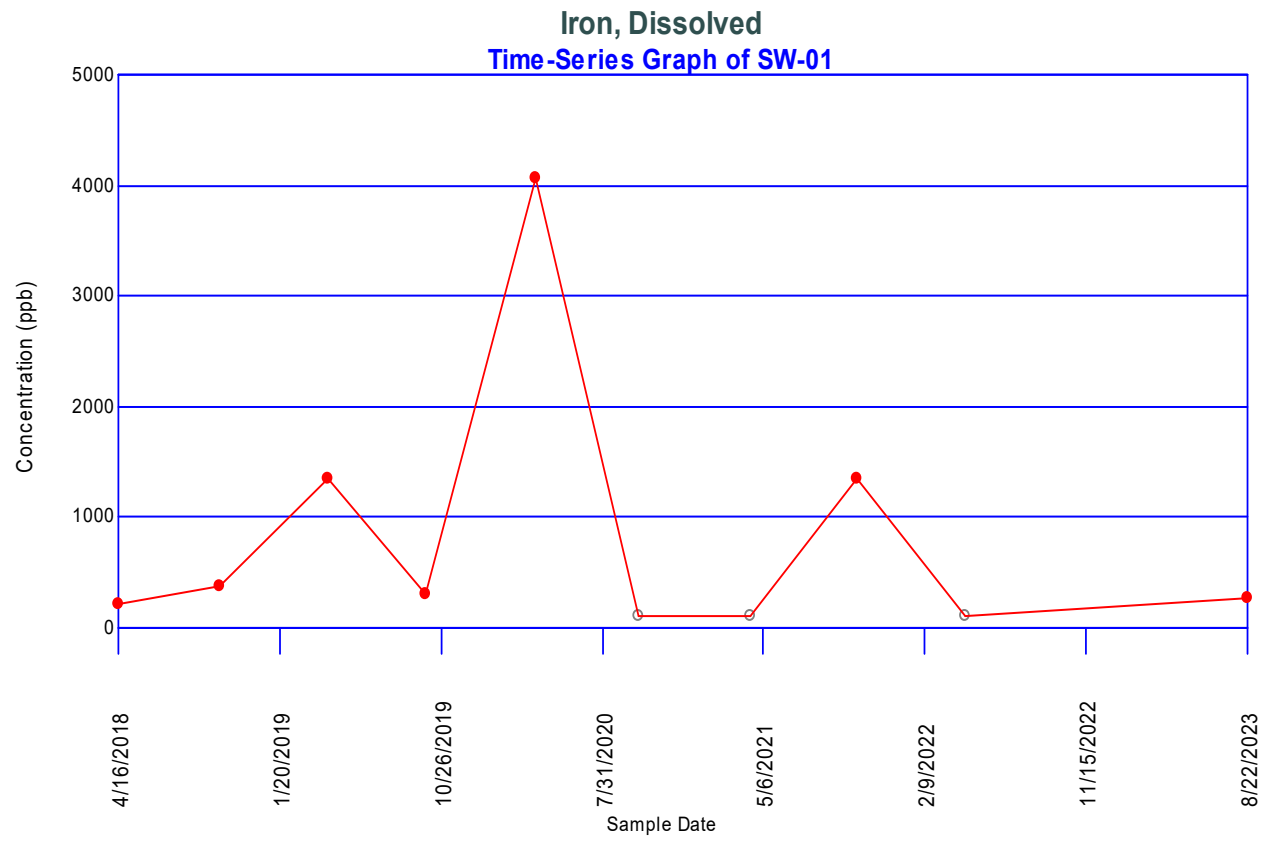
|        |        |       |    |    |
|--------|--------|-------|----|----|
| 276    | ND<100 | 176   | 16 | 23 |
| ND<100 | 1340   | -1240 | 16 | 24 |
| 276    | 1340   | -1064 | 16 | 25 |
| 276    | ND<100 | 176   | 17 | 25 |

S Statistic = 17 - 25 = -8

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |-8| is 0.542

0.542 >= 0.025 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Iron, Dissolved

Location: SW-02

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 10 Measurements...

5% Level of Significance

| Iteration | Highest   | Lowest    | Critical | Outlier |
|-----------|-----------|-----------|----------|---------|
| 1         | 0.0935629 | 0.0389842 | 0.477    | None    |

| Loc.  | Date       | Conc.  | Outlier |
|-------|------------|--------|---------|
| SW-02 | 4/16/2018  | 31.9   | FALSE   |
|       | 10/8/2018  | 191    | FALSE   |
|       | 4/13/2019  | 1040   | FALSE   |
|       | 9/30/2019  | ND<100 | FALSE   |
|       | 4/7/2020   | 1140   | FALSE   |
|       | 10/2/2020  | 71.2   | FALSE   |
|       | 4/13/2021  | ND<100 | FALSE   |
|       | 10/14/2021 | 408    | FALSE   |
|       | 4/19/2022  | ND<100 | FALSE   |
|       | 8/22/2023  | ND<100 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Iron, Dissolved

Location: SW-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 5 for 10 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 31.9 | 1140     | 1108.1        | 0.5739   | 635.939 |
| 2  | 71.2 | 1040     | 968.8         | 0.3291   | 318.832 |
| 3  | 100  | 408      | 308           | 0.2141   | 65.9428 |
| 4  | 100  | 191      | 91            | 0.1224   | 11.1384 |
| 5  | 100  | 100      | 0             | 0.0399   | 0       |
| 6  | 100  | 100      | 0             |          |         |
| 7  | 191  | 100      | -91           |          |         |
| 8  | 408  | 100      | -308          |          |         |
| 9  | 1040 | 71.2     | -968.8        |          |         |
| 10 | 1140 | 31.9     | -1108.1       |          |         |

---

Sum of b values = 1031.85

Sample Standard Deviation = 415.4

W Statistic = 0.685582

**5% Critical value of 0.842 exceeds 0.685582**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.781 exceeds 0.685582**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Iron, Dissolved**  
**Location: SW-02**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 191       | 31.9      | 159.1          | 1                | 0                |
| 1040      | 31.9      | 1008.1         | 2                | 0                |
| ND<100    | 31.9      | 68.1           | 3                | 0                |
| 1140      | 31.9      | 1108.1         | 4                | 0                |
| 71.2      | 31.9      | 39.3           | 5                | 0                |
| ND<100    | 31.9      | 68.1           | 6                | 0                |
| 408       | 31.9      | 376.1          | 7                | 0                |
| ND<100    | 31.9      | 68.1           | 8                | 0                |
| ND<100    | 31.9      | 68.1           | 9                | 0                |
|           |           |                |                  |                  |
| 1040      | 191       | 849            | 10               | 0                |
| ND<100    | 191       | -91            | 10               | 1                |
| 1140      | 191       | 949            | 11               | 1                |
| 71.2      | 191       | -119.8         | 11               | 2                |
| ND<100    | 191       | -91            | 11               | 3                |
| 408       | 191       | 217            | 12               | 3                |
| ND<100    | 191       | -91            | 12               | 4                |
| ND<100    | 191       | -91            | 12               | 5                |
|           |           |                |                  |                  |
| ND<100    | 1040      | -940           | 12               | 6                |
| 1140      | 1040      | 100            | 13               | 6                |
| 71.2      | 1040      | -968.8         | 13               | 7                |
| ND<100    | 1040      | -940           | 13               | 8                |
| 408       | 1040      | -632           | 13               | 9                |
| ND<100    | 1040      | -940           | 13               | 10               |
| ND<100    | 1040      | -940           | 13               | 11               |
|           |           |                |                  |                  |
| 1140      | ND<100    | 1040           | 14               | 11               |
| 71.2      | ND<100    | -28.8          | 14               | 12               |
| ND<100    | ND<100    | 0              | 14               | 12               |
| 408       | ND<100    | 308            | 15               | 12               |
| ND<100    | ND<100    | 0              | 15               | 12               |
| ND<100    | ND<100    | 0              | 15               | 12               |
|           |           |                |                  |                  |
| 71.2      | 1140      | -1068.8        | 15               | 13               |
| ND<100    | 1140      | -1040          | 15               | 14               |
| 408       | 1140      | -732           | 15               | 15               |
| ND<100    | 1140      | -1040          | 15               | 16               |
| ND<100    | 1140      | -1040          | 15               | 17               |
|           |           |                |                  |                  |
| ND<100    | 71.2      | 28.8           | 16               | 17               |
| 408       | 71.2      | 336.8          | 17               | 17               |
| ND<100    | 71.2      | 28.8           | 18               | 17               |
| ND<100    | 71.2      | 28.8           | 19               | 17               |
|           |           |                |                  |                  |
| 408       | ND<100    | 308            | 20               | 17               |
| ND<100    | ND<100    | 0              | 20               | 17               |

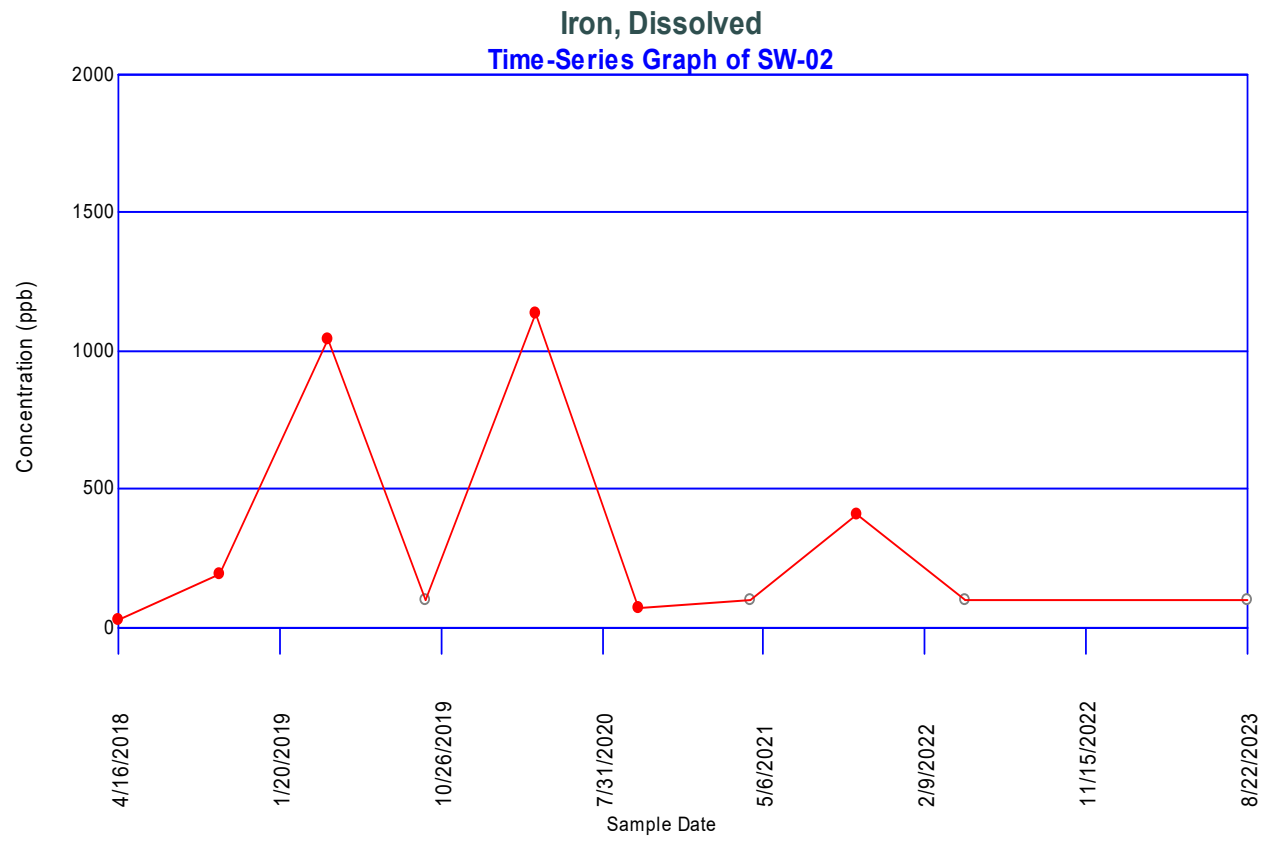
|        |        |      |    |    |
|--------|--------|------|----|----|
| ND<100 | ND<100 | 0    | 20 | 17 |
| ND<100 | 408    | -308 | 20 | 18 |
| ND<100 | 408    | -308 | 20 | 19 |
| ND<100 | ND<100 | 0    | 20 | 19 |

S Statistic = 20 - 19 = 1

Comparing at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level (two-tailed)

Probability of obtaining  $S \geq |1|$  is 1

1  $\geq 0.025$  indicating no evidence of a trend



## Concentrations (ppb)

Parameter: Lithium, Total

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 144

Total Non-Detect: 40

Percent Non-Detects: 27.7778%

Total Background Measurements: 0

There are 0 background locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

There are 12 compliance locations

| Loc.  | Meas. | ND           | Date       | Conc. | Original |
|-------|-------|--------------|------------|-------|----------|
| MW-05 | 12    | 1 (8.33333%) | 4/18/2018  | 30.1  | 30.1     |
|       |       |              | 10/10/2018 | 66.2  | 66.2     |
|       |       |              | 4/13/2019  | 25.5  | 25.5     |
|       |       |              | 10/1/2019  | 25.1  | 25.1     |
|       |       |              | 4/9/2020   | 18.2  | 18.2     |
|       |       |              | 10/1/2020  | 24.9  | 24.9     |
|       |       |              | 4/14/2021  | 17.5  | 17.5     |
|       |       |              | 10/13/2021 | 21.7  | 21.7     |
|       |       |              | 4/20/2022  | ND<50 | ND<50    |
|       |       |              | 9/28/2022  | 21.6  | 21.6     |
|       |       |              | 4/19/2023  | 25.5  | 25.5     |
|       |       |              | 8/24/2023  | 22.1  | 22.1     |
| MW-06 | 12    | 4 (33.3333%) | 4/18/2018  | 19.2  | 19.2     |
|       |       |              | 10/10/2018 | ND<50 | ND<50    |
|       |       |              | 4/14/2019  | 19.6  | 19.6     |
|       |       |              | 10/2/2019  | 14.3  | 14.3     |
|       |       |              | 4/8/2020   | 10.4  | 10.4     |
|       |       |              | 9/30/2020  | 13    | 13       |
|       |       |              | 4/13/2021  | 6.96  | 6.96     |
|       |       |              | 10/14/2021 | 9.78  | 9.78     |
|       |       |              | 4/20/2022  | ND<50 | ND<50    |
|       |       |              | 9/27/2022  | 12.2  | 12.2     |
|       |       |              | 4/18/2023  | ND<50 | ND<50    |
|       |       |              | 8/23/2023  | ND<50 | ND<50    |
| MW-07 | 12    | 0 (0%)       | 4/18/2018  | 87.2  | 87.2     |
|       |       |              | 10/10/2018 | 116   | 116      |
|       |       |              | 4/14/2019  | 91.6  | 91.6     |
|       |       |              | 10/2/2019  | 77.6  | 77.6     |
|       |       |              | 4/8/2020   | 69.6  | 69.6     |
|       |       |              | 9/30/2020  | 78.4  | 78.4     |
|       |       |              | 4/13/2021  | 67.1  | 67.1     |
|       |       |              | 10/14/2021 | 73    | 73       |
|       |       |              | 4/20/2022  | 82.9  | 82.9     |
|       |       |              | 9/27/2022  | 77    | 77       |
|       |       |              | 4/18/2023  | 57.3  | 57.3     |
|       |       |              | 8/23/2023  | 71.1  | 71.1     |
| MW-12 | 12    | 7 (58.3333%) | 4/17/2018  | 19.3  | 19.3     |
|       |       |              | 10/9/2018  | ND<50 | ND<50    |

|       |    |              |            |       |       |
|-------|----|--------------|------------|-------|-------|
|       |    |              | 4/14/2019  | 17.5  | 17.5  |
|       |    |              | 10/2/2019  | ND<50 | ND<50 |
|       |    |              | 4/8/2020   | ND<50 | ND<50 |
|       |    |              | 10/1/2020  | 12.8  | 12.8  |
|       |    |              | 4/15/2021  | 7.96  | 7.96  |
|       |    |              | 10/14/2021 | 10.2  | 10.2  |
|       |    |              | 4/19/2022  | ND<50 | ND<50 |
|       |    |              | 9/28/2022  | ND<50 | ND<50 |
|       |    |              | 4/18/2023  | ND<50 | ND<50 |
|       |    |              | 8/24/2023  | ND<50 | ND<50 |
| <hr/> |    |              |            |       |       |
| MW-16 | 12 | 0 (0%)       | 4/17/2018  | 70.3  | 70.3  |
|       |    |              | 10/9/2018  | 89.3  | 89.3  |
|       |    |              | 4/14/2019  | 64.8  | 64.8  |
|       |    |              | 10/2/2019  | 61.7  | 61.7  |
|       |    |              | 4/9/2020   | 54.3  | 54.3  |
|       |    |              | 10/1/2020  | 61.8  | 61.8  |
|       |    |              | 4/15/2021  | 51.2  | 51.2  |
|       |    |              | 10/14/2021 | 63    | 63    |
|       |    |              | 4/19/2022  | 68.4  | 68.4  |
|       |    |              | 9/28/2022  | 58    | 58    |
|       |    |              | 4/18/2023  | 49.8  | 49.8  |
|       |    |              | 8/24/2023  | 55.6  | 55.6  |
| <hr/> |    |              |            |       |       |
| MW-20 | 12 | 1 (8.33333%) | 4/17/2018  | 33.6  | 33.6  |
|       |    |              | 10/10/2018 | 56.6  | 56.6  |
|       |    |              | 4/14/2019  | 31.6  | 31.6  |
|       |    |              | 10/2/2019  | 29.5  | 29.5  |
|       |    |              | 4/9/2020   | 29.1  | 29.1  |
|       |    |              | 10/2/2020  | 30.8  | 30.8  |
|       |    |              | 4/15/2021  | 19.5  | 19.5  |
|       |    |              | 10/12/2021 | 25.1  | 25.1  |
|       |    |              | 4/20/2022  | ND<50 | ND<50 |
|       |    |              | 9/28/2022  | 29.1  | 29.1  |
|       |    |              | 4/19/2023  | 29.3  | 29.3  |
|       |    |              | 8/23/2023  | 28.7  | 28.7  |
| <hr/> |    |              |            |       |       |
| MW-21 | 12 | 1 (8.33333%) | 4/17/2018  | 50.7  | 50.7  |
|       |    |              | 10/10/2018 | 66    | 66    |
|       |    |              | 4/13/2019  | 44.2  | 44.2  |
|       |    |              | 10/1/2019  | 38.1  | 38.1  |
|       |    |              | 4/7/2020   | 40.9  | 40.9  |
|       |    |              | 9/30/2020  | 36.2  | 36.2  |
|       |    |              | 4/14/2021  | 32.8  | 32.8  |
|       |    |              | 10/12/2021 | 40.1  | 40.1  |
|       |    |              | 4/20/2022  | ND<50 | ND<50 |
|       |    |              | 9/29/2022  | 35    | 35    |
|       |    |              | 4/18/2023  | 34.6  | 34.6  |
|       |    |              | 8/23/2023  | 35.2  | 35.2  |
| <hr/> |    |              |            |       |       |
| MW-25 | 12 | 1 (8.33333%) | 4/17/2018  | 42.7  | 42.7  |
|       |    |              | 10/9/2018  | 73.7  | 73.7  |
|       |    |              | 4/13/2019  | 27.3  | 27.3  |
|       |    |              | 10/1/2019  | 44.2  | 44.2  |
|       |    |              | 4/8/2020   | 35.8  | 35.8  |
|       |    |              | 10/1/2020  | 48.7  | 48.7  |
|       |    |              | 4/14/2021  | 13.4  | 13.4  |

|       |    |              |            |         |         |
|-------|----|--------------|------------|---------|---------|
|       |    |              | 10/13/2021 | 42.9    | 42.9    |
|       |    |              | 4/19/2022  | ND<50   | ND<50   |
|       |    |              | 9/29/2022  | 42.7    | 42.7    |
|       |    |              | 4/19/2023  | 37      | 37      |
|       |    |              | 8/24/2023  | 44      | 44      |
| <hr/> |    |              |            |         |         |
| MW-26 | 12 | 4 (33.3333%) | 4/17/2018  | 28.4    | 28.4    |
|       |    |              | 10/9/2018  | ND<50   | ND<50   |
|       |    |              | 4/13/2019  | 32.5    | 32.5    |
|       |    |              | 10/1/2019  | 17.7    | 17.7    |
|       |    |              | 4/8/2020   | 14.3    | 14.3    |
|       |    |              | 10/1/2020  | 28.7    | 28.7    |
|       |    |              | 4/14/2021  | 12      | 12      |
|       |    |              | 10/13/2021 | 14.7    | 14.7    |
|       |    |              | 4/19/2022  | ND<50   | ND<50   |
|       |    |              | 9/29/2022  | 21      | 21      |
|       |    |              | 4/19/2023  | ND<50   | ND<50   |
|       |    |              | 8/24/2023  | ND<50   | ND<50   |
| <hr/> |    |              |            |         |         |
| MW-27 | 12 | 1 (8.33333%) | 4/18/2018  | 56.6    | 56.6    |
|       |    |              | 10/9/2018  | 77      | 77      |
|       |    |              | 4/13/2019  | 58.4    | 58.4    |
|       |    |              | 10/1/2019  | 51.6    | 51.6    |
|       |    |              | 4/9/2020   | 46.6    | 46.6    |
|       |    |              | 10/1/2020  | 52.5    | 52.5    |
|       |    |              | 4/14/2021  | 41      | 41      |
|       |    |              | 10/13/2021 | 39.1    | 39.1    |
|       |    |              | 4/20/2022  | ND<55.6 | ND<55.6 |
|       |    |              | 9/28/2022  | 47.9    | 47.9    |
|       |    |              | 4/19/2023  | 55.3    | 55.3    |
|       |    |              | 8/24/2023  | 44.7    | 44.7    |
| <hr/> |    |              |            |         |         |
| SW-01 | 12 | 12 (100%)    | 4/16/2018  | ND<50   | ND<50   |
|       |    |              | 10/8/2018  | ND<50   | ND<50   |
|       |    |              | 4/13/2019  | ND<50   | ND<50   |
|       |    |              | 9/30/2019  | ND<50   | ND<50   |
|       |    |              | 4/7/2020   | ND<50   | ND<50   |
|       |    |              | 10/2/2020  | ND<50   | ND<50   |
|       |    |              | 4/13/2021  | ND<50   | ND<50   |
|       |    |              | 10/14/2021 | ND<50   | ND<50   |
|       |    |              | 4/19/2022  | ND<50   | ND<50   |
|       |    |              | 9/27/2022  | ND<50   | ND<50   |
|       |    |              | 4/18/2023  | ND<50   | ND<50   |
|       |    |              | 8/22/2023  | ND<50   | ND<50   |
| <hr/> |    |              |            |         |         |
| SW-02 | 12 | 8 (66.6667%) | 4/16/2018  | 10.3    | 10.3    |
|       |    |              | 10/8/2018  | ND<50   | ND<50   |
|       |    |              | 4/13/2019  | ND<50   | ND<50   |
|       |    |              | 9/30/2019  | 10.3    | 10.3    |
|       |    |              | 4/7/2020   | ND<50   | ND<50   |
|       |    |              | 10/2/2020  | 9.72    | 9.72    |
|       |    |              | 4/13/2021  | ND<50   | ND<50   |
|       |    |              | 10/14/2021 | 7.94    | 7.94    |
|       |    |              | 4/19/2022  | ND<50   | ND<50   |
|       |    |              | 9/27/2022  | ND<50   | ND<50   |
|       |    |              | 4/18/2023  | ND<50   | ND<50   |
|       |    |              | 8/22/2023  | ND<50   | ND<50   |

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There are 0 unused locations

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| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

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## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.752083 | 0.126154 | 0.546    | 66.2    |
| 2         | 0.77044  | 0.325397 | 0.576    | 50      |
| 3         | 0.386555 | 0.0875   | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-05 | 4/18/2018  | 30.1  | FALSE   |
|       | 10/10/2018 | 66.2  | TRUE    |
|       | 4/13/2019  | 25.5  | FALSE   |
|       | 10/1/2019  | 25.1  | FALSE   |
|       | 4/9/2020   | 18.2  | FALSE   |
|       | 10/1/2020  | 24.9  | FALSE   |
|       | 4/14/2021  | 17.5  | FALSE   |
|       | 10/13/2021 | 21.7  | FALSE   |
|       | 4/20/2022  | ND<50 | TRUE    |
|       | 9/28/2022  | 21.6  | FALSE   |
|       | 4/19/2023  | 25.5  | FALSE   |
|       | 8/24/2023  | 22.1  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 17.5 | 66.2     | 48.7          | 0.5475   | 26.6633 |
| 2  | 18.2 | 50       | 31.8          | 0.3325   | 10.5735 |
| 3  | 21.6 | 30.1     | 8.5           | 0.2347   | 1.99495 |
| 4  | 21.7 | 25.5     | 3.8           | 0.1586   | 0.60268 |
| 5  | 22.1 | 25.5     | 3.4           | 0.0922   | 0.31348 |
| 6  | 24.9 | 25.1     | 0.2           | 0.0303   | 0.00606 |
| 7  | 25.1 | 24.9     | -0.2          |          |         |
| 8  | 25.5 | 22.1     | -3.4          |          |         |
| 9  | 25.5 | 21.7     | -3.8          |          |         |
| 10 | 30.1 | 21.6     | -8.5          |          |         |
| 11 | 50   | 18.2     | -31.8         |          |         |
| 12 | 66.2 | 17.5     | -48.7         |          |         |

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Sum of b values = 40.1539

Sample Standard Deviation = 14.4194

W Statistic = 0.704968

**5% Critical value of 0.859 exceeds 0.704968**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.704968**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 66.2      | 30.1      | 36.1           | 1                | 0                |
| 25.5      | 30.1      | -4.6           | 1                | 1                |
| 25.1      | 30.1      | -5             | 1                | 2                |
| 18.2      | 30.1      | -11.9          | 1                | 3                |
| 24.9      | 30.1      | -5.2           | 1                | 4                |
| 17.5      | 30.1      | -12.6          | 1                | 5                |
| 21.7      | 30.1      | -8.4           | 1                | 6                |
| ND<50     | 30.1      | 19.9           | 2                | 6                |
| 21.6      | 30.1      | -8.5           | 2                | 7                |
| 25.5      | 30.1      | -4.6           | 2                | 8                |
| 22.1      | 30.1      | -8             | 2                | 9                |
|           |           |                |                  |                  |
| 25.5      | 66.2      | -40.7          | 2                | 10               |
| 25.1      | 66.2      | -41.1          | 2                | 11               |
| 18.2      | 66.2      | -48            | 2                | 12               |
| 24.9      | 66.2      | -41.3          | 2                | 13               |
| 17.5      | 66.2      | -48.7          | 2                | 14               |
| 21.7      | 66.2      | -44.5          | 2                | 15               |
| ND<50     | 66.2      | -16.2          | 2                | 16               |
| 21.6      | 66.2      | -44.6          | 2                | 17               |
| 25.5      | 66.2      | -40.7          | 2                | 18               |
| 22.1      | 66.2      | -44.1          | 2                | 19               |
|           |           |                |                  |                  |
| 25.1      | 25.5      | -0.4           | 2                | 20               |
| 18.2      | 25.5      | -7.3           | 2                | 21               |
| 24.9      | 25.5      | -0.6           | 2                | 22               |
| 17.5      | 25.5      | -8             | 2                | 23               |
| 21.7      | 25.5      | -3.8           | 2                | 24               |
| ND<50     | 25.5      | 24.5           | 3                | 24               |
| 21.6      | 25.5      | -3.9           | 3                | 25               |
| 25.5      | 25.5      | 0              | 3                | 25               |
| 22.1      | 25.5      | -3.4           | 3                | 26               |
|           |           |                |                  |                  |
| 18.2      | 25.1      | -6.9           | 3                | 27               |
| 24.9      | 25.1      | -0.2           | 3                | 28               |
| 17.5      | 25.1      | -7.6           | 3                | 29               |
| 21.7      | 25.1      | -3.4           | 3                | 30               |
| ND<50     | 25.1      | 24.9           | 4                | 30               |
| 21.6      | 25.1      | -3.5           | 4                | 31               |
| 25.5      | 25.1      | 0.4            | 5                | 31               |
| 22.1      | 25.1      | -3             | 5                | 32               |
|           |           |                |                  |                  |
| 24.9      | 18.2      | 6.7            | 6                | 32               |
| 17.5      | 18.2      | -0.7           | 6                | 33               |
| 21.7      | 18.2      | 3.5            | 7                | 33               |
| ND<50     | 18.2      | 31.8           | 8                | 33               |
| 21.6      | 18.2      | 3.4            | 9                | 33               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 25.5  | 18.2  | 7.3   | 10 | 33 |
| 22.1  | 18.2  | 3.9   | 11 | 33 |
| 17.5  | 24.9  | -7.4  | 11 | 34 |
| 21.7  | 24.9  | -3.2  | 11 | 35 |
| ND<50 | 24.9  | 25.1  | 12 | 35 |
| 21.6  | 24.9  | -3.3  | 12 | 36 |
| 25.5  | 24.9  | 0.6   | 13 | 36 |
| 22.1  | 24.9  | -2.8  | 13 | 37 |
| 21.7  | 17.5  | 4.2   | 14 | 37 |
| ND<50 | 17.5  | 32.5  | 15 | 37 |
| 21.6  | 17.5  | 4.1   | 16 | 37 |
| 25.5  | 17.5  | 8     | 17 | 37 |
| 22.1  | 17.5  | 4.6   | 18 | 37 |
| ND<50 | 21.7  | 28.3  | 19 | 37 |
| 21.6  | 21.7  | -0.1  | 19 | 38 |
| 25.5  | 21.7  | 3.8   | 20 | 38 |
| 22.1  | 21.7  | 0.4   | 21 | 38 |
| 21.6  | ND<50 | -28.4 | 21 | 39 |
| 25.5  | ND<50 | -24.5 | 21 | 40 |
| 22.1  | ND<50 | -27.9 | 21 | 41 |
| 25.5  | 21.6  | 3.9   | 22 | 41 |
| 22.1  | 21.6  | 0.5   | 23 | 41 |
| 22.1  | 25.5  | -3.4  | 23 | 42 |

S Statistic = 23 - 42 = -19

---

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 25.5  | 2       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/10/2018  | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/20/2022   | 1            |
| 9/28/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

---

A = 18  
B = 0  
C = 0  
D = 0  
E = 2  
F = 0

a = 3828

b = 11880

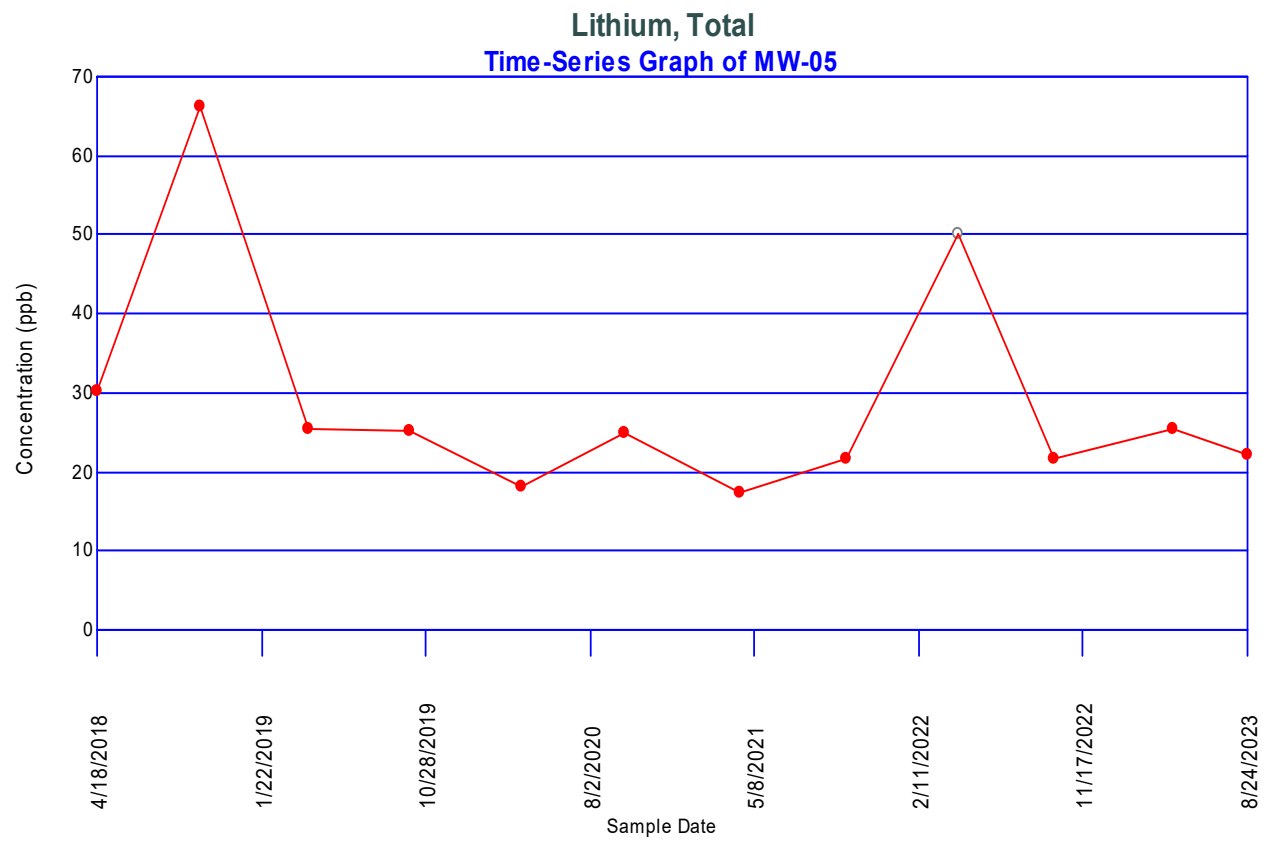
c = 264

Group Variance = 211.667

Z-Score = -1.23722

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.23722| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest | Lowest    | Critical | Outlier |
|-----------|---------|-----------|----------|---------|
| 1         | 0       | 0.0799257 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-06 | 4/18/2018  | 19.2  | FALSE   |
|       | 10/10/2018 | ND<50 | FALSE   |
|       | 4/14/2019  | 19.6  | FALSE   |
|       | 10/2/2019  | 14.3  | FALSE   |
|       | 4/8/2020   | 10.4  | FALSE   |
|       | 9/30/2020  | 13    | FALSE   |
|       | 4/13/2021  | 6.96  | FALSE   |
|       | 10/14/2021 | 9.78  | FALSE   |
|       | 4/20/2022  | ND<50 | FALSE   |
|       | 9/27/2022  | 12.2  | FALSE   |
|       | 4/18/2023  | ND<50 | FALSE   |
|       | 8/23/2023  | ND<50 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 6.96 | 50       | 43.04         | 0.5475   | 23.5644 |
| 2  | 9.78 | 50       | 40.22         | 0.3325   | 13.3732 |
| 3  | 10.4 | 50       | 39.6          | 0.2347   | 9.29412 |
| 4  | 12.2 | 50       | 37.8          | 0.1586   | 5.99508 |
| 5  | 13   | 19.6     | 6.6           | 0.0922   | 0.60852 |
| 6  | 14.3 | 19.2     | 4.9           | 0.0303   | 0.14847 |
| 7  | 19.2 | 14.3     | -4.9          |          |         |
| 8  | 19.6 | 13       | -6.6          |          |         |
| 9  | 50   | 12.2     | -37.8         |          |         |
| 10 | 50   | 10.4     | -39.6         |          |         |
| 11 | 50   | 9.78     | -40.22        |          |         |
| 12 | 50   | 6.96     | -43.04        |          |         |

---

Sum of b values = 52.9837

Sample Standard Deviation = 18.4709

W Statistic = 0.748026

**5% Critical value of 0.859 exceeds 0.748026**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.748026**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| ND<50     | 19.2      | 30.8           | 1                | 0                |
| 19.6      | 19.2      | 0.4            | 2                | 0                |
| 14.3      | 19.2      | -4.9           | 2                | 1                |
| 10.4      | 19.2      | -8.8           | 2                | 2                |
| 13        | 19.2      | -6.2           | 2                | 3                |
| 6.96      | 19.2      | -12.24         | 2                | 4                |
| 9.78      | 19.2      | -9.42          | 2                | 5                |
| ND<50     | 19.2      | 30.8           | 3                | 5                |
| 12.2      | 19.2      | -7             | 3                | 6                |
| ND<50     | 19.2      | 30.8           | 4                | 6                |
| ND<50     | 19.2      | 30.8           | 5                | 6                |
|           |           |                |                  |                  |
| 19.6      | ND<50     | -30.4          | 5                | 7                |
| 14.3      | ND<50     | -35.7          | 5                | 8                |
| 10.4      | ND<50     | -39.6          | 5                | 9                |
| 13        | ND<50     | -37            | 5                | 10               |
| 6.96      | ND<50     | -43.04         | 5                | 11               |
| 9.78      | ND<50     | -40.22         | 5                | 12               |
| ND<50     | ND<50     | 0              | 5                | 12               |
| 12.2      | ND<50     | -37.8          | 5                | 13               |
| ND<50     | ND<50     | 0              | 5                | 13               |
| ND<50     | ND<50     | 0              | 5                | 13               |
|           |           |                |                  |                  |
| 14.3      | 19.6      | -5.3           | 5                | 14               |
| 10.4      | 19.6      | -9.2           | 5                | 15               |
| 13        | 19.6      | -6.6           | 5                | 16               |
| 6.96      | 19.6      | -12.64         | 5                | 17               |
| 9.78      | 19.6      | -9.82          | 5                | 18               |
| ND<50     | 19.6      | 30.4           | 6                | 18               |
| 12.2      | 19.6      | -7.4           | 6                | 19               |
| ND<50     | 19.6      | 30.4           | 7                | 19               |
| ND<50     | 19.6      | 30.4           | 8                | 19               |
|           |           |                |                  |                  |
| 10.4      | 14.3      | -3.9           | 8                | 20               |
| 13        | 14.3      | -1.3           | 8                | 21               |
| 6.96      | 14.3      | -7.34          | 8                | 22               |
| 9.78      | 14.3      | -4.52          | 8                | 23               |
| ND<50     | 14.3      | 35.7           | 9                | 23               |
| 12.2      | 14.3      | -2.1           | 9                | 24               |
| ND<50     | 14.3      | 35.7           | 10               | 24               |
| ND<50     | 14.3      | 35.7           | 11               | 24               |
|           |           |                |                  |                  |
| 13        | 10.4      | 2.6            | 12               | 24               |
| 6.96      | 10.4      | -3.44          | 12               | 25               |
| 9.78      | 10.4      | -0.62          | 12               | 26               |
| ND<50     | 10.4      | 39.6           | 13               | 26               |
| 12.2      | 10.4      | 1.8            | 14               | 26               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| ND<50 | 10.4  | 39.6  | 15 | 26 |
| ND<50 | 10.4  | 39.6  | 16 | 26 |
| 6.96  | 13    | -6.04 | 16 | 27 |
| 9.78  | 13    | -3.22 | 16 | 28 |
| ND<50 | 13    | 37    | 17 | 28 |
| 12.2  | 13    | -0.8  | 17 | 29 |
| ND<50 | 13    | 37    | 18 | 29 |
| ND<50 | 13    | 37    | 19 | 29 |
| 9.78  | 6.96  | 2.82  | 20 | 29 |
| ND<50 | 6.96  | 43.04 | 21 | 29 |
| 12.2  | 6.96  | 5.24  | 22 | 29 |
| ND<50 | 6.96  | 43.04 | 23 | 29 |
| ND<50 | 6.96  | 43.04 | 24 | 29 |
| ND<50 | 9.78  | 40.22 | 25 | 29 |
| 12.2  | 9.78  | 2.42  | 26 | 29 |
| ND<50 | 9.78  | 40.22 | 27 | 29 |
| ND<50 | 9.78  | 40.22 | 28 | 29 |
| 12.2  | ND<50 | -37.8 | 28 | 30 |
| ND<50 | ND<50 | 0     | 28 | 30 |
| ND<50 | ND<50 | 0     | 28 | 30 |
| ND<50 | 12.2  | 37.8  | 29 | 30 |
| ND<50 | 12.2  | 37.8  | 30 | 30 |
| ND<50 | ND<50 | 0     | 30 | 30 |

S Statistic = 30 - 30 = 0

---

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 50    | 4       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/10/2018  | 1            |
| 4/14/2019   | 1            |
| 10/2/2019   | 1            |
| 4/8/2020    | 1            |
| 9/30/2020   | 1            |
| 4/13/2021   | 1            |
| 10/14/2021  | 1            |
| 4/20/2022   | 1            |
| 9/27/2022   | 1            |
| 4/18/2023   | 1            |
| 8/23/2023   | 1            |

There are 0 time periods with multiple data

---

A = 156  
 B = 0  
 C = 24  
 D = 0  
 E = 12  
 F = 0

a = 3828

b = 11880

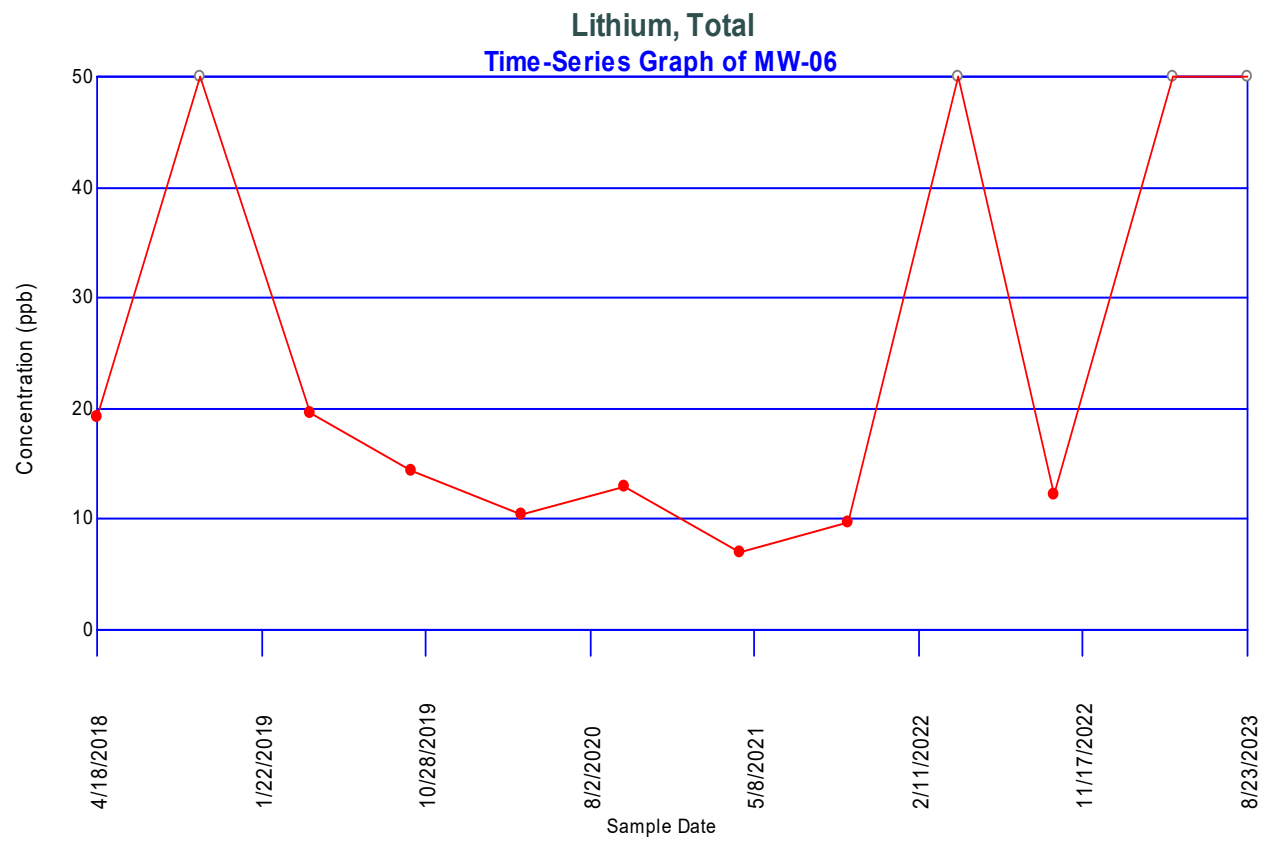
c = 264

Group Variance = 204

Z-Score = 0

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|0| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-07

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.588957 | 0.358601 | 0.546    | 116     |
| 2         | 0.355102 | 0.411371 | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-07 | 4/18/2018  | 87.2  | FALSE   |
|       | 10/10/2018 | 116   | TRUE    |
|       | 4/14/2019  | 91.6  | FALSE   |
|       | 10/2/2019  | 77.6  | FALSE   |
|       | 4/8/2020   | 69.6  | FALSE   |
|       | 9/30/2020  | 78.4  | FALSE   |
|       | 4/13/2021  | 67.1  | FALSE   |
|       | 10/14/2021 | 73    | FALSE   |
|       | 4/20/2022  | 82.9  | FALSE   |
|       | 9/27/2022  | 77    | FALSE   |
|       | 4/18/2023  | 57.3  | FALSE   |
|       | 8/23/2023  | 71.1  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 57.3 | 116      | 58.7          | 0.5475   | 32.1382 |
| 2  | 67.1 | 91.6     | 24.5          | 0.3325   | 8.14625 |
| 3  | 69.6 | 87.2     | 17.6          | 0.2347   | 4.13072 |
| 4  | 71.1 | 82.9     | 11.8          | 0.1586   | 1.87148 |
| 5  | 73   | 78.4     | 5.4           | 0.0922   | 0.49788 |
| 6  | 77   | 77.6     | 0.6           | 0.0303   | 0.01818 |
| 7  | 77.6 | 77       | -0.6          |          |         |
| 8  | 78.4 | 73       | -5.4          |          |         |
| 9  | 82.9 | 71.1     | -11.8         |          |         |
| 10 | 87.2 | 69.6     | -17.6         |          |         |
| 11 | 91.6 | 67.1     | -24.5         |          |         |
| 12 | 116  | 57.3     | -58.7         |          |         |

---

Sum of b values = 46.8028

Sample Standard Deviation = 14.8194

W Statistic = 0.906758

5% Critical value of 0.859 is less than 0.906758

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.906758

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-07**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 116       | 87.2      | 28.8           | 1                | 0                |
| 91.6      | 87.2      | 4.4            | 2                | 0                |
| 77.6      | 87.2      | -9.6           | 2                | 1                |
| 69.6      | 87.2      | -17.6          | 2                | 2                |
| 78.4      | 87.2      | -8.8           | 2                | 3                |
| 67.1      | 87.2      | -20.1          | 2                | 4                |
| 73        | 87.2      | -14.2          | 2                | 5                |
| 82.9      | 87.2      | -4.3           | 2                | 6                |
| 77        | 87.2      | -10.2          | 2                | 7                |
| 57.3      | 87.2      | -29.9          | 2                | 8                |
| 71.1      | 87.2      | -16.1          | 2                | 9                |
|           |           |                |                  |                  |
| 91.6      | 116       | -24.4          | 2                | 10               |
| 77.6      | 116       | -38.4          | 2                | 11               |
| 69.6      | 116       | -46.4          | 2                | 12               |
| 78.4      | 116       | -37.6          | 2                | 13               |
| 67.1      | 116       | -48.9          | 2                | 14               |
| 73        | 116       | -43            | 2                | 15               |
| 82.9      | 116       | -33.1          | 2                | 16               |
| 77        | 116       | -39            | 2                | 17               |
| 57.3      | 116       | -58.7          | 2                | 18               |
| 71.1      | 116       | -44.9          | 2                | 19               |
|           |           |                |                  |                  |
| 77.6      | 91.6      | -14            | 2                | 20               |
| 69.6      | 91.6      | -22            | 2                | 21               |
| 78.4      | 91.6      | -13.2          | 2                | 22               |
| 67.1      | 91.6      | -24.5          | 2                | 23               |
| 73        | 91.6      | -18.6          | 2                | 24               |
| 82.9      | 91.6      | -8.7           | 2                | 25               |
| 77        | 91.6      | -14.6          | 2                | 26               |
| 57.3      | 91.6      | -34.3          | 2                | 27               |
| 71.1      | 91.6      | -20.5          | 2                | 28               |
|           |           |                |                  |                  |
| 69.6      | 77.6      | -8             | 2                | 29               |
| 78.4      | 77.6      | 0.8            | 3                | 29               |
| 67.1      | 77.6      | -10.5          | 3                | 30               |
| 73        | 77.6      | -4.6           | 3                | 31               |
| 82.9      | 77.6      | 5.3            | 4                | 31               |
| 77        | 77.6      | -0.6           | 4                | 32               |
| 57.3      | 77.6      | -20.3          | 4                | 33               |
| 71.1      | 77.6      | -6.5           | 4                | 34               |
|           |           |                |                  |                  |
| 78.4      | 69.6      | 8.8            | 5                | 34               |
| 67.1      | 69.6      | -2.5           | 5                | 35               |
| 73        | 69.6      | 3.4            | 6                | 35               |
| 82.9      | 69.6      | 13.3           | 7                | 35               |
| 77        | 69.6      | 7.4            | 8                | 35               |

|      |      |       |    |    |
|------|------|-------|----|----|
| 57.3 | 69.6 | -12.3 | 8  | 36 |
| 71.1 | 69.6 | 1.5   | 9  | 36 |
| 67.1 | 78.4 | -11.3 | 9  | 37 |
| 73   | 78.4 | -5.4  | 9  | 38 |
| 82.9 | 78.4 | 4.5   | 10 | 38 |
| 77   | 78.4 | -1.4  | 10 | 39 |
| 57.3 | 78.4 | -21.1 | 10 | 40 |
| 71.1 | 78.4 | -7.3  | 10 | 41 |
| 73   | 67.1 | 5.9   | 11 | 41 |
| 82.9 | 67.1 | 15.8  | 12 | 41 |
| 77   | 67.1 | 9.9   | 13 | 41 |
| 57.3 | 67.1 | -9.8  | 13 | 42 |
| 71.1 | 67.1 | 4     | 14 | 42 |
| 82.9 | 73   | 9.9   | 15 | 42 |
| 77   | 73   | 4     | 16 | 42 |
| 57.3 | 73   | -15.7 | 16 | 43 |
| 71.1 | 73   | -1.9  | 16 | 44 |
| 77   | 82.9 | -5.9  | 16 | 45 |
| 57.3 | 82.9 | -25.6 | 16 | 46 |
| 71.1 | 82.9 | -11.8 | 16 | 47 |
| 57.3 | 77   | -19.7 | 16 | 48 |
| 71.1 | 77   | -5.9  | 16 | 49 |
| 71.1 | 57.3 | 13.8  | 17 | 49 |

S Statistic = 17 - 49 = -32

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/18/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 4/14/2019                                   | 1            |         |
| 10/2/2019                                   | 1            |         |
| 4/8/2020                                    | 1            |         |
| 9/30/2020                                   | 1            |         |
| 4/13/2021                                   | 1            |         |
| 10/14/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/27/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

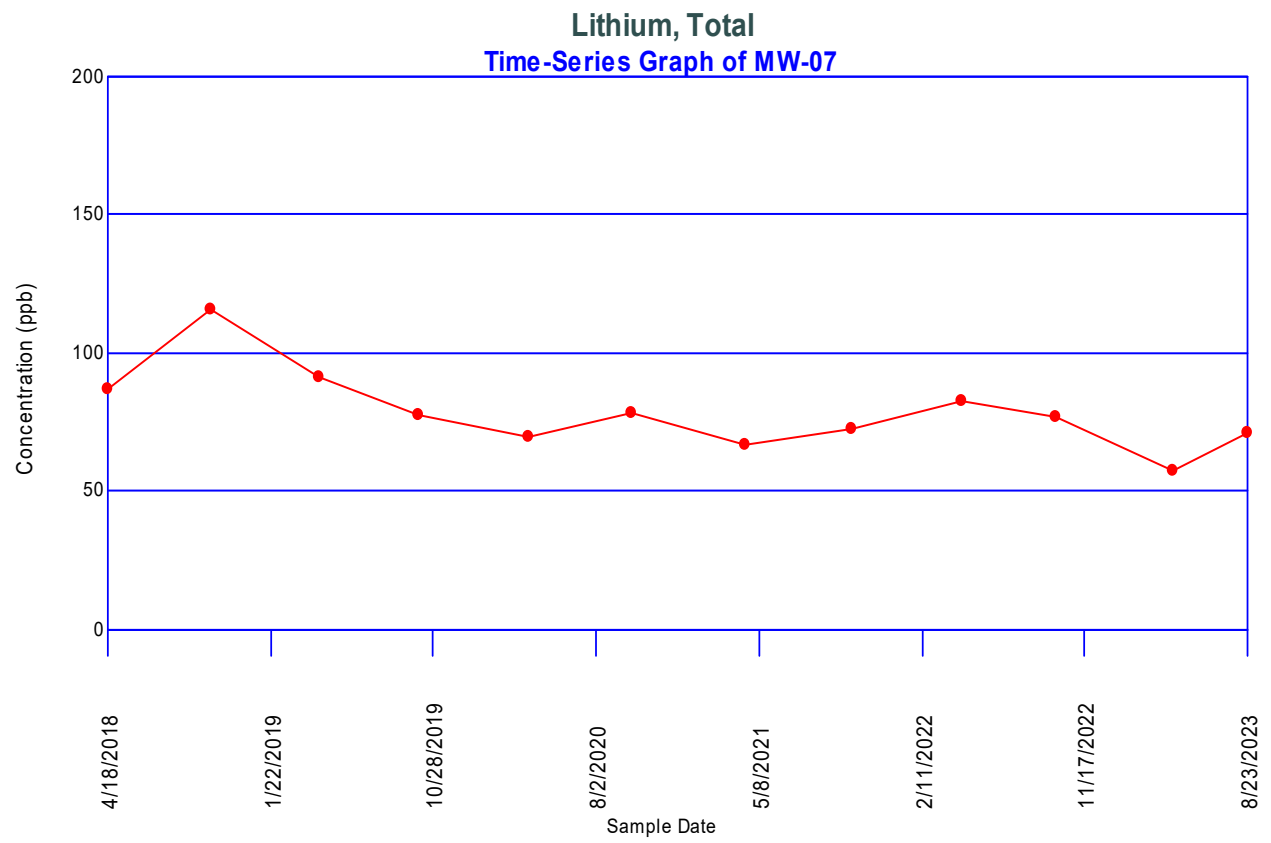
c = 264

Group Variance = 212.667

Z-Score = -2.12575

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

**$|-2.12575| > 1.97737$  indicating a trend**



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-12

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest | Lowest   | Critical | Outlier |
|-----------|---------|----------|----------|---------|
| 1         | 0       | 0.115128 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-12 | 4/17/2018  | 19.3  | FALSE   |
|       | 10/9/2018  | ND<50 | FALSE   |
|       | 4/14/2019  | 17.5  | FALSE   |
|       | 10/2/2019  | ND<50 | FALSE   |
|       | 4/8/2020   | ND<50 | FALSE   |
|       | 10/1/2020  | 12.8  | FALSE   |
|       | 4/15/2021  | 7.96  | FALSE   |
|       | 10/14/2021 | 10.2  | FALSE   |
|       | 4/19/2022  | ND<50 | FALSE   |
|       | 9/28/2022  | ND<50 | FALSE   |
|       | 4/18/2023  | ND<50 | FALSE   |
|       | 8/24/2023  | ND<50 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-12

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 7.96 | 50       | 42.04         | 0.5475   | 23.0169 |
| 2  | 10.2 | 50       | 39.8          | 0.3325   | 13.2335 |
| 3  | 12.8 | 50       | 37.2          | 0.2347   | 8.73084 |
| 4  | 17.5 | 50       | 32.5          | 0.1586   | 5.1545  |
| 5  | 19.3 | 50       | 30.7          | 0.0922   | 2.83054 |
| 6  | 50   | 50       | 0             | 0.0303   | 0       |
| 7  | 50   | 50       | 0             |          |         |
| 8  | 50   | 19.3     | -30.7         |          |         |
| 9  | 50   | 17.5     | -32.5         |          |         |
| 10 | 50   | 12.8     | -37.2         |          |         |
| 11 | 50   | 10.2     | -39.8         |          |         |
| 12 | 50   | 7.96     | -42.04        |          |         |

---

Sum of b values = 52.9663

Sample Standard Deviation = 18.9889

W Statistic = 0.707305

**5% Critical value of 0.859 exceeds 0.707305**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.707305**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-12**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| ND<50     | 19.3      | 30.7           | 1                | 0                |
| 17.5      | 19.3      | -1.8           | 1                | 1                |
| ND<50     | 19.3      | 30.7           | 2                | 1                |
| ND<50     | 19.3      | 30.7           | 3                | 1                |
| 12.8      | 19.3      | -6.5           | 3                | 2                |
| 7.96      | 19.3      | -11.34         | 3                | 3                |
| 10.2      | 19.3      | -9.1           | 3                | 4                |
| ND<50     | 19.3      | 30.7           | 4                | 4                |
| ND<50     | 19.3      | 30.7           | 5                | 4                |
| ND<50     | 19.3      | 30.7           | 6                | 4                |
| ND<50     | 19.3      | 30.7           | 7                | 4                |
|           |           |                |                  |                  |
| 17.5      | ND<50     | -32.5          | 7                | 5                |
| ND<50     | ND<50     | 0              | 7                | 5                |
| ND<50     | ND<50     | 0              | 7                | 5                |
| 12.8      | ND<50     | -37.2          | 7                | 6                |
| 7.96      | ND<50     | -42.04         | 7                | 7                |
| 10.2      | ND<50     | -39.8          | 7                | 8                |
| ND<50     | ND<50     | 0              | 7                | 8                |
| ND<50     | ND<50     | 0              | 7                | 8                |
| ND<50     | ND<50     | 0              | 7                | 8                |
| ND<50     | ND<50     | 0              | 7                | 8                |
|           |           |                |                  |                  |
| ND<50     | 17.5      | 32.5           | 8                | 8                |
| ND<50     | 17.5      | 32.5           | 9                | 8                |
| 12.8      | 17.5      | -4.7           | 9                | 9                |
| 7.96      | 17.5      | -9.54          | 9                | 10               |
| 10.2      | 17.5      | -7.3           | 9                | 11               |
| ND<50     | 17.5      | 32.5           | 10               | 11               |
| ND<50     | 17.5      | 32.5           | 11               | 11               |
| ND<50     | 17.5      | 32.5           | 12               | 11               |
| ND<50     | 17.5      | 32.5           | 13               | 11               |
|           |           |                |                  |                  |
| ND<50     | ND<50     | 0              | 13               | 11               |
| 12.8      | ND<50     | -37.2          | 13               | 12               |
| 7.96      | ND<50     | -42.04         | 13               | 13               |
| 10.2      | ND<50     | -39.8          | 13               | 14               |
| ND<50     | ND<50     | 0              | 13               | 14               |
| ND<50     | ND<50     | 0              | 13               | 14               |
| ND<50     | ND<50     | 0              | 13               | 14               |
| ND<50     | ND<50     | 0              | 13               | 14               |
|           |           |                |                  |                  |
| 12.8      | ND<50     | -37.2          | 13               | 15               |
| 7.96      | ND<50     | -42.04         | 13               | 16               |
| 10.2      | ND<50     | -39.8          | 13               | 17               |
| ND<50     | ND<50     | 0              | 13               | 17               |
| ND<50     | ND<50     | 0              | 13               | 17               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| ND<50 | ND<50 | 0     | 13 | 17 |
| ND<50 | ND<50 | 0     | 13 | 17 |
| 7.96  | 12.8  | -4.84 | 13 | 18 |
| 10.2  | 12.8  | -2.6  | 13 | 19 |
| ND<50 | 12.8  | 37.2  | 14 | 19 |
| ND<50 | 12.8  | 37.2  | 15 | 19 |
| ND<50 | 12.8  | 37.2  | 16 | 19 |
| ND<50 | 12.8  | 37.2  | 17 | 19 |
| 10.2  | 7.96  | 2.24  | 18 | 19 |
| ND<50 | 7.96  | 42.04 | 19 | 19 |
| ND<50 | 7.96  | 42.04 | 20 | 19 |
| ND<50 | 7.96  | 42.04 | 21 | 19 |
| ND<50 | 7.96  | 42.04 | 22 | 19 |
| ND<50 | 10.2  | 39.8  | 23 | 19 |
| ND<50 | 10.2  | 39.8  | 24 | 19 |
| ND<50 | 10.2  | 39.8  | 25 | 19 |
| ND<50 | 10.2  | 39.8  | 26 | 19 |
| ND<50 | ND<50 | 0     | 26 | 19 |
| ND<50 | ND<50 | 0     | 26 | 19 |
| ND<50 | ND<50 | 0     | 26 | 19 |
| ND<50 | ND<50 | 0     | 26 | 19 |
| ND<50 | ND<50 | 0     | 26 | 19 |
| ND<50 | ND<50 | 0     | 26 | 19 |

S Statistic = 26 - 19 = 7

---

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 50    | 7       |

---

| Time Period | Observations |
|-------------|--------------|
|-------------|--------------|

|            |   |
|------------|---|
| 4/17/2018  | 1 |
| 10/9/2018  | 1 |
| 4/14/2019  | 1 |
| 10/2/2019  | 1 |
| 4/8/2020   | 1 |
| 10/1/2020  | 1 |
| 4/15/2021  | 1 |
| 10/14/2021 | 1 |
| 4/19/2022  | 1 |
| 9/28/2022  | 1 |
| 4/18/2023  | 1 |
| 8/24/2023  | 1 |

There are 0 time periods with multiple data

---

A = 798  
B = 0  
C = 210  
D = 0  
E = 42  
F = 0

a = 3828

b = 11880

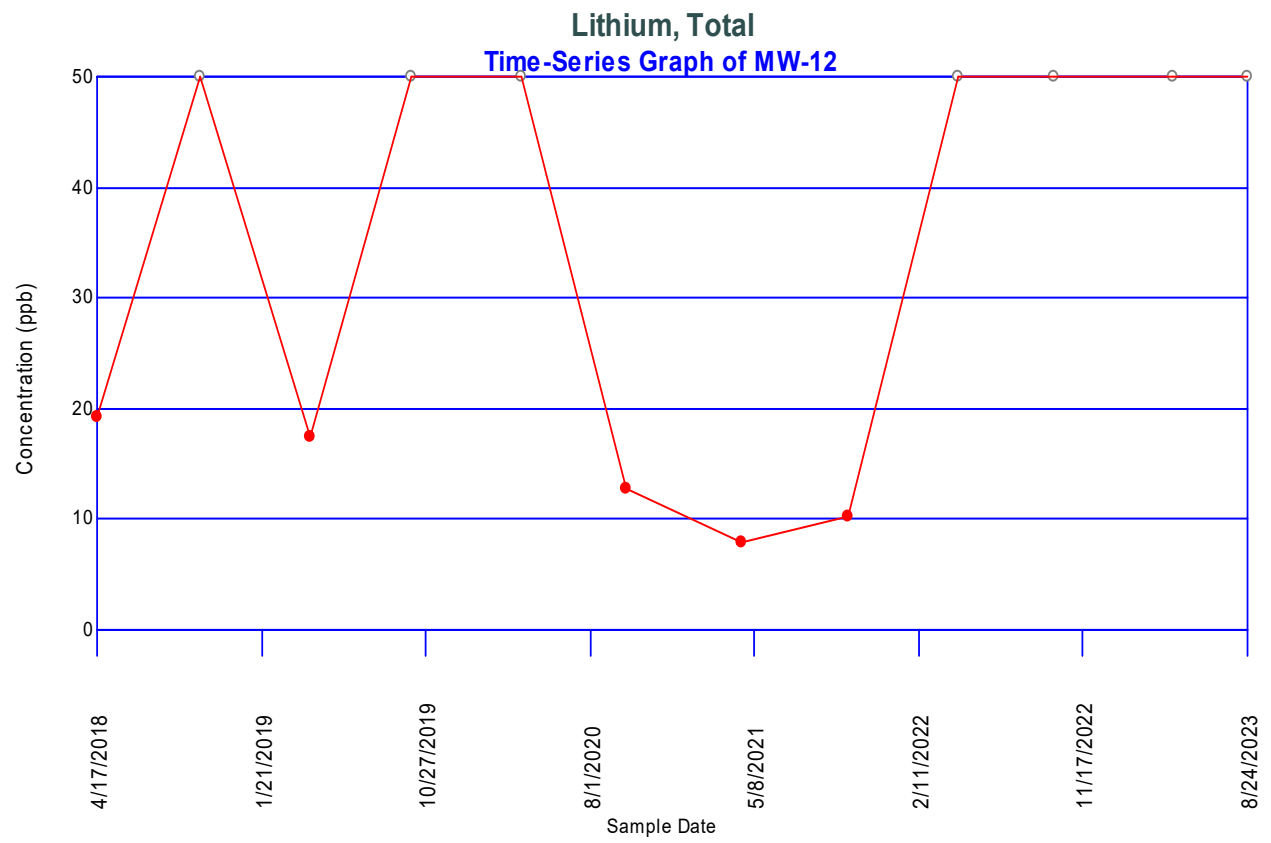
c = 264

Group Variance = 168.333

Z-Score = 0.462451

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|0.462451|  $\leq$  1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-16

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.548556 | 0.219512 | 0.546    | 89.3    |
| 2         | 0.287958 | 0.241935 | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-16 | 4/17/2018  | 70.3  | FALSE   |
|       | 10/9/2018  | 89.3  | TRUE    |
|       | 4/14/2019  | 64.8  | FALSE   |
|       | 10/2/2019  | 61.7  | FALSE   |
|       | 4/9/2020   | 54.3  | FALSE   |
|       | 10/1/2020  | 61.8  | FALSE   |
|       | 4/15/2021  | 51.2  | FALSE   |
|       | 10/14/2021 | 63    | FALSE   |
|       | 4/19/2022  | 68.4  | FALSE   |
|       | 9/28/2022  | 58    | FALSE   |
|       | 4/18/2023  | 49.8  | FALSE   |
|       | 8/24/2023  | 55.6  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-16

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 49.8 | 89.3     | 39.5          | 0.5475   | 21.6262 |
| 2  | 51.2 | 70.3     | 19.1          | 0.3325   | 6.35075 |
| 3  | 54.3 | 68.4     | 14.1          | 0.2347   | 3.30927 |
| 4  | 55.6 | 64.8     | 9.2           | 0.1586   | 1.45912 |
| 5  | 58   | 63       | 5             | 0.0922   | 0.461   |
| 6  | 61.7 | 61.8     | 0.1           | 0.0303   | 0.00303 |
| 7  | 61.8 | 61.7     | -0.1          |          |         |
| 8  | 63   | 58       | -5            |          |         |
| 9  | 64.8 | 55.6     | -9.2          |          |         |
| 10 | 68.4 | 54.3     | -14.1         |          |         |
| 11 | 70.3 | 51.2     | -19.1         |          |         |
| 12 | 89.3 | 49.8     | -39.5         |          |         |

---

Sum of b values = 33.2094

Sample Standard Deviation = 10.636

W Statistic = 0.886284

5% Critical value of 0.859 is less than 0.886284

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.886284

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-16**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 89.3      | 70.3      | 19             | 1                | 0                |
| 64.8      | 70.3      | -5.5           | 1                | 1                |
| 61.7      | 70.3      | -8.6           | 1                | 2                |
| 54.3      | 70.3      | -16            | 1                | 3                |
| 61.8      | 70.3      | -8.5           | 1                | 4                |
| 51.2      | 70.3      | -19.1          | 1                | 5                |
| 63        | 70.3      | -7.3           | 1                | 6                |
| 68.4      | 70.3      | -1.9           | 1                | 7                |
| 58        | 70.3      | -12.3          | 1                | 8                |
| 49.8      | 70.3      | -20.5          | 1                | 9                |
| 55.6      | 70.3      | -14.7          | 1                | 10               |
| 64.8      | 89.3      | -24.5          | 1                | 11               |
| 61.7      | 89.3      | -27.6          | 1                | 12               |
| 54.3      | 89.3      | -35            | 1                | 13               |
| 61.8      | 89.3      | -27.5          | 1                | 14               |
| 51.2      | 89.3      | -38.1          | 1                | 15               |
| 63        | 89.3      | -26.3          | 1                | 16               |
| 68.4      | 89.3      | -20.9          | 1                | 17               |
| 58        | 89.3      | -31.3          | 1                | 18               |
| 49.8      | 89.3      | -39.5          | 1                | 19               |
| 55.6      | 89.3      | -33.7          | 1                | 20               |
| 61.7      | 64.8      | -3.1           | 1                | 21               |
| 54.3      | 64.8      | -10.5          | 1                | 22               |
| 61.8      | 64.8      | -3             | 1                | 23               |
| 51.2      | 64.8      | -13.6          | 1                | 24               |
| 63        | 64.8      | -1.8           | 1                | 25               |
| 68.4      | 64.8      | 3.6            | 2                | 25               |
| 58        | 64.8      | -6.8           | 2                | 26               |
| 49.8      | 64.8      | -15            | 2                | 27               |
| 55.6      | 64.8      | -9.2           | 2                | 28               |
| 54.3      | 61.7      | -7.4           | 2                | 29               |
| 61.8      | 61.7      | 0.1            | 3                | 29               |
| 51.2      | 61.7      | -10.5          | 3                | 30               |
| 63        | 61.7      | 1.3            | 4                | 30               |
| 68.4      | 61.7      | 6.7            | 5                | 30               |
| 58        | 61.7      | -3.7           | 5                | 31               |
| 49.8      | 61.7      | -11.9          | 5                | 32               |
| 55.6      | 61.7      | -6.1           | 5                | 33               |
| 61.8      | 54.3      | 7.5            | 6                | 33               |
| 51.2      | 54.3      | -3.1           | 6                | 34               |
| 63        | 54.3      | 8.7            | 7                | 34               |
| 68.4      | 54.3      | 14.1           | 8                | 34               |
| 58        | 54.3      | 3.7            | 9                | 34               |

|      |      |       |    |    |
|------|------|-------|----|----|
| 49.8 | 54.3 | -4.5  | 9  | 35 |
| 55.6 | 54.3 | 1.3   | 10 | 35 |
| 51.2 | 61.8 | -10.6 | 10 | 36 |
| 63   | 61.8 | 1.2   | 11 | 36 |
| 68.4 | 61.8 | 6.6   | 12 | 36 |
| 58   | 61.8 | -3.8  | 12 | 37 |
| 49.8 | 61.8 | -12   | 12 | 38 |
| 55.6 | 61.8 | -6.2  | 12 | 39 |
| 63   | 51.2 | 11.8  | 13 | 39 |
| 68.4 | 51.2 | 17.2  | 14 | 39 |
| 58   | 51.2 | 6.8   | 15 | 39 |
| 49.8 | 51.2 | -1.4  | 15 | 40 |
| 55.6 | 51.2 | 4.4   | 16 | 40 |
| 68.4 | 63   | 5.4   | 17 | 40 |
| 58   | 63   | -5    | 17 | 41 |
| 49.8 | 63   | -13.2 | 17 | 42 |
| 55.6 | 63   | -7.4  | 17 | 43 |
| 58   | 68.4 | -10.4 | 17 | 44 |
| 49.8 | 68.4 | -18.6 | 17 | 45 |
| 55.6 | 68.4 | -12.8 | 17 | 46 |
| 49.8 | 58   | -8.2  | 17 | 47 |
| 55.6 | 58   | -2.4  | 17 | 48 |
| 55.6 | 49.8 | 5.8   | 18 | 48 |

S Statistic = 18 - 48 = -30

| Tied Group  | Value        | Members |
|-------------|--------------|---------|
| Time Period | Observations |         |
| 4/17/2018   | 1            |         |
| 10/9/2018   | 1            |         |
| 4/14/2019   | 1            |         |
| 10/2/2019   | 1            |         |
| 4/9/2020    | 1            |         |
| 10/1/2020   | 1            |         |
| 4/15/2021   | 1            |         |
| 10/14/2021  | 1            |         |
| 4/19/2022   | 1            |         |
| 9/28/2022   | 1            |         |
| 4/18/2023   | 1            |         |
| 8/24/2023   | 1            |         |

There are 0 time periods with multiple data

A = 0  
B = 0  
C = 0  
D = 0  
E = 0  
F = 0  
a = 3828

b = 11880

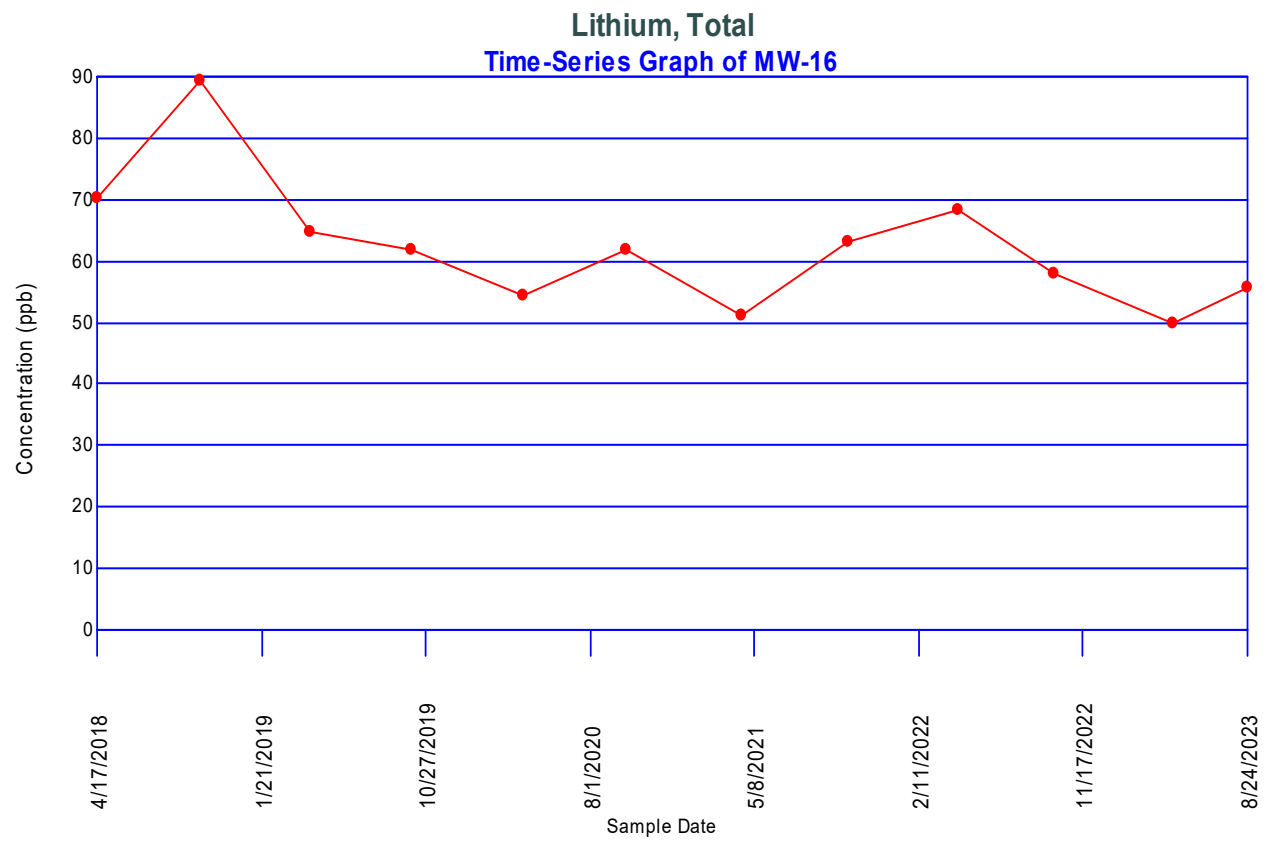
c = 264

Group Variance = 212.667

Z-Score = -1.9886

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

**$|-1.9886| > 1.97737$  indicating a trend**



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-20

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.730159 | 0.301639 | 0.546    | 56.6    |
| 2         | 0.738956 | 0.652482 | 0.576    | 50      |
| 3         | 0.235294 | 0.46281  | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-20 | 4/17/2018  | 33.6  | FALSE   |
|       | 10/10/2018 | 56.6  | TRUE    |
|       | 4/14/2019  | 31.6  | FALSE   |
|       | 10/2/2019  | 29.5  | FALSE   |
|       | 4/9/2020   | 29.1  | FALSE   |
|       | 10/2/2020  | 30.8  | FALSE   |
|       | 4/15/2021  | 19.5  | FALSE   |
|       | 10/12/2021 | 25.1  | FALSE   |
|       | 4/20/2022  | ND<50 | TRUE    |
|       | 9/28/2022  | 29.1  | FALSE   |
|       | 4/19/2023  | 29.3  | FALSE   |
|       | 8/23/2023  | 28.7  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-20

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 19.5 | 56.6     | 37.1          | 0.5475   | 20.3122 |
| 2  | 25.1 | 50       | 24.9          | 0.3325   | 8.27925 |
| 3  | 28.7 | 33.6     | 4.9           | 0.2347   | 1.15003 |
| 4  | 29.1 | 31.6     | 2.5           | 0.1586   | 0.3965  |
| 5  | 29.1 | 30.8     | 1.7           | 0.0922   | 0.15674 |
| 6  | 29.3 | 29.5     | 0.2           | 0.0303   | 0.00606 |
| 7  | 29.5 | 29.3     | -0.2          |          |         |
| 8  | 30.8 | 29.1     | -1.7          |          |         |
| 9  | 31.6 | 29.1     | -2.5          |          |         |
| 10 | 33.6 | 28.7     | -4.9          |          |         |
| 11 | 50   | 25.1     | -24.9         |          |         |
| 12 | 56.6 | 19.5     | -37.1         |          |         |

---

Sum of b values = 30.3008

Sample Standard Deviation = 10.3213

W Statistic = 0.78351

**5% Critical value of 0.859 exceeds 0.78351**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.78351**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-20**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 56.6      | 33.6      | 23             | 1                | 0                |
| 31.6      | 33.6      | -2             | 1                | 1                |
| 29.5      | 33.6      | -4.1           | 1                | 2                |
| 29.1      | 33.6      | -4.5           | 1                | 3                |
| 30.8      | 33.6      | -2.8           | 1                | 4                |
| 19.5      | 33.6      | -14.1          | 1                | 5                |
| 25.1      | 33.6      | -8.5           | 1                | 6                |
| ND<50     | 33.6      | 16.4           | 2                | 6                |
| 29.1      | 33.6      | -4.5           | 2                | 7                |
| 29.3      | 33.6      | -4.3           | 2                | 8                |
| 28.7      | 33.6      | -4.9           | 2                | 9                |
|           |           |                |                  |                  |
| 31.6      | 56.6      | -25            | 2                | 10               |
| 29.5      | 56.6      | -27.1          | 2                | 11               |
| 29.1      | 56.6      | -27.5          | 2                | 12               |
| 30.8      | 56.6      | -25.8          | 2                | 13               |
| 19.5      | 56.6      | -37.1          | 2                | 14               |
| 25.1      | 56.6      | -31.5          | 2                | 15               |
| ND<50     | 56.6      | -6.6           | 2                | 16               |
| 29.1      | 56.6      | -27.5          | 2                | 17               |
| 29.3      | 56.6      | -27.3          | 2                | 18               |
| 28.7      | 56.6      | -27.9          | 2                | 19               |
|           |           |                |                  |                  |
| 29.5      | 31.6      | -2.1           | 2                | 20               |
| 29.1      | 31.6      | -2.5           | 2                | 21               |
| 30.8      | 31.6      | -0.8           | 2                | 22               |
| 19.5      | 31.6      | -12.1          | 2                | 23               |
| 25.1      | 31.6      | -6.5           | 2                | 24               |
| ND<50     | 31.6      | 18.4           | 3                | 24               |
| 29.1      | 31.6      | -2.5           | 3                | 25               |
| 29.3      | 31.6      | -2.3           | 3                | 26               |
| 28.7      | 31.6      | -2.9           | 3                | 27               |
|           |           |                |                  |                  |
| 29.1      | 29.5      | -0.4           | 3                | 28               |
| 30.8      | 29.5      | 1.3            | 4                | 28               |
| 19.5      | 29.5      | -10            | 4                | 29               |
| 25.1      | 29.5      | -4.4           | 4                | 30               |
| ND<50     | 29.5      | 20.5           | 5                | 30               |
| 29.1      | 29.5      | -0.4           | 5                | 31               |
| 29.3      | 29.5      | -0.2           | 5                | 32               |
| 28.7      | 29.5      | -0.8           | 5                | 33               |
|           |           |                |                  |                  |
| 30.8      | 29.1      | 1.7            | 6                | 33               |
| 19.5      | 29.1      | -9.6           | 6                | 34               |
| 25.1      | 29.1      | -4             | 6                | 35               |
| ND<50     | 29.1      | 20.9           | 7                | 35               |
| 29.1      | 29.1      | 0              | 7                | 35               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 29.3  | 29.1  | 0.2   | 8  | 35 |
| 28.7  | 29.1  | -0.4  | 8  | 36 |
| 19.5  | 30.8  | -11.3 | 8  | 37 |
| 25.1  | 30.8  | -5.7  | 8  | 38 |
| ND<50 | 30.8  | 19.2  | 9  | 38 |
| 29.1  | 30.8  | -1.7  | 9  | 39 |
| 29.3  | 30.8  | -1.5  | 9  | 40 |
| 28.7  | 30.8  | -2.1  | 9  | 41 |
| 25.1  | 19.5  | 5.6   | 10 | 41 |
| ND<50 | 19.5  | 30.5  | 11 | 41 |
| 29.1  | 19.5  | 9.6   | 12 | 41 |
| 29.3  | 19.5  | 9.8   | 13 | 41 |
| 28.7  | 19.5  | 9.2   | 14 | 41 |
| ND<50 | 25.1  | 24.9  | 15 | 41 |
| 29.1  | 25.1  | 4     | 16 | 41 |
| 29.3  | 25.1  | 4.2   | 17 | 41 |
| 28.7  | 25.1  | 3.6   | 18 | 41 |
| 29.1  | ND<50 | -20.9 | 18 | 42 |
| 29.3  | ND<50 | -20.7 | 18 | 43 |
| 28.7  | ND<50 | -21.3 | 18 | 44 |
| 29.3  | 29.1  | 0.2   | 19 | 44 |
| 28.7  | 29.1  | -0.4  | 19 | 45 |
| 28.7  | 29.3  | -0.6  | 19 | 46 |

S Statistic = 19 - 46 = -27

---

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 29.1  | 2       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/10/2018  | 1            |
| 4/14/2019   | 1            |
| 10/2/2019   | 1            |
| 4/9/2020    | 1            |
| 10/2/2020   | 1            |
| 4/15/2021   | 1            |
| 10/12/2021  | 1            |
| 4/20/2022   | 1            |
| 9/28/2022   | 1            |
| 4/19/2023   | 1            |
| 8/23/2023   | 1            |

There are 0 time periods with multiple data

---

A = 18  
 B = 0  
 C = 0  
 D = 0  
 E = 2  
 F = 0

a = 3828

b = 11880

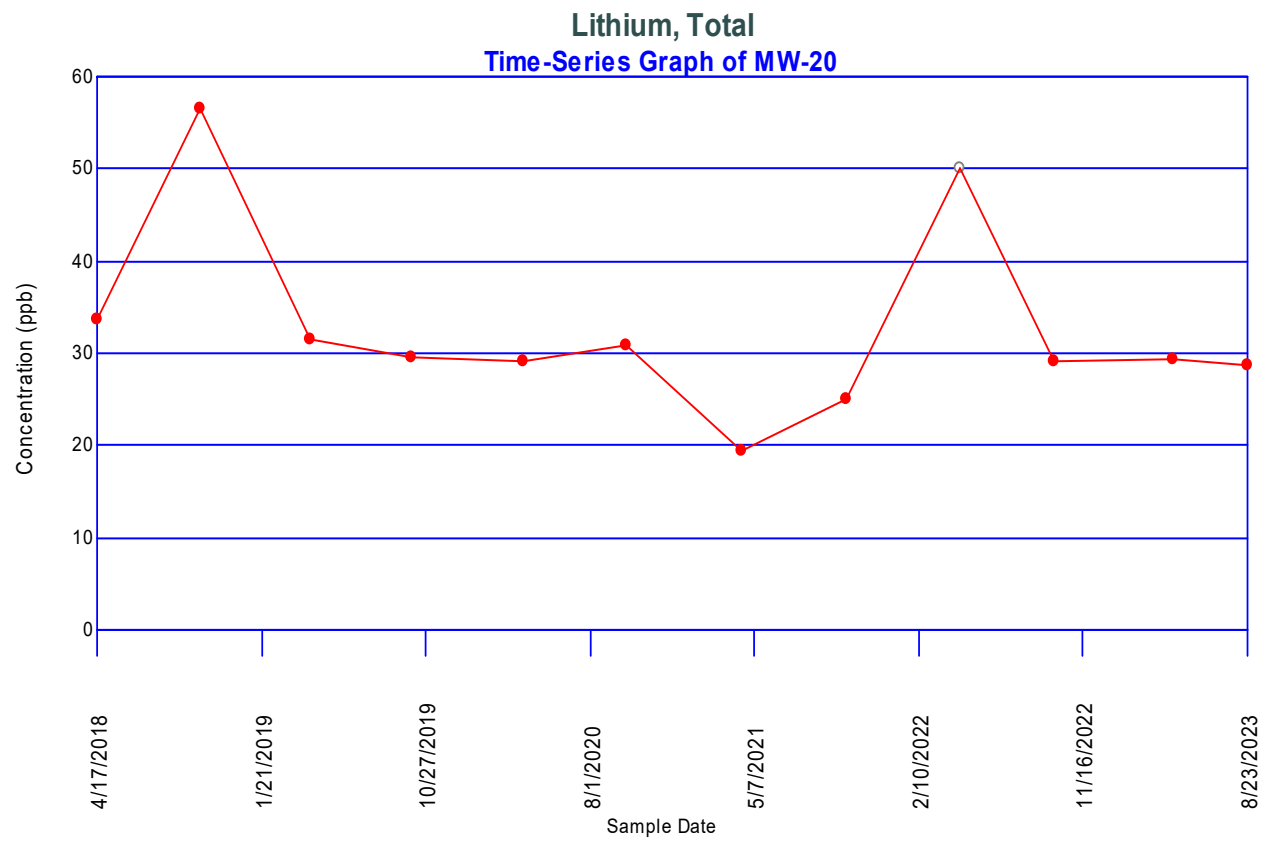
c = 264

Group Variance = 211.667

Z-Score = -1.78709

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|-1.78709| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-21

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.509554 | 0.122905 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-21 | 4/17/2018  | 50.7  | FALSE   |
|       | 10/10/2018 | 66    | FALSE   |
|       | 4/13/2019  | 44.2  | FALSE   |
|       | 10/1/2019  | 38.1  | FALSE   |
|       | 4/7/2020   | 40.9  | FALSE   |
|       | 9/30/2020  | 36.2  | FALSE   |
|       | 4/14/2021  | 32.8  | FALSE   |
|       | 10/12/2021 | 40.1  | FALSE   |
|       | 4/20/2022  | ND<50 | FALSE   |
|       | 9/29/2022  | 35    | FALSE   |
|       | 4/18/2023  | 34.6  | FALSE   |
|       | 8/23/2023  | 35.2  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-21

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 32.8 | 66       | 33.2          | 0.5475   | 18.177  |
| 2  | 34.6 | 50.7     | 16.1          | 0.3325   | 5.35325 |
| 3  | 35   | 50       | 15            | 0.2347   | 3.5205  |
| 4  | 35.2 | 44.2     | 9             | 0.1586   | 1.4274  |
| 5  | 36.2 | 40.9     | 4.7           | 0.0922   | 0.43334 |
| 6  | 38.1 | 40.1     | 2             | 0.0303   | 0.0606  |
| 7  | 40.1 | 38.1     | -2            |          |         |
| 8  | 40.9 | 36.2     | -4.7          |          |         |
| 9  | 44.2 | 35.2     | -9            |          |         |
| 10 | 50   | 35       | -15           |          |         |
| 11 | 50.7 | 34.6     | -16.1         |          |         |
| 12 | 66   | 32.8     | -33.2         |          |         |

---

Sum of b values = 28.9721

Sample Standard Deviation = 9.57666

W Statistic = 0.83203

**5% Critical value of 0.859 exceeds 0.83203**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.83203

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-21**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 66        | 50.7      | 15.3           | 1                | 0                |
| 44.2      | 50.7      | -6.5           | 1                | 1                |
| 38.1      | 50.7      | -12.6          | 1                | 2                |
| 40.9      | 50.7      | -9.8           | 1                | 3                |
| 36.2      | 50.7      | -14.5          | 1                | 4                |
| 32.8      | 50.7      | -17.9          | 1                | 5                |
| 40.1      | 50.7      | -10.6          | 1                | 6                |
| ND<50     | 50.7      | -0.7           | 1                | 7                |
| 35        | 50.7      | -15.7          | 1                | 8                |
| 34.6      | 50.7      | -16.1          | 1                | 9                |
| 35.2      | 50.7      | -15.5          | 1                | 10               |
|           |           |                |                  |                  |
| 44.2      | 66        | -21.8          | 1                | 11               |
| 38.1      | 66        | -27.9          | 1                | 12               |
| 40.9      | 66        | -25.1          | 1                | 13               |
| 36.2      | 66        | -29.8          | 1                | 14               |
| 32.8      | 66        | -33.2          | 1                | 15               |
| 40.1      | 66        | -25.9          | 1                | 16               |
| ND<50     | 66        | -16            | 1                | 17               |
| 35        | 66        | -31            | 1                | 18               |
| 34.6      | 66        | -31.4          | 1                | 19               |
| 35.2      | 66        | -30.8          | 1                | 20               |
|           |           |                |                  |                  |
| 38.1      | 44.2      | -6.1           | 1                | 21               |
| 40.9      | 44.2      | -3.3           | 1                | 22               |
| 36.2      | 44.2      | -8             | 1                | 23               |
| 32.8      | 44.2      | -11.4          | 1                | 24               |
| 40.1      | 44.2      | -4.1           | 1                | 25               |
| ND<50     | 44.2      | 5.8            | 2                | 25               |
| 35        | 44.2      | -9.2           | 2                | 26               |
| 34.6      | 44.2      | -9.6           | 2                | 27               |
| 35.2      | 44.2      | -9             | 2                | 28               |
|           |           |                |                  |                  |
| 40.9      | 38.1      | 2.8            | 3                | 28               |
| 36.2      | 38.1      | -1.9           | 3                | 29               |
| 32.8      | 38.1      | -5.3           | 3                | 30               |
| 40.1      | 38.1      | 2              | 4                | 30               |
| ND<50     | 38.1      | 11.9           | 5                | 30               |
| 35        | 38.1      | -3.1           | 5                | 31               |
| 34.6      | 38.1      | -3.5           | 5                | 32               |
| 35.2      | 38.1      | -2.9           | 5                | 33               |
|           |           |                |                  |                  |
| 36.2      | 40.9      | -4.7           | 5                | 34               |
| 32.8      | 40.9      | -8.1           | 5                | 35               |
| 40.1      | 40.9      | -0.8           | 5                | 36               |
| ND<50     | 40.9      | 9.1            | 6                | 36               |
| 35        | 40.9      | -5.9           | 6                | 37               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 34.6  | 40.9  | -6.3  | 6  | 38 |
| 35.2  | 40.9  | -5.7  | 6  | 39 |
| 32.8  | 36.2  | -3.4  | 6  | 40 |
| 40.1  | 36.2  | 3.9   | 7  | 40 |
| ND<50 | 36.2  | 13.8  | 8  | 40 |
| 35    | 36.2  | -1.2  | 8  | 41 |
| 34.6  | 36.2  | -1.6  | 8  | 42 |
| 35.2  | 36.2  | -1    | 8  | 43 |
| 40.1  | 32.8  | 7.3   | 9  | 43 |
| ND<50 | 32.8  | 17.2  | 10 | 43 |
| 35    | 32.8  | 2.2   | 11 | 43 |
| 34.6  | 32.8  | 1.8   | 12 | 43 |
| 35.2  | 32.8  | 2.4   | 13 | 43 |
| ND<50 | 40.1  | 9.9   | 14 | 43 |
| 35    | 40.1  | -5.1  | 14 | 44 |
| 34.6  | 40.1  | -5.5  | 14 | 45 |
| 35.2  | 40.1  | -4.9  | 14 | 46 |
| 35    | ND<50 | -15   | 14 | 47 |
| 34.6  | ND<50 | -15.4 | 14 | 48 |
| 35.2  | ND<50 | -14.8 | 14 | 49 |
| 34.6  | 35    | -0.4  | 14 | 50 |
| 35.2  | 35    | 0.2   | 15 | 50 |
| 35.2  | 34.6  | 0.6   | 16 | 50 |

S Statistic = 16 - 50 = -34

| Tied Group  | Value        | Members |
|-------------|--------------|---------|
| Time Period | Observations |         |
| 4/17/2018   | 1            |         |
| 10/10/2018  | 1            |         |
| 4/13/2019   | 1            |         |
| 10/1/2019   | 1            |         |
| 4/7/2020    | 1            |         |
| 9/30/2020   | 1            |         |
| 4/14/2021   | 1            |         |
| 10/12/2021  | 1            |         |
| 4/20/2022   | 1            |         |
| 9/29/2022   | 1            |         |
| 4/18/2023   | 1            |         |
| 8/23/2023   | 1            |         |

There are 0 time periods with multiple data

A = 0  
B = 0  
C = 0  
D = 0  
E = 0  
F = 0  
a = 3828

b = 11880

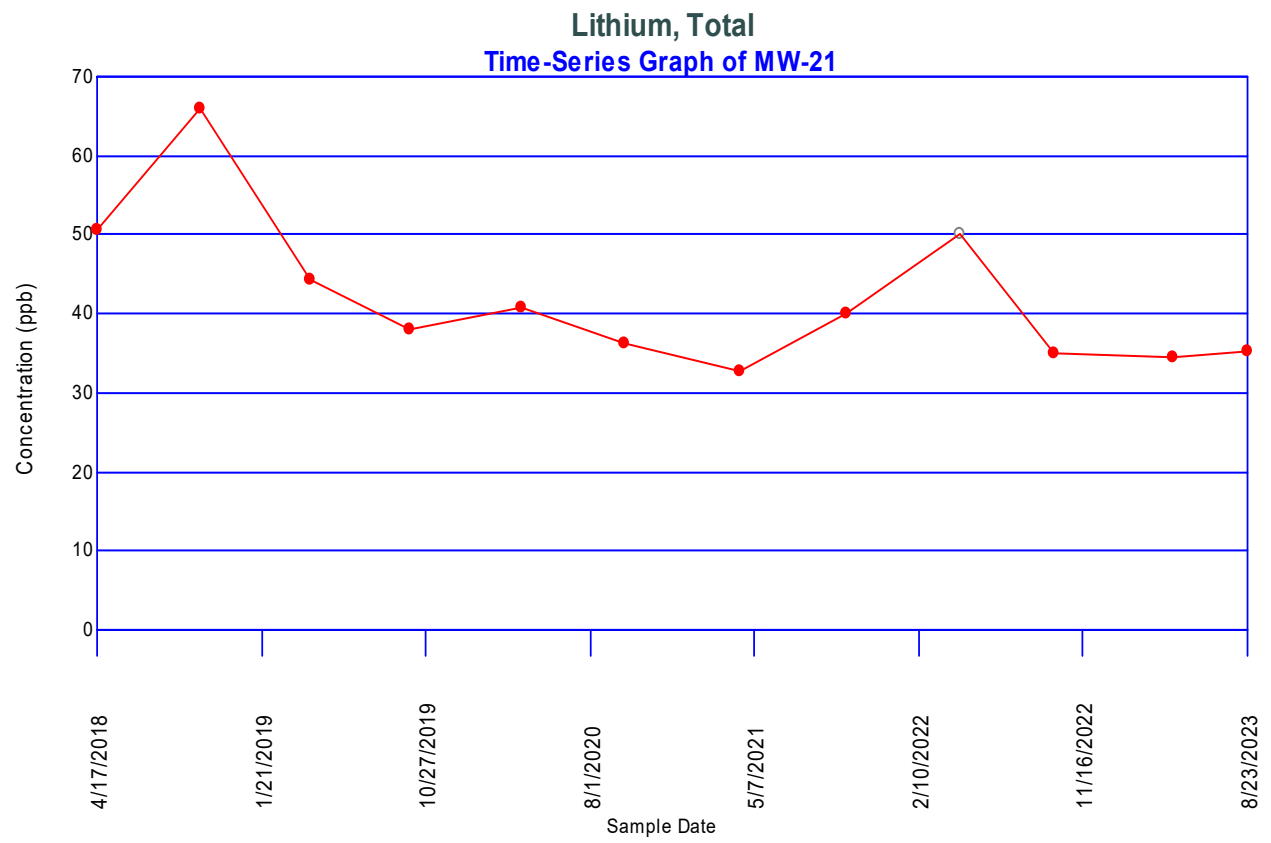
c = 264

Group Variance = 212.667

Z-Score = -2.26289

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

**$|-2.26289| > 1.97737$  indicating a trend**



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-25

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest   | Lowest   | Critical | Outlier |
|-----------|-----------|----------|----------|---------|
| 1         | 0.538793  | 0.612022 | 0.546    | 13.4    |
| 2         | 0.659631  | 0.427313 | 0.576    | 73.7    |
| 3         | 0.0915493 | 0.397196 | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-25 | 4/17/2018  | 42.7  | FALSE   |
|       | 10/9/2018  | 73.7  | TRUE    |
|       | 4/13/2019  | 27.3  | FALSE   |
|       | 10/1/2019  | 44.2  | FALSE   |
|       | 4/8/2020   | 35.8  | FALSE   |
|       | 10/1/2020  | 48.7  | FALSE   |
|       | 4/14/2021  | 13.4  | TRUE    |
|       | 10/13/2021 | 42.9  | FALSE   |
|       | 4/19/2022  | ND<50 | FALSE   |
|       | 9/29/2022  | 42.7  | FALSE   |
|       | 4/19/2023  | 37    | FALSE   |
|       | 8/24/2023  | 44    | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-25

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 13.4 | 73.7     | 60.3          | 0.5475   | 33.0143 |
| 2  | 27.3 | 50       | 22.7          | 0.3325   | 7.54775 |
| 3  | 35.8 | 48.7     | 12.9          | 0.2347   | 3.02763 |
| 4  | 37   | 44.2     | 7.2           | 0.1586   | 1.14192 |
| 5  | 42.7 | 44       | 1.3           | 0.0922   | 0.11986 |
| 6  | 42.7 | 42.9     | 0.2           | 0.0303   | 0.00606 |
| 7  | 42.9 | 42.7     | -0.2          |          |         |
| 8  | 44   | 42.7     | -1.3          |          |         |
| 9  | 44.2 | 37       | -7.2          |          |         |
| 10 | 48.7 | 35.8     | -12.9         |          |         |
| 11 | 50   | 27.3     | -22.7         |          |         |
| 12 | 73.7 | 13.4     | -60.3         |          |         |

---

Sum of b values = 44.8575

Sample Standard Deviation = 14.2117

W Statistic = 0.905705

5% Critical value of 0.859 is less than 0.905705

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.905705

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-25**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 73.7      | 42.7      | 31             | 1                | 0                |
| 27.3      | 42.7      | -15.4          | 1                | 1                |
| 44.2      | 42.7      | 1.5            | 2                | 1                |
| 35.8      | 42.7      | -6.9           | 2                | 2                |
| 48.7      | 42.7      | 6              | 3                | 2                |
| 13.4      | 42.7      | -29.3          | 3                | 3                |
| 42.9      | 42.7      | 0.2            | 4                | 3                |
| ND<50     | 42.7      | 7.3            | 5                | 3                |
| 42.7      | 42.7      | 0              | 5                | 3                |
| 37        | 42.7      | -5.7           | 5                | 4                |
| 44        | 42.7      | 1.3            | 6                | 4                |
|           |           |                |                  |                  |
| 27.3      | 73.7      | -46.4          | 6                | 5                |
| 44.2      | 73.7      | -29.5          | 6                | 6                |
| 35.8      | 73.7      | -37.9          | 6                | 7                |
| 48.7      | 73.7      | -25            | 6                | 8                |
| 13.4      | 73.7      | -60.3          | 6                | 9                |
| 42.9      | 73.7      | -30.8          | 6                | 10               |
| ND<50     | 73.7      | -23.7          | 6                | 11               |
| 42.7      | 73.7      | -31            | 6                | 12               |
| 37        | 73.7      | -36.7          | 6                | 13               |
| 44        | 73.7      | -29.7          | 6                | 14               |
|           |           |                |                  |                  |
| 44.2      | 27.3      | 16.9           | 7                | 14               |
| 35.8      | 27.3      | 8.5            | 8                | 14               |
| 48.7      | 27.3      | 21.4           | 9                | 14               |
| 13.4      | 27.3      | -13.9          | 9                | 15               |
| 42.9      | 27.3      | 15.6           | 10               | 15               |
| ND<50     | 27.3      | 22.7           | 11               | 15               |
| 42.7      | 27.3      | 15.4           | 12               | 15               |
| 37        | 27.3      | 9.7            | 13               | 15               |
| 44        | 27.3      | 16.7           | 14               | 15               |
|           |           |                |                  |                  |
| 35.8      | 44.2      | -8.4           | 14               | 16               |
| 48.7      | 44.2      | 4.5            | 15               | 16               |
| 13.4      | 44.2      | -30.8          | 15               | 17               |
| 42.9      | 44.2      | -1.3           | 15               | 18               |
| ND<50     | 44.2      | 5.8            | 16               | 18               |
| 42.7      | 44.2      | -1.5           | 16               | 19               |
| 37        | 44.2      | -7.2           | 16               | 20               |
| 44        | 44.2      | -0.2           | 16               | 21               |
|           |           |                |                  |                  |
| 48.7      | 35.8      | 12.9           | 17               | 21               |
| 13.4      | 35.8      | -22.4          | 17               | 22               |
| 42.9      | 35.8      | 7.1            | 18               | 22               |
| ND<50     | 35.8      | 14.2           | 19               | 22               |
| 42.7      | 35.8      | 6.9            | 20               | 22               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 37    | 35.8  | 1.2   | 21 | 22 |
| 44    | 35.8  | 8.2   | 22 | 22 |
| 13.4  | 48.7  | -35.3 | 22 | 23 |
| 42.9  | 48.7  | -5.8  | 22 | 24 |
| ND<50 | 48.7  | 1.3   | 23 | 24 |
| 42.7  | 48.7  | -6    | 23 | 25 |
| 37    | 48.7  | -11.7 | 23 | 26 |
| 44    | 48.7  | -4.7  | 23 | 27 |
| 42.9  | 13.4  | 29.5  | 24 | 27 |
| ND<50 | 13.4  | 36.6  | 25 | 27 |
| 42.7  | 13.4  | 29.3  | 26 | 27 |
| 37    | 13.4  | 23.6  | 27 | 27 |
| 44    | 13.4  | 30.6  | 28 | 27 |
| ND<50 | 42.9  | 7.1   | 29 | 27 |
| 42.7  | 42.9  | -0.2  | 29 | 28 |
| 37    | 42.9  | -5.9  | 29 | 29 |
| 44    | 42.9  | 1.1   | 30 | 29 |
| 42.7  | ND<50 | -7.3  | 30 | 30 |
| 37    | ND<50 | -13   | 30 | 31 |
| 44    | ND<50 | -6    | 30 | 32 |
| 37    | 42.7  | -5.7  | 30 | 33 |
| 44    | 42.7  | 1.3   | 31 | 33 |
| 44    | 37    | 7     | 32 | 33 |

S Statistic = 32 - 33 = -1

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| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 42.7  | 2       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/8/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/19/2022   | 1            |
| 9/29/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

---

A = 18  
B = 0  
C = 0  
D = 0  
E = 2  
F = 0

a = 3828

b = 11880

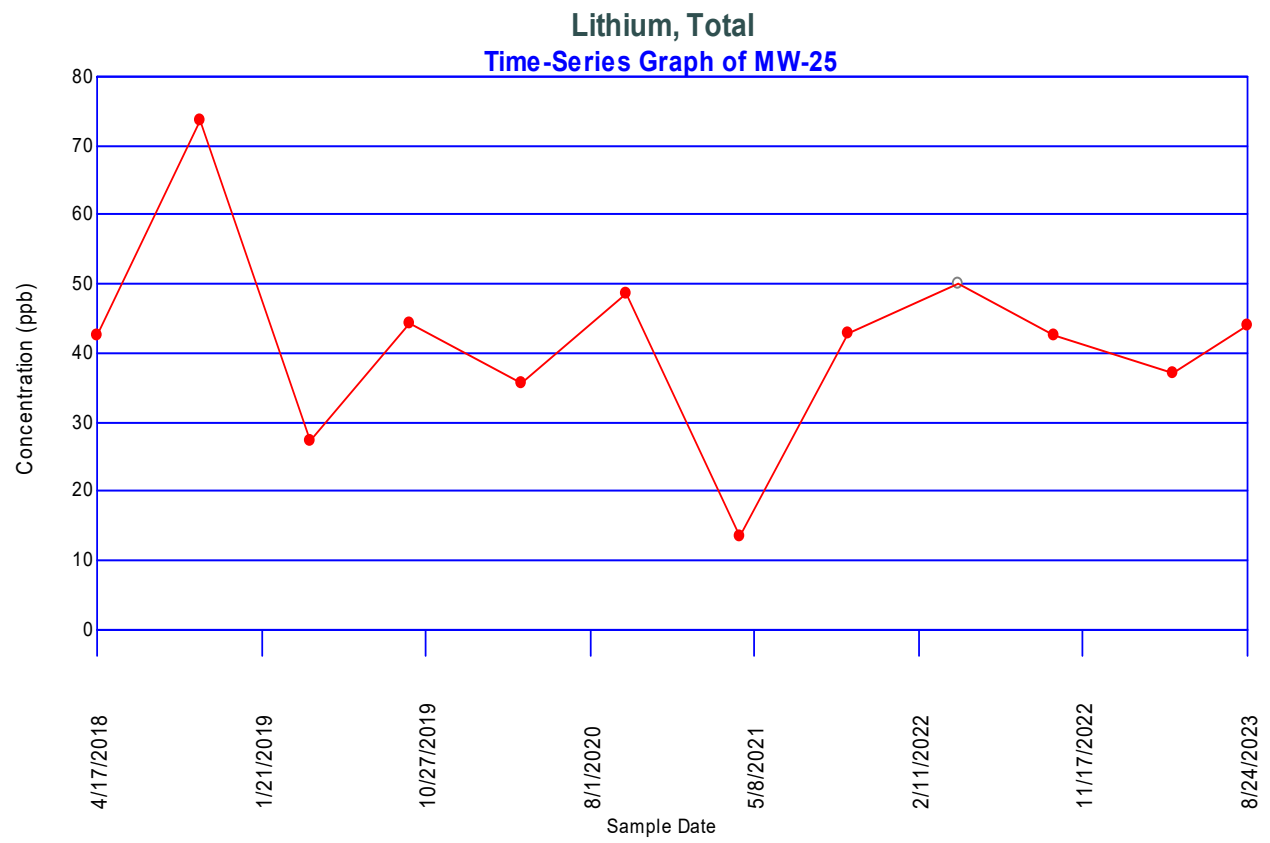
c = 264

Group Variance = 211.667

Z-Score = 0

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|0| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-26

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest | Lowest    | Critical | Outlier |
|-----------|---------|-----------|----------|---------|
| 1         | 0       | 0.0710526 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-26 | 4/17/2018  | 28.4  | FALSE   |
|       | 10/9/2018  | ND<50 | FALSE   |
|       | 4/13/2019  | 32.5  | FALSE   |
|       | 10/1/2019  | 17.7  | FALSE   |
|       | 4/8/2020   | 14.3  | FALSE   |
|       | 10/1/2020  | 28.7  | FALSE   |
|       | 4/14/2021  | 12    | FALSE   |
|       | 10/13/2021 | 14.7  | FALSE   |
|       | 4/19/2022  | ND<50 | FALSE   |
|       | 9/29/2022  | 21    | FALSE   |
|       | 4/19/2023  | ND<50 | FALSE   |
|       | 8/24/2023  | ND<50 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-26

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 12   | 50       | 38            | 0.5475   | 20.805  |
| 2  | 14.3 | 50       | 35.7          | 0.3325   | 11.8703 |
| 3  | 14.7 | 50       | 35.3          | 0.2347   | 8.28491 |
| 4  | 17.7 | 50       | 32.3          | 0.1586   | 5.12278 |
| 5  | 21   | 32.5     | 11.5          | 0.0922   | 1.0603  |
| 6  | 28.4 | 28.7     | 0.3           | 0.0303   | 0.00909 |
| 7  | 28.7 | 28.4     | -0.3          |          |         |
| 8  | 32.5 | 21       | -11.5         |          |         |
| 9  | 50   | 17.7     | -32.3         |          |         |
| 10 | 50   | 14.7     | -35.3         |          |         |
| 11 | 50   | 14.3     | -35.7         |          |         |
| 12 | 50   | 12       | -38           |          |         |

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Sum of b values = 47.1523

Sample Standard Deviation = 15.4924

W Statistic = 0.842123

**5% Critical value of 0.859 exceeds 0.842123**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.842123

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-26**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| ND<50     | 28.4      | 21.6           | 1                | 0                |
| 32.5      | 28.4      | 4.1            | 2                | 0                |
| 17.7      | 28.4      | -10.7          | 2                | 1                |
| 14.3      | 28.4      | -14.1          | 2                | 2                |
| 28.7      | 28.4      | 0.3            | 3                | 2                |
| 12        | 28.4      | -16.4          | 3                | 3                |
| 14.7      | 28.4      | -13.7          | 3                | 4                |
| ND<50     | 28.4      | 21.6           | 4                | 4                |
| 21        | 28.4      | -7.4           | 4                | 5                |
| ND<50     | 28.4      | 21.6           | 5                | 5                |
| ND<50     | 28.4      | 21.6           | 6                | 5                |
|           |           |                |                  |                  |
| 32.5      | ND<50     | -17.5          | 6                | 6                |
| 17.7      | ND<50     | -32.3          | 6                | 7                |
| 14.3      | ND<50     | -35.7          | 6                | 8                |
| 28.7      | ND<50     | -21.3          | 6                | 9                |
| 12        | ND<50     | -38            | 6                | 10               |
| 14.7      | ND<50     | -35.3          | 6                | 11               |
| ND<50     | ND<50     | 0              | 6                | 11               |
| 21        | ND<50     | -29            | 6                | 12               |
| ND<50     | ND<50     | 0              | 6                | 12               |
| ND<50     | ND<50     | 0              | 6                | 12               |
|           |           |                |                  |                  |
| 17.7      | 32.5      | -14.8          | 6                | 13               |
| 14.3      | 32.5      | -18.2          | 6                | 14               |
| 28.7      | 32.5      | -3.8           | 6                | 15               |
| 12        | 32.5      | -20.5          | 6                | 16               |
| 14.7      | 32.5      | -17.8          | 6                | 17               |
| ND<50     | 32.5      | 17.5           | 7                | 17               |
| 21        | 32.5      | -11.5          | 7                | 18               |
| ND<50     | 32.5      | 17.5           | 8                | 18               |
| ND<50     | 32.5      | 17.5           | 9                | 18               |
|           |           |                |                  |                  |
| 14.3      | 17.7      | -3.4           | 9                | 19               |
| 28.7      | 17.7      | 11             | 10               | 19               |
| 12        | 17.7      | -5.7           | 10               | 20               |
| 14.7      | 17.7      | -3             | 10               | 21               |
| ND<50     | 17.7      | 32.3           | 11               | 21               |
| 21        | 17.7      | 3.3            | 12               | 21               |
| ND<50     | 17.7      | 32.3           | 13               | 21               |
| ND<50     | 17.7      | 32.3           | 14               | 21               |
|           |           |                |                  |                  |
| 28.7      | 14.3      | 14.4           | 15               | 21               |
| 12        | 14.3      | -2.3           | 15               | 22               |
| 14.7      | 14.3      | 0.4            | 16               | 22               |
| ND<50     | 14.3      | 35.7           | 17               | 22               |
| 21        | 14.3      | 6.7            | 18               | 22               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| ND<50 | 14.3  | 35.7  | 19 | 22 |
| ND<50 | 14.3  | 35.7  | 20 | 22 |
| 12    | 28.7  | -16.7 | 20 | 23 |
| 14.7  | 28.7  | -14   | 20 | 24 |
| ND<50 | 28.7  | 21.3  | 21 | 24 |
| 21    | 28.7  | -7.7  | 21 | 25 |
| ND<50 | 28.7  | 21.3  | 22 | 25 |
| ND<50 | 28.7  | 21.3  | 23 | 25 |
| 14.7  | 12    | 2.7   | 24 | 25 |
| ND<50 | 12    | 38    | 25 | 25 |
| 21    | 12    | 9     | 26 | 25 |
| ND<50 | 12    | 38    | 27 | 25 |
| ND<50 | 12    | 38    | 28 | 25 |
| ND<50 | 14.7  | 35.3  | 29 | 25 |
| 21    | 14.7  | 6.3   | 30 | 25 |
| ND<50 | 14.7  | 35.3  | 31 | 25 |
| ND<50 | 14.7  | 35.3  | 32 | 25 |
| 21    | ND<50 | -29   | 32 | 26 |
| ND<50 | ND<50 | 0     | 32 | 26 |
| ND<50 | ND<50 | 0     | 32 | 26 |
| ND<50 | 21    | 29    | 33 | 26 |
| ND<50 | 21    | 29    | 34 | 26 |
| ND<50 | ND<50 | 0     | 34 | 26 |

S Statistic = 34 - 26 = 8

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 50    | 4       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/8/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/19/2022   | 1            |
| 9/29/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 156  
B = 0  
C = 24  
D = 0  
E = 12  
F = 0

a = 3828

b = 11880

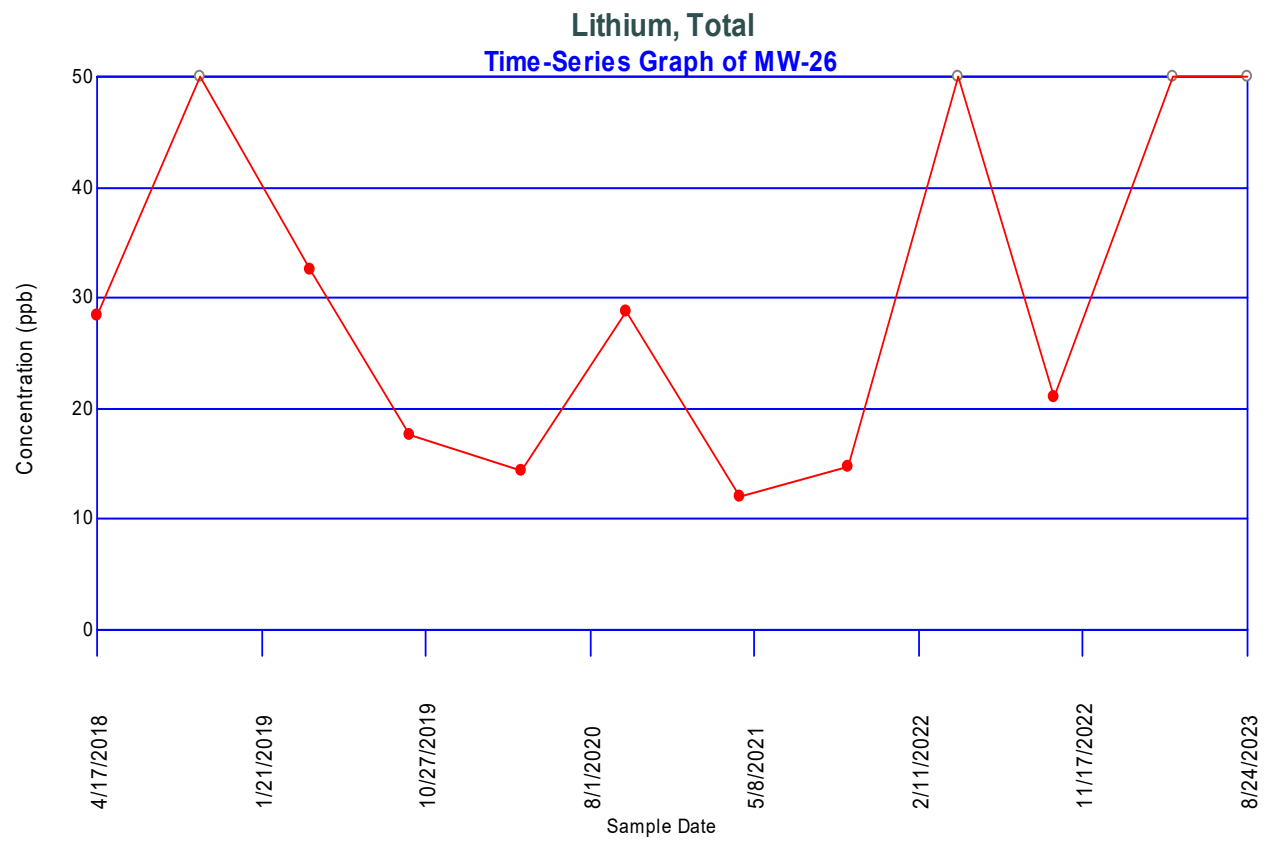
c = 264

Group Variance = 204

Z-Score = 0.490098

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|0.490098| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Lithium, Total

Location: MW-27

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.566667 | 0.290155 | 0.546    | 77      |
| 2         | 0.16092  | 0.32     | 0.576    | None    |

| Loc.  | Date       | Conc.   | Outlier |
|-------|------------|---------|---------|
| MW-27 | 4/18/2018  | 56.6    | FALSE   |
|       | 10/9/2018  | 77      | TRUE    |
|       | 4/13/2019  | 58.4    | FALSE   |
|       | 10/1/2019  | 51.6    | FALSE   |
|       | 4/9/2020   | 46.6    | FALSE   |
|       | 10/1/2020  | 52.5    | FALSE   |
|       | 4/14/2021  | 41      | FALSE   |
|       | 10/13/2021 | 39.1    | FALSE   |
|       | 4/20/2022  | ND<55.6 | FALSE   |
|       | 9/28/2022  | 47.9    | FALSE   |
|       | 4/19/2023  | 55.3    | FALSE   |
|       | 8/24/2023  | 44.7    | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Lithium, Total

Location: MW-27

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 39.1 | 77       | 37.9          | 0.5475   | 20.7502 |
| 2  | 41   | 58.4     | 17.4          | 0.3325   | 5.7855  |
| 3  | 44.7 | 56.6     | 11.9          | 0.2347   | 2.79293 |
| 4  | 46.6 | 55.6     | 9             | 0.1586   | 1.4274  |
| 5  | 47.9 | 55.3     | 7.4           | 0.0922   | 0.68228 |
| 6  | 51.6 | 52.5     | 0.9           | 0.0303   | 0.02727 |
| 7  | 52.5 | 51.6     | -0.9          |          |         |
| 8  | 55.3 | 47.9     | -7.4          |          |         |
| 9  | 55.6 | 46.6     | -9            |          |         |
| 10 | 56.6 | 44.7     | -11.9         |          |         |
| 11 | 58.4 | 41       | -17.4         |          |         |
| 12 | 77   | 39.1     | -37.9         |          |         |

---

Sum of b values = 31.4656

Sample Standard Deviation = 9.98913

W Statistic = 0.902039

5% Critical value of 0.859 is less than 0.902039

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.902039

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Lithium, Total**  
**Location: MW-27**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 77        | 56.6      | 20.4           | 1                | 0                |
| 58.4      | 56.6      | 1.8            | 2                | 0                |
| 51.6      | 56.6      | -5             | 2                | 1                |
| 46.6      | 56.6      | -10            | 2                | 2                |
| 52.5      | 56.6      | -4.1           | 2                | 3                |
| 41        | 56.6      | -15.6          | 2                | 4                |
| 39.1      | 56.6      | -17.5          | 2                | 5                |
| ND<55.6   | 56.6      | -1             | 2                | 6                |
| 47.9      | 56.6      | -8.7           | 2                | 7                |
| 55.3      | 56.6      | -1.3           | 2                | 8                |
| 44.7      | 56.6      | -11.9          | 2                | 9                |
|           |           |                |                  |                  |
| 58.4      | 77        | -18.6          | 2                | 10               |
| 51.6      | 77        | -25.4          | 2                | 11               |
| 46.6      | 77        | -30.4          | 2                | 12               |
| 52.5      | 77        | -24.5          | 2                | 13               |
| 41        | 77        | -36            | 2                | 14               |
| 39.1      | 77        | -37.9          | 2                | 15               |
| ND<55.6   | 77        | -21.4          | 2                | 16               |
| 47.9      | 77        | -29.1          | 2                | 17               |
| 55.3      | 77        | -21.7          | 2                | 18               |
| 44.7      | 77        | -32.3          | 2                | 19               |
|           |           |                |                  |                  |
| 51.6      | 58.4      | -6.8           | 2                | 20               |
| 46.6      | 58.4      | -11.8          | 2                | 21               |
| 52.5      | 58.4      | -5.9           | 2                | 22               |
| 41        | 58.4      | -17.4          | 2                | 23               |
| 39.1      | 58.4      | -19.3          | 2                | 24               |
| ND<55.6   | 58.4      | -2.8           | 2                | 25               |
| 47.9      | 58.4      | -10.5          | 2                | 26               |
| 55.3      | 58.4      | -3.1           | 2                | 27               |
| 44.7      | 58.4      | -13.7          | 2                | 28               |
|           |           |                |                  |                  |
| 46.6      | 51.6      | -5             | 2                | 29               |
| 52.5      | 51.6      | 0.9            | 3                | 29               |
| 41        | 51.6      | -10.6          | 3                | 30               |
| 39.1      | 51.6      | -12.5          | 3                | 31               |
| ND<55.6   | 51.6      | 4              | 4                | 31               |
| 47.9      | 51.6      | -3.7           | 4                | 32               |
| 55.3      | 51.6      | 3.7            | 5                | 32               |
| 44.7      | 51.6      | -6.9           | 5                | 33               |
|           |           |                |                  |                  |
| 52.5      | 46.6      | 5.9            | 6                | 33               |
| 41        | 46.6      | -5.6           | 6                | 34               |
| 39.1      | 46.6      | -7.5           | 6                | 35               |
| ND<55.6   | 46.6      | 9              | 7                | 35               |
| 47.9      | 46.6      | 1.3            | 8                | 35               |

|         |         |       |    |    |
|---------|---------|-------|----|----|
| 55.3    | 46.6    | 8.7   | 9  | 35 |
| 44.7    | 46.6    | -1.9  | 9  | 36 |
| 41      | 52.5    | -11.5 | 9  | 37 |
| 39.1    | 52.5    | -13.4 | 9  | 38 |
| ND<55.6 | 52.5    | 3.1   | 10 | 38 |
| 47.9    | 52.5    | -4.6  | 10 | 39 |
| 55.3    | 52.5    | 2.8   | 11 | 39 |
| 44.7    | 52.5    | -7.8  | 11 | 40 |
| 39.1    | 41      | -1.9  | 11 | 41 |
| ND<55.6 | 41      | 14.6  | 12 | 41 |
| 47.9    | 41      | 6.9   | 13 | 41 |
| 55.3    | 41      | 14.3  | 14 | 41 |
| 44.7    | 41      | 3.7   | 15 | 41 |
| ND<55.6 | 39.1    | 16.5  | 16 | 41 |
| 47.9    | 39.1    | 8.8   | 17 | 41 |
| 55.3    | 39.1    | 16.2  | 18 | 41 |
| 44.7    | 39.1    | 5.6   | 19 | 41 |
| 47.9    | ND<55.6 | -7.7  | 19 | 42 |
| 55.3    | ND<55.6 | -0.3  | 19 | 43 |
| 44.7    | ND<55.6 | -10.9 | 19 | 44 |
| 55.3    | 47.9    | 7.4   | 20 | 44 |
| 44.7    | 47.9    | -3.2  | 20 | 45 |
| 44.7    | 55.3    | -10.6 | 20 | 46 |

S Statistic = 20 - 46 = -26

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/18/2018                                   | 1            |         |
| 10/9/2018                                   | 1            |         |
| 4/13/2019                                   | 1            |         |
| 10/1/2019                                   | 1            |         |
| 4/9/2020                                    | 1            |         |
| 10/1/2020                                   | 1            |         |
| 4/14/2021                                   | 1            |         |
| 10/13/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/28/2022                                   | 1            |         |
| 4/19/2023                                   | 1            |         |
| 8/24/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

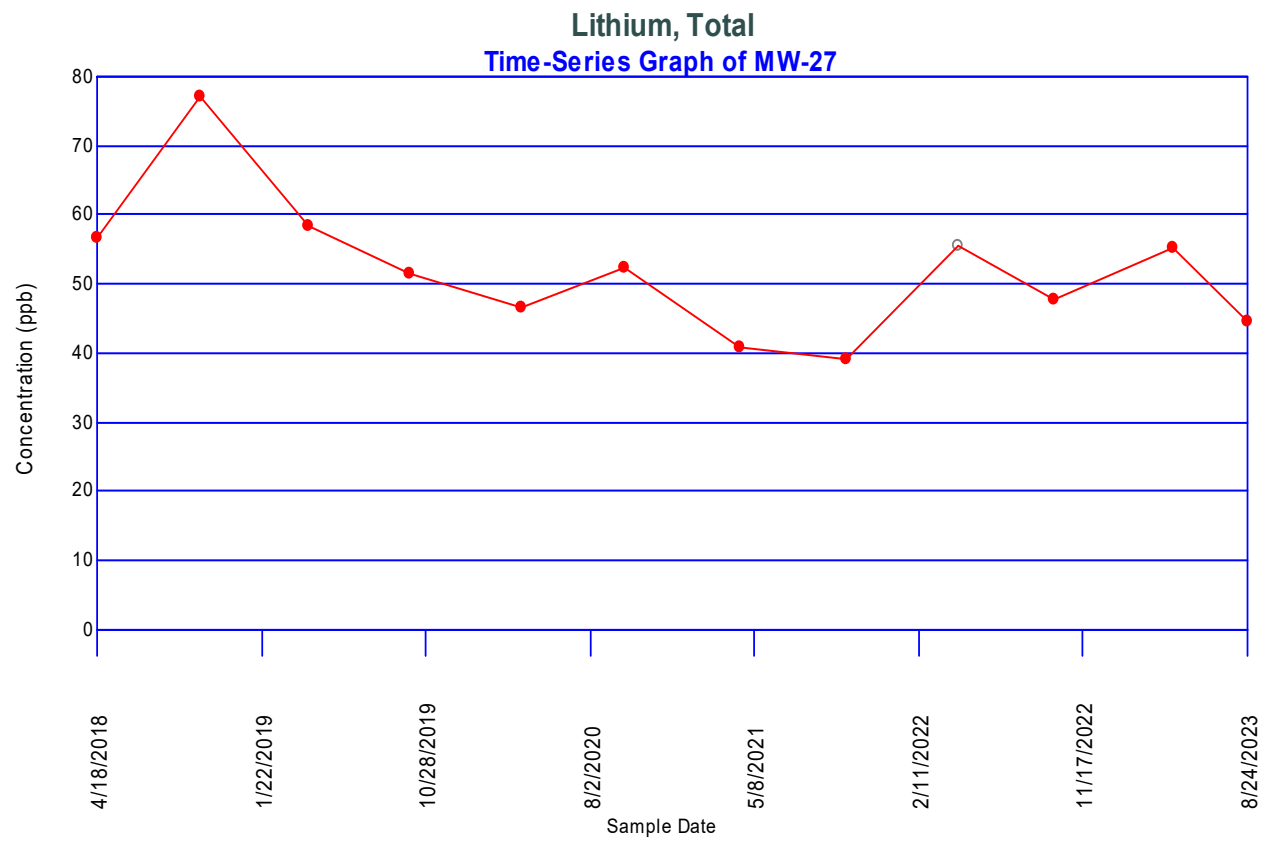
c = 264

Group Variance = 212.667

Z-Score = -1.71431

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.71431| \leq 1.97737$  indicating no evidence of a trend



## Concentrations (ppb)

Parameter: Manganese, Total

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 144

Total Non-Detect: 21

Percent Non-Detects: 14.5833%

Total Background Measurements: 0

There are 0 background locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

There are 12 compliance locations

| Loc.  | Meas. | ND           | Date       | Conc. | Original |
|-------|-------|--------------|------------|-------|----------|
| MW-05 | 12    | 2 (16.6667%) | 4/18/2018  | 14.5  | 14.5     |
|       |       |              | 10/10/2018 | ND<80 | ND<80    |
|       |       |              | 4/13/2019  | 7.77  | 7.77     |
|       |       |              | 10/1/2019  | 7.88  | 7.88     |
|       |       |              | 4/9/2020   | 90.1  | 90.1     |
|       |       |              | 10/1/2020  | 64.8  | 64.8     |
|       |       |              | 4/14/2021  | 33.7  | 33.7     |
|       |       |              | 10/13/2021 | 44.9  | 44.9     |
|       |       |              | 4/20/2022  | 24.5  | 24.5     |
|       |       |              | 9/28/2022  | 171   | 171      |
|       |       |              | 4/19/2023  | ND<5  | ND<5     |
|       |       |              | 8/24/2023  | 19.6  | 19.6     |
| MW-06 | 12    | 0 (0%)       | 4/18/2018  | 124   | 124      |
|       |       |              | 10/10/2018 | 549   | 549      |
|       |       |              | 4/14/2019  | 78.6  | 78.6     |
|       |       |              | 10/2/2019  | 200   | 200      |
|       |       |              | 4/8/2020   | 90.9  | 90.9     |
|       |       |              | 9/30/2020  | 436   | 436      |
|       |       |              | 4/13/2021  | 55.7  | 55.7     |
|       |       |              | 10/14/2021 | 703   | 703      |
|       |       |              | 4/20/2022  | 72.9  | 72.9     |
|       |       |              | 9/27/2022  | 253   | 253      |
|       |       |              | 4/18/2023  | 14.9  | 14.9     |
|       |       |              | 8/23/2023  | 575   | 575      |
| MW-07 | 12    | 0 (0%)       | 4/18/2018  | 84.4  | 84.4     |
|       |       |              | 10/10/2018 | 2330  | 2330     |
|       |       |              | 4/14/2019  | 78.3  | 78.3     |
|       |       |              | 10/2/2019  | 1760  | 1760     |
|       |       |              | 4/8/2020   | 1280  | 1280     |
|       |       |              | 9/30/2020  | 1490  | 1490     |
|       |       |              | 4/13/2021  | 1300  | 1300     |
|       |       |              | 10/14/2021 | 1490  | 1490     |
|       |       |              | 4/20/2022  | 1460  | 1460     |
|       |       |              | 9/27/2022  | 1580  | 1580     |
|       |       |              | 4/18/2023  | 54.3  | 54.3     |
|       |       |              | 8/23/2023  | 1410  | 1410     |
| MW-12 | 12    | 9 (75%)      | 4/17/2018  | 3.44  | 3.44     |
|       |       |              | 10/9/2018  | ND<80 | ND<80    |

|       |    |               |            |       |       |
|-------|----|---------------|------------|-------|-------|
|       |    |               | 4/14/2019  | ND<4  | ND<4  |
|       |    |               | 10/2/2019  | ND<5  | ND<5  |
|       |    |               | 4/8/2020   | 2.82  | 2.82  |
|       |    |               | 10/1/2020  | 6.43  | 6.43  |
|       |    |               | 4/15/2021  | ND<5  | ND<5  |
|       |    |               | 10/14/2021 | ND<10 | ND<10 |
|       |    |               | 4/19/2022  | ND<10 | ND<10 |
|       |    |               | 9/28/2022  | ND<10 | ND<10 |
|       |    |               | 4/18/2023  | ND<5  | ND<5  |
|       |    |               | 8/24/2023  | ND<5  | ND<5  |
| <hr/> |    |               |            |       |       |
| MW-16 | 12 | 0 (0%)        | 4/17/2018  | 477   | 477   |
|       |    |               | 10/9/2018  | 91    | 91    |
|       |    |               | 4/14/2019  | 97.1  | 97.1  |
|       |    |               | 10/2/2019  | 72.3  | 72.3  |
|       |    |               | 4/9/2020   | 57.8  | 57.8  |
|       |    |               | 10/1/2020  | 74.2  | 74.2  |
|       |    |               | 4/15/2021  | 75.5  | 75.5  |
|       |    |               | 10/14/2021 | 73.5  | 73.5  |
|       |    |               | 4/19/2022  | 126   | 126   |
|       |    |               | 9/28/2022  | 181   | 181   |
|       |    |               | 4/18/2023  | 59.5  | 59.5  |
|       |    |               | 8/24/2023  | 110   | 110   |
| <hr/> |    |               |            |       |       |
| MW-20 | 12 | 10 (83.3333%) | 4/17/2018  | ND<4  | ND<4  |
|       |    |               | 10/10/2018 | ND<80 | ND<80 |
|       |    |               | 4/14/2019  | ND<4  | ND<4  |
|       |    |               | 10/2/2019  | ND<5  | ND<5  |
|       |    |               | 4/9/2020   | 2.68  | 2.68  |
|       |    |               | 10/2/2020  | ND<5  | ND<5  |
|       |    |               | 4/15/2021  | 5     | 5     |
|       |    |               | 10/12/2021 | ND<10 | ND<10 |
|       |    |               | 4/20/2022  | ND<10 | ND<10 |
|       |    |               | 9/28/2022  | ND<10 | ND<10 |
|       |    |               | 4/19/2023  | ND<5  | ND<5  |
|       |    |               | 8/23/2023  | ND<5  | ND<5  |
| <hr/> |    |               |            |       |       |
| MW-21 | 12 | 0 (0%)        | 4/17/2018  | 553   | 553   |
|       |    |               | 10/10/2018 | 69.5  | 69.5  |
|       |    |               | 4/13/2019  | 67.6  | 67.6  |
|       |    |               | 10/1/2019  | 47.5  | 47.5  |
|       |    |               | 4/7/2020   | 43.6  | 43.6  |
|       |    |               | 9/30/2020  | 48.6  | 48.6  |
|       |    |               | 4/14/2021  | 51.2  | 51.2  |
|       |    |               | 10/12/2021 | 21.7  | 21.7  |
|       |    |               | 4/20/2022  | 79    | 79    |
|       |    |               | 9/29/2022  | 44.4  | 44.4  |
|       |    |               | 4/18/2023  | 161   | 161   |
|       |    |               | 8/23/2023  | 21.6  | 21.6  |
| <hr/> |    |               |            |       |       |
| MW-25 | 12 | 0 (0%)        | 4/17/2018  | 12    | 12    |
|       |    |               | 10/9/2018  | 277   | 277   |
|       |    |               | 4/13/2019  | 30.1  | 30.1  |
|       |    |               | 10/1/2019  | 79.2  | 79.2  |
|       |    |               | 4/8/2020   | 54.5  | 54.5  |
|       |    |               | 10/1/2020  | 24.1  | 24.1  |
|       |    |               | 4/14/2021  | 16.7  | 16.7  |

|       |    |        |            |      |      |
|-------|----|--------|------------|------|------|
|       |    |        | 10/13/2021 | 29.7 | 29.7 |
|       |    |        | 4/19/2022  | 93.7 | 93.7 |
|       |    |        | 9/29/2022  | 22.3 | 22.3 |
|       |    |        | 4/19/2023  | 3.76 | 3.76 |
|       |    |        | 8/24/2023  | 9.12 | 9.12 |
| <hr/> |    |        |            |      |      |
| MW-26 | 12 | 0 (0%) | 4/17/2018  | 4000 | 4000 |
|       |    |        | 10/9/2018  | 5140 | 5140 |
|       |    |        | 4/13/2019  | 2630 | 2630 |
|       |    |        | 10/1/2019  | 3450 | 3450 |
|       |    |        | 4/8/2020   | 2620 | 2620 |
|       |    |        | 10/1/2020  | 3070 | 3070 |
|       |    |        | 4/14/2021  | 2720 | 2720 |
|       |    |        | 10/13/2021 | 2500 | 2500 |
|       |    |        | 4/19/2022  | 2670 | 2670 |
|       |    |        | 9/29/2022  | 3390 | 3390 |
|       |    |        | 4/19/2023  | 3350 | 3350 |
|       |    |        | 8/24/2023  | 2830 | 2830 |
| <hr/> |    |        |            |      |      |
| MW-27 | 12 | 0 (0%) | 4/18/2018  | 139  | 139  |
|       |    |        | 10/9/2018  | 186  | 186  |
|       |    |        | 4/13/2019  | 138  | 138  |
|       |    |        | 10/1/2019  | 134  | 134  |
|       |    |        | 4/9/2020   | 147  | 147  |
|       |    |        | 10/1/2020  | 128  | 128  |
|       |    |        | 4/14/2021  | 114  | 114  |
|       |    |        | 10/13/2021 | 135  | 135  |
|       |    |        | 4/20/2022  | 131  | 131  |
|       |    |        | 9/28/2022  | 220  | 220  |
|       |    |        | 4/19/2023  | 153  | 153  |
|       |    |        | 8/24/2023  | 162  | 162  |
| <hr/> |    |        |            |      |      |
| SW-01 | 12 | 0 (0%) | 4/16/2018  | 375  | 375  |
|       |    |        | 10/8/2018  | 184  | 184  |
|       |    |        | 4/13/2019  | 510  | 510  |
|       |    |        | 9/30/2019  | 275  | 275  |
|       |    |        | 4/7/2020   | 817  | 817  |
|       |    |        | 10/2/2020  | 533  | 533  |
|       |    |        | 4/13/2021  | 254  | 254  |
|       |    |        | 10/14/2021 | 245  | 245  |
|       |    |        | 4/19/2022  | 340  | 340  |
|       |    |        | 9/27/2022  | 572  | 572  |
|       |    |        | 4/18/2023  | 497  | 497  |
|       |    |        | 8/22/2023  | 710  | 710  |
| <hr/> |    |        |            |      |      |
| SW-02 | 12 | 0 (0%) | 4/16/2018  | 506  | 506  |
|       |    |        | 10/8/2018  | 188  | 188  |
|       |    |        | 4/13/2019  | 350  | 350  |
|       |    |        | 9/30/2019  | 91   | 91   |
|       |    |        | 4/7/2020   | 417  | 417  |
|       |    |        | 10/2/2020  | 292  | 292  |
|       |    |        | 4/13/2021  | 88.2 | 88.2 |
|       |    |        | 10/14/2021 | 195  | 195  |
|       |    |        | 4/19/2022  | 624  | 624  |
|       |    |        | 9/27/2022  | 164  | 164  |
|       |    |        | 4/18/2023  | 741  | 741  |
|       |    |        | 8/22/2023  | 229  | 229  |

There are 0 unused locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: MW-06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.237911 | 0.103553 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-06 | 4/18/2018  | 124   | FALSE   |
|       | 10/10/2018 | 549   | FALSE   |
|       | 4/14/2019  | 78.6  | FALSE   |
|       | 10/2/2019  | 200   | FALSE   |
|       | 4/8/2020   | 90.9  | FALSE   |
|       | 9/30/2020  | 436   | FALSE   |
|       | 4/13/2021  | 55.7  | FALSE   |
|       | 10/14/2021 | 703   | FALSE   |
|       | 4/20/2022  | 72.9  | FALSE   |
|       | 9/27/2022  | 253   | FALSE   |
|       | 4/18/2023  | 14.9  | FALSE   |
|       | 8/23/2023  | 575   | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: MW-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 14.9 | 703      | 688.1         | 0.5475   | 376.735 |
| 2  | 55.7 | 575      | 519.3         | 0.3325   | 172.667 |
| 3  | 72.9 | 549      | 476.1         | 0.2347   | 111.741 |
| 4  | 78.6 | 436      | 357.4         | 0.1586   | 56.6836 |
| 5  | 90.9 | 253      | 162.1         | 0.0922   | 14.9456 |
| 6  | 124  | 200      | 76            | 0.0303   | 2.3028  |
| 7  | 200  | 124      | -76           |          |         |
| 8  | 253  | 90.9     | -162.1        |          |         |
| 9  | 436  | 78.6     | -357.4        |          |         |
| 10 | 549  | 72.9     | -476.1        |          |         |
| 11 | 575  | 55.7     | -519.3        |          |         |
| 12 | 703  | 14.9     | -688.1        |          |         |

---

Sum of b values = 735.075

Sample Standard Deviation = 239.383

W Statistic = 0.857205

**5% Critical value of 0.859 exceeds 0.857205**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.857205

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: MW-06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 549       | 124       | 425            | 1                | 0                |
| 78.6      | 124       | -45.4          | 1                | 1                |
| 200       | 124       | 76             | 2                | 1                |
| 90.9      | 124       | -33.1          | 2                | 2                |
| 436       | 124       | 312            | 3                | 2                |
| 55.7      | 124       | -68.3          | 3                | 3                |
| 703       | 124       | 579            | 4                | 3                |
| 72.9      | 124       | -51.1          | 4                | 4                |
| 253       | 124       | 129            | 5                | 4                |
| 14.9      | 124       | -109.1         | 5                | 5                |
| 575       | 124       | 451            | 6                | 5                |
|           |           |                |                  |                  |
| 78.6      | 549       | -470.4         | 6                | 6                |
| 200       | 549       | -349           | 6                | 7                |
| 90.9      | 549       | -458.1         | 6                | 8                |
| 436       | 549       | -113           | 6                | 9                |
| 55.7      | 549       | -493.3         | 6                | 10               |
| 703       | 549       | 154            | 7                | 10               |
| 72.9      | 549       | -476.1         | 7                | 11               |
| 253       | 549       | -296           | 7                | 12               |
| 14.9      | 549       | -534.1         | 7                | 13               |
| 575       | 549       | 26             | 8                | 13               |
|           |           |                |                  |                  |
| 200       | 78.6      | 121.4          | 9                | 13               |
| 90.9      | 78.6      | 12.3           | 10               | 13               |
| 436       | 78.6      | 357.4          | 11               | 13               |
| 55.7      | 78.6      | -22.9          | 11               | 14               |
| 703       | 78.6      | 624.4          | 12               | 14               |
| 72.9      | 78.6      | -5.7           | 12               | 15               |
| 253       | 78.6      | 174.4          | 13               | 15               |
| 14.9      | 78.6      | -63.7          | 13               | 16               |
| 575       | 78.6      | 496.4          | 14               | 16               |
|           |           |                |                  |                  |
| 90.9      | 200       | -109.1         | 14               | 17               |
| 436       | 200       | 236            | 15               | 17               |
| 55.7      | 200       | -144.3         | 15               | 18               |
| 703       | 200       | 503            | 16               | 18               |
| 72.9      | 200       | -127.1         | 16               | 19               |
| 253       | 200       | 53             | 17               | 19               |
| 14.9      | 200       | -185.1         | 17               | 20               |
| 575       | 200       | 375            | 18               | 20               |
|           |           |                |                  |                  |
| 436       | 90.9      | 345.1          | 19               | 20               |
| 55.7      | 90.9      | -35.2          | 19               | 21               |
| 703       | 90.9      | 612.1          | 20               | 21               |
| 72.9      | 90.9      | -18            | 20               | 22               |
| 253       | 90.9      | 162.1          | 21               | 22               |

|      |      |        |    |    |
|------|------|--------|----|----|
| 14.9 | 90.9 | -76    | 21 | 23 |
| 575  | 90.9 | 484.1  | 22 | 23 |
| 55.7 | 436  | -380.3 | 22 | 24 |
| 703  | 436  | 267    | 23 | 24 |
| 72.9 | 436  | -363.1 | 23 | 25 |
| 253  | 436  | -183   | 23 | 26 |
| 14.9 | 436  | -421.1 | 23 | 27 |
| 575  | 436  | 139    | 24 | 27 |
| 703  | 55.7 | 647.3  | 25 | 27 |
| 72.9 | 55.7 | 17.2   | 26 | 27 |
| 253  | 55.7 | 197.3  | 27 | 27 |
| 14.9 | 55.7 | -40.8  | 27 | 28 |
| 575  | 55.7 | 519.3  | 28 | 28 |
| 72.9 | 703  | -630.1 | 28 | 29 |
| 253  | 703  | -450   | 28 | 30 |
| 14.9 | 703  | -688.1 | 28 | 31 |
| 575  | 703  | -128   | 28 | 32 |
| 253  | 72.9 | 180.1  | 29 | 32 |
| 14.9 | 72.9 | -58    | 29 | 33 |
| 575  | 72.9 | 502.1  | 30 | 33 |
| 14.9 | 253  | -238.1 | 30 | 34 |
| 575  | 253  | 322    | 31 | 34 |
| 575  | 14.9 | 560.1  | 32 | 34 |

S Statistic = 32 - 34 = -2

| Tied Group  | Value        | Members |
|-------------|--------------|---------|
| Time Period | Observations |         |
| 4/18/2018   | 1            |         |
| 10/10/2018  | 1            |         |
| 4/14/2019   | 1            |         |
| 10/2/2019   | 1            |         |
| 4/8/2020    | 1            |         |
| 9/30/2020   | 1            |         |
| 4/13/2021   | 1            |         |
| 10/14/2021  | 1            |         |
| 4/20/2022   | 1            |         |
| 9/27/2022   | 1            |         |
| 4/18/2023   | 1            |         |
| 8/23/2023   | 1            |         |

There are 0 time periods with multiple data

A = 0  
B = 0  
C = 0  
D = 0  
E = 0  
F = 0  
a = 3828

b = 11880

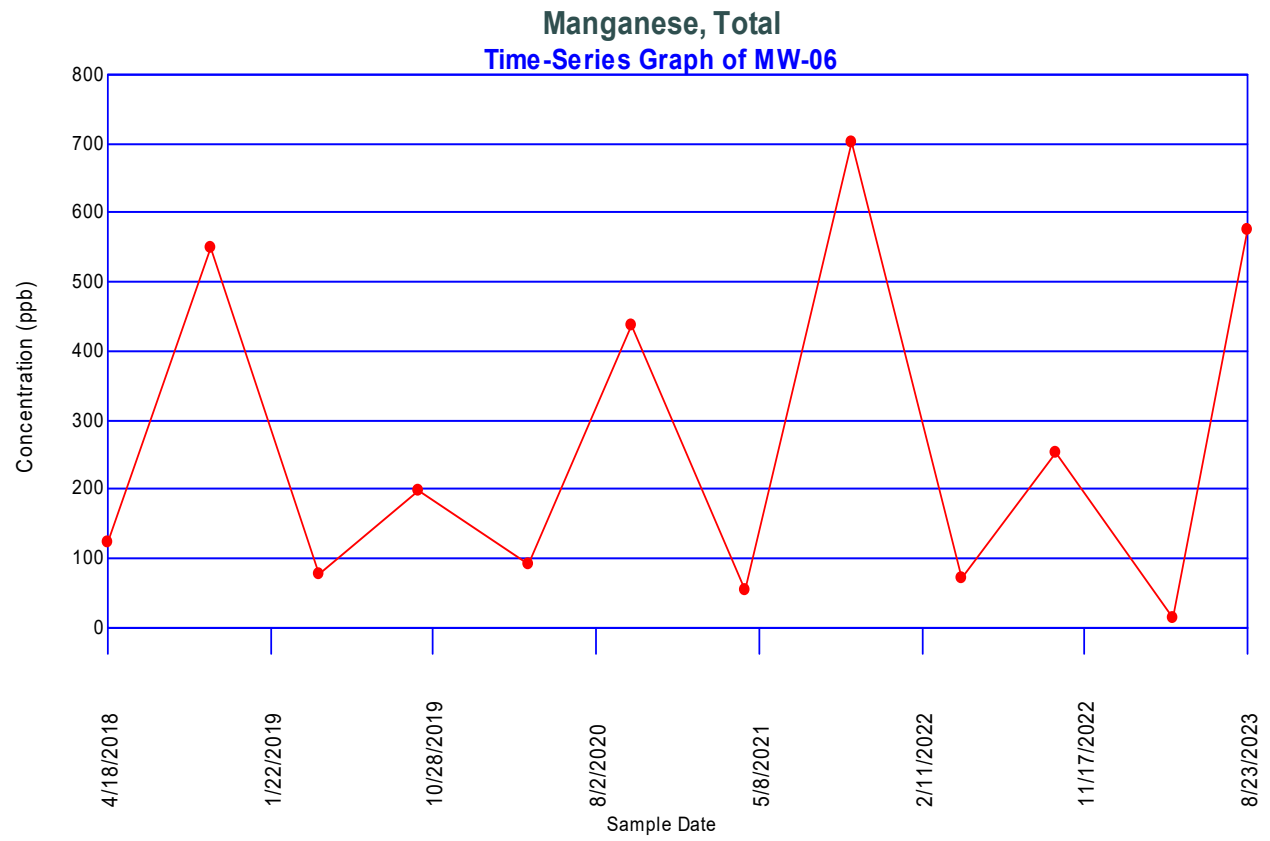
c = 264

Group Variance = 212.667

Z-Score = -0.0685725

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-0.0685725| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: MW-07

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest    | Critical | Outlier |
|-----------|----------|-----------|----------|---------|
| 1         | 0.333082 | 0.0176467 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-07 | 4/18/2018  | 84.4  | FALSE   |
|       | 10/10/2018 | 2330  | FALSE   |
|       | 4/14/2019  | 78.3  | FALSE   |
|       | 10/2/2019  | 1760  | FALSE   |
|       | 4/8/2020   | 1280  | FALSE   |
|       | 9/30/2020  | 1490  | FALSE   |
|       | 4/13/2021  | 1300  | FALSE   |
|       | 10/14/2021 | 1490  | FALSE   |
|       | 4/20/2022  | 1460  | FALSE   |
|       | 9/27/2022  | 1580  | FALSE   |
|       | 4/18/2023  | 54.3  | FALSE   |
|       | 8/23/2023  | 1410  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: MW-07

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 54.3 | 2330     | 2275.7        | 0.5475   | 1245.95 |
| 2  | 78.3 | 1760     | 1681.7        | 0.3325   | 559.165 |
| 3  | 84.4 | 1580     | 1495.6        | 0.2347   | 351.017 |
| 4  | 1280 | 1490     | 210           | 0.1586   | 33.306  |
| 5  | 1300 | 1490     | 190           | 0.0922   | 17.518  |
| 6  | 1410 | 1460     | 50            | 0.0303   | 1.515   |
| 7  | 1460 | 1410     | -50           |          |         |
| 8  | 1490 | 1300     | -190          |          |         |
| 9  | 1490 | 1280     | -210          |          |         |
| 10 | 1580 | 84.4     | -1495.6       |          |         |
| 11 | 1760 | 78.3     | -1681.7       |          |         |
| 12 | 2330 | 54.3     | -2275.7       |          |         |

---

Sum of b values = 2208.47

Sample Standard Deviation = 729.011

W Statistic = 0.834298

**5% Critical value of 0.859 exceeds 0.834298**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.834298

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: MW-07**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 2330      | 84.4      | 2245.6         | 1                | 0                |
| 78.3      | 84.4      | -6.1           | 1                | 1                |
| 1760      | 84.4      | 1675.6         | 2                | 1                |
| 1280      | 84.4      | 1195.6         | 3                | 1                |
| 1490      | 84.4      | 1405.6         | 4                | 1                |
| 1300      | 84.4      | 1215.6         | 5                | 1                |
| 1490      | 84.4      | 1405.6         | 6                | 1                |
| 1460      | 84.4      | 1375.6         | 7                | 1                |
| 1580      | 84.4      | 1495.6         | 8                | 1                |
| 54.3      | 84.4      | -30.1          | 8                | 2                |
| 1410      | 84.4      | 1325.6         | 9                | 2                |
|           |           |                |                  |                  |
| 78.3      | 2330      | -2251.7        | 9                | 3                |
| 1760      | 2330      | -570           | 9                | 4                |
| 1280      | 2330      | -1050          | 9                | 5                |
| 1490      | 2330      | -840           | 9                | 6                |
| 1300      | 2330      | -1030          | 9                | 7                |
| 1490      | 2330      | -840           | 9                | 8                |
| 1460      | 2330      | -870           | 9                | 9                |
| 1580      | 2330      | -750           | 9                | 10               |
| 54.3      | 2330      | -2275.7        | 9                | 11               |
| 1410      | 2330      | -920           | 9                | 12               |
|           |           |                |                  |                  |
| 1760      | 78.3      | 1681.7         | 10               | 12               |
| 1280      | 78.3      | 1201.7         | 11               | 12               |
| 1490      | 78.3      | 1411.7         | 12               | 12               |
| 1300      | 78.3      | 1221.7         | 13               | 12               |
| 1490      | 78.3      | 1411.7         | 14               | 12               |
| 1460      | 78.3      | 1381.7         | 15               | 12               |
| 1580      | 78.3      | 1501.7         | 16               | 12               |
| 54.3      | 78.3      | -24            | 16               | 13               |
| 1410      | 78.3      | 1331.7         | 17               | 13               |
|           |           |                |                  |                  |
| 1280      | 1760      | -480           | 17               | 14               |
| 1490      | 1760      | -270           | 17               | 15               |
| 1300      | 1760      | -460           | 17               | 16               |
| 1490      | 1760      | -270           | 17               | 17               |
| 1460      | 1760      | -300           | 17               | 18               |
| 1580      | 1760      | -180           | 17               | 19               |
| 54.3      | 1760      | -1705.7        | 17               | 20               |
| 1410      | 1760      | -350           | 17               | 21               |
|           |           |                |                  |                  |
| 1490      | 1280      | 210            | 18               | 21               |
| 1300      | 1280      | 20             | 19               | 21               |
| 1490      | 1280      | 210            | 20               | 21               |
| 1460      | 1280      | 180            | 21               | 21               |
| 1580      | 1280      | 300            | 22               | 21               |

|      |      |         |    |    |
|------|------|---------|----|----|
| 54.3 | 1280 | -1225.7 | 22 | 22 |
| 1410 | 1280 | 130     | 23 | 22 |
| 1300 | 1490 | -190    | 23 | 23 |
| 1490 | 1490 | 0       | 23 | 23 |
| 1460 | 1490 | -30     | 23 | 24 |
| 1580 | 1490 | 90      | 24 | 24 |
| 54.3 | 1490 | -1435.7 | 24 | 25 |
| 1410 | 1490 | -80     | 24 | 26 |
| 1490 | 1300 | 190     | 25 | 26 |
| 1460 | 1300 | 160     | 26 | 26 |
| 1580 | 1300 | 280     | 27 | 26 |
| 54.3 | 1300 | -1245.7 | 27 | 27 |
| 1410 | 1300 | 110     | 28 | 27 |
| 1460 | 1490 | -30     | 28 | 28 |
| 1580 | 1490 | 90      | 29 | 28 |
| 54.3 | 1490 | -1435.7 | 29 | 29 |
| 1410 | 1490 | -80     | 29 | 30 |
| 1580 | 1460 | 120     | 30 | 30 |
| 54.3 | 1460 | -1405.7 | 30 | 31 |
| 1410 | 1460 | -50     | 30 | 32 |
| 54.3 | 1580 | -1525.7 | 30 | 33 |
| 1410 | 1580 | -170    | 30 | 34 |
| 1410 | 54.3 | 1355.7  | 31 | 34 |

S Statistic = 31 - 34 = -3

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| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 1490  | 2       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/10/2018  | 1            |
| 4/14/2019   | 1            |
| 10/2/2019   | 1            |
| 4/8/2020    | 1            |
| 9/30/2020   | 1            |
| 4/13/2021   | 1            |
| 10/14/2021  | 1            |
| 4/20/2022   | 1            |
| 9/27/2022   | 1            |
| 4/18/2023   | 1            |
| 8/23/2023   | 1            |

There are 0 time periods with multiple data

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A = 18  
B = 0  
C = 0  
D = 0  
E = 2  
F = 0

a = 3828

b = 11880

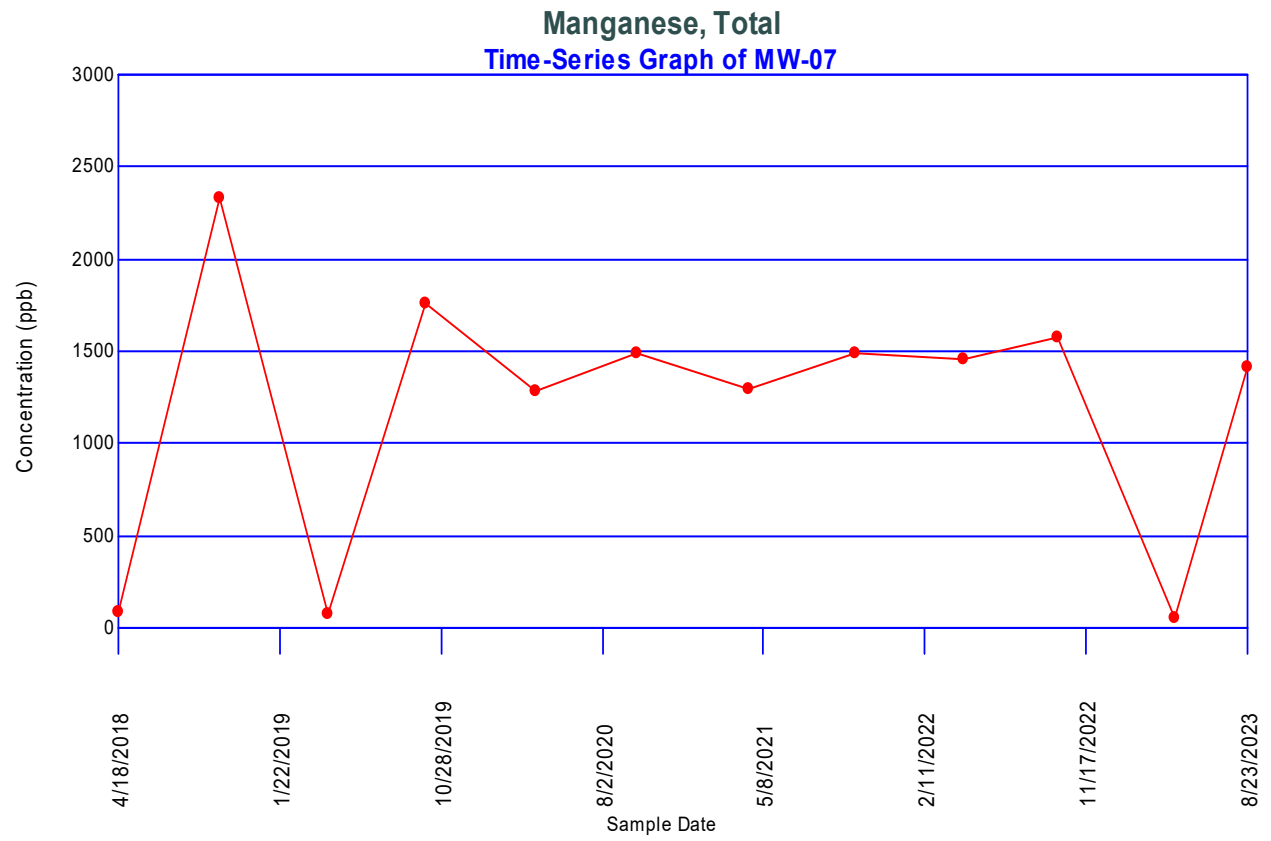
c = 264

Group Variance = 211.667

Z-Score = -0.137469

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-0.137469| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: MW-16

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.840719 | 0.117695 | 0.546    | 477     |
| 2         | 0.584362 | 0.21261  | 0.576    | 181     |
| 3         | 0.240602 | 0.032567 | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-16 | 4/17/2018  | 477   | TRUE    |
|       | 10/9/2018  | 91    | FALSE   |
|       | 4/14/2019  | 97.1  | FALSE   |
|       | 10/2/2019  | 72.3  | FALSE   |
|       | 4/9/2020   | 57.8  | FALSE   |
|       | 10/1/2020  | 74.2  | FALSE   |
|       | 4/15/2021  | 75.5  | FALSE   |
|       | 10/14/2021 | 73.5  | FALSE   |
|       | 4/19/2022  | 126   | FALSE   |
|       | 9/28/2022  | 181   | TRUE    |
|       | 4/18/2023  | 59.5  | FALSE   |
|       | 8/24/2023  | 110   | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: MW-16

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 57.8 | 477      | 419.2         | 0.5475   | 229.512 |
| 2  | 59.5 | 181      | 121.5         | 0.3325   | 40.3988 |
| 3  | 72.3 | 126      | 53.7          | 0.2347   | 12.6034 |
| 4  | 73.5 | 110      | 36.5          | 0.1586   | 5.7889  |
| 5  | 74.2 | 97.1     | 22.9          | 0.0922   | 2.11138 |
| 6  | 75.5 | 91       | 15.5          | 0.0303   | 0.46965 |
| 7  | 91   | 75.5     | -15.5         |          |         |
| 8  | 97.1 | 74.2     | -22.9         |          |         |
| 9  | 110  | 73.5     | -36.5         |          |         |
| 10 | 126  | 72.3     | -53.7         |          |         |
| 11 | 181  | 59.5     | -121.5        |          |         |
| 12 | 477  | 57.8     | -419.2        |          |         |

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Sum of b values = 290.884

Sample Standard Deviation = 116.176

W Statistic = 0.569923

**5% Critical value of 0.859 exceeds 0.569923**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.569923**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: MW-16**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 91        | 477       | -386           | 0                | 1                |
| 97.1      | 477       | -379.9         | 0                | 2                |
| 72.3      | 477       | -404.7         | 0                | 3                |
| 57.8      | 477       | -419.2         | 0                | 4                |
| 74.2      | 477       | -402.8         | 0                | 5                |
| 75.5      | 477       | -401.5         | 0                | 6                |
| 73.5      | 477       | -403.5         | 0                | 7                |
| 126       | 477       | -351           | 0                | 8                |
| 181       | 477       | -296           | 0                | 9                |
| 59.5      | 477       | -417.5         | 0                | 10               |
| 110       | 477       | -367           | 0                | 11               |
| 97.1      | 91        | 6.1            | 1                | 11               |
| 72.3      | 91        | -18.7          | 1                | 12               |
| 57.8      | 91        | -33.2          | 1                | 13               |
| 74.2      | 91        | -16.8          | 1                | 14               |
| 75.5      | 91        | -15.5          | 1                | 15               |
| 73.5      | 91        | -17.5          | 1                | 16               |
| 126       | 91        | 35             | 2                | 16               |
| 181       | 91        | 90             | 3                | 16               |
| 59.5      | 91        | -31.5          | 3                | 17               |
| 110       | 91        | 19             | 4                | 17               |
| 72.3      | 97.1      | -24.8          | 4                | 18               |
| 57.8      | 97.1      | -39.3          | 4                | 19               |
| 74.2      | 97.1      | -22.9          | 4                | 20               |
| 75.5      | 97.1      | -21.6          | 4                | 21               |
| 73.5      | 97.1      | -23.6          | 4                | 22               |
| 126       | 97.1      | 28.9           | 5                | 22               |
| 181       | 97.1      | 83.9           | 6                | 22               |
| 59.5      | 97.1      | -37.6          | 6                | 23               |
| 110       | 97.1      | 12.9           | 7                | 23               |
| 57.8      | 72.3      | -14.5          | 7                | 24               |
| 74.2      | 72.3      | 1.9            | 8                | 24               |
| 75.5      | 72.3      | 3.2            | 9                | 24               |
| 73.5      | 72.3      | 1.2            | 10               | 24               |
| 126       | 72.3      | 53.7           | 11               | 24               |
| 181       | 72.3      | 108.7          | 12               | 24               |
| 59.5      | 72.3      | -12.8          | 12               | 25               |
| 110       | 72.3      | 37.7           | 13               | 25               |
| 74.2      | 57.8      | 16.4           | 14               | 25               |
| 75.5      | 57.8      | 17.7           | 15               | 25               |
| 73.5      | 57.8      | 15.7           | 16               | 25               |
| 126       | 57.8      | 68.2           | 17               | 25               |
| 181       | 57.8      | 123.2          | 18               | 25               |

|      |      |        |    |    |
|------|------|--------|----|----|
| 59.5 | 57.8 | 1.7    | 19 | 25 |
| 110  | 57.8 | 52.2   | 20 | 25 |
| 75.5 | 74.2 | 1.3    | 21 | 25 |
| 73.5 | 74.2 | -0.7   | 21 | 26 |
| 126  | 74.2 | 51.8   | 22 | 26 |
| 181  | 74.2 | 106.8  | 23 | 26 |
| 59.5 | 74.2 | -14.7  | 23 | 27 |
| 110  | 74.2 | 35.8   | 24 | 27 |
| 73.5 | 75.5 | -2     | 24 | 28 |
| 126  | 75.5 | 50.5   | 25 | 28 |
| 181  | 75.5 | 105.5  | 26 | 28 |
| 59.5 | 75.5 | -16    | 26 | 29 |
| 110  | 75.5 | 34.5   | 27 | 29 |
| 126  | 73.5 | 52.5   | 28 | 29 |
| 181  | 73.5 | 107.5  | 29 | 29 |
| 59.5 | 73.5 | -14    | 29 | 30 |
| 110  | 73.5 | 36.5   | 30 | 30 |
| 181  | 126  | 55     | 31 | 30 |
| 59.5 | 126  | -66.5  | 31 | 31 |
| 110  | 126  | -16    | 31 | 32 |
| 59.5 | 181  | -121.5 | 31 | 33 |
| 110  | 181  | -71    | 31 | 34 |
| 110  | 59.5 | 50.5   | 32 | 34 |

S Statistic = 32 - 34 = -2

| Tied Group  | Value        | Members |
|-------------|--------------|---------|
| Time Period | Observations |         |
| 4/17/2018   | 1            |         |
| 10/9/2018   | 1            |         |
| 4/14/2019   | 1            |         |
| 10/2/2019   | 1            |         |
| 4/9/2020    | 1            |         |
| 10/1/2020   | 1            |         |
| 4/15/2021   | 1            |         |
| 10/14/2021  | 1            |         |
| 4/19/2022   | 1            |         |
| 9/28/2022   | 1            |         |
| 4/18/2023   | 1            |         |
| 8/24/2023   | 1            |         |

There are 0 time periods with multiple data

A = 0  
B = 0  
C = 0  
D = 0  
E = 0  
F = 0  
a = 3828

b = 11880

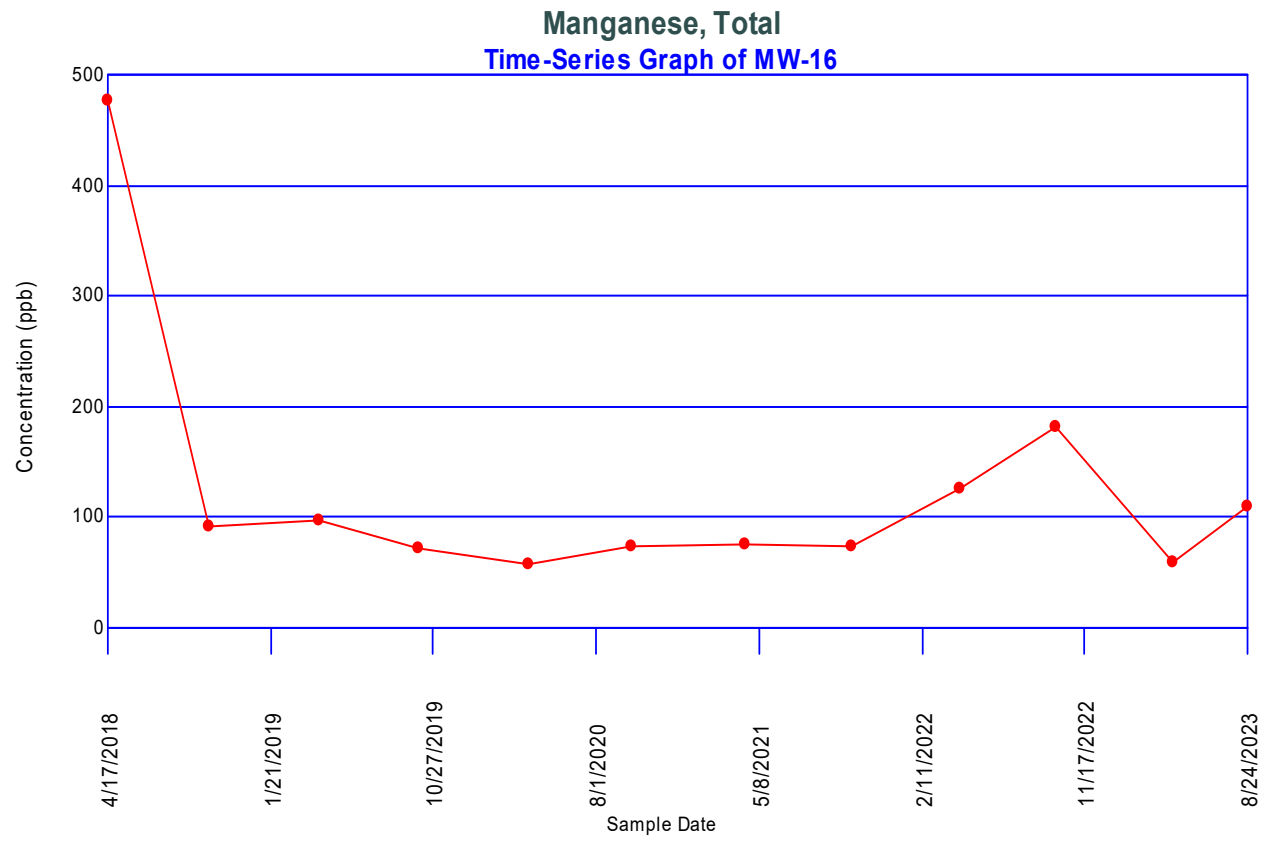
c = 264

Group Variance = 212.667

Z-Score = -0.0685725

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-0.0685725| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: MW-21

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest     | Critical | Outlier |
|-----------|----------|------------|----------|---------|
| 1         | 0.892151 | 0.157819   | 0.546    | 553     |
| 2         | 0.656856 | 0.383275   | 0.576    | 161     |
| 3         | 0.165794 | 0.00208768 | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-21 | 4/17/2018  | 553   | TRUE    |
|       | 10/10/2018 | 69.5  | FALSE   |
|       | 4/13/2019  | 67.6  | FALSE   |
|       | 10/1/2019  | 47.5  | FALSE   |
|       | 4/7/2020   | 43.6  | FALSE   |
|       | 9/30/2020  | 48.6  | FALSE   |
|       | 4/14/2021  | 51.2  | FALSE   |
|       | 10/12/2021 | 21.7  | FALSE   |
|       | 4/20/2022  | 79    | FALSE   |
|       | 9/29/2022  | 44.4  | FALSE   |
|       | 4/18/2023  | 161   | TRUE    |
|       | 8/23/2023  | 21.6  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: MW-21

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 21.6 | 553      | 531.4         | 0.5475   | 290.941 |
| 2  | 21.7 | 161      | 139.3         | 0.3325   | 46.3173 |
| 3  | 43.6 | 79       | 35.4          | 0.2347   | 8.30838 |
| 4  | 44.4 | 69.5     | 25.1          | 0.1586   | 3.98086 |
| 5  | 47.5 | 67.6     | 20.1          | 0.0922   | 1.85322 |
| 6  | 48.6 | 51.2     | 2.6           | 0.0303   | 0.07878 |
| 7  | 51.2 | 48.6     | -2.6          |          |         |
| 8  | 67.6 | 47.5     | -20.1         |          |         |
| 9  | 69.5 | 44.4     | -25.1         |          |         |
| 10 | 79   | 43.6     | -35.4         |          |         |
| 11 | 161  | 21.7     | -139.3        |          |         |
| 12 | 553  | 21.6     | -531.4        |          |         |

---

Sum of b values = 351.48

Sample Standard Deviation = 146.992

W Statistic = 0.51978

**5% Critical value of 0.859 exceeds 0.51978**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.51978**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: MW-21**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 69.5      | 553       | -483.5         | 0                | 1                |
| 67.6      | 553       | -485.4         | 0                | 2                |
| 47.5      | 553       | -505.5         | 0                | 3                |
| 43.6      | 553       | -509.4         | 0                | 4                |
| 48.6      | 553       | -504.4         | 0                | 5                |
| 51.2      | 553       | -501.8         | 0                | 6                |
| 21.7      | 553       | -531.3         | 0                | 7                |
| 79        | 553       | -474           | 0                | 8                |
| 44.4      | 553       | -508.6         | 0                | 9                |
| 161       | 553       | -392           | 0                | 10               |
| 21.6      | 553       | -531.4         | 0                | 11               |
| 67.6      | 69.5      | -1.9           | 0                | 12               |
| 47.5      | 69.5      | -22            | 0                | 13               |
| 43.6      | 69.5      | -25.9          | 0                | 14               |
| 48.6      | 69.5      | -20.9          | 0                | 15               |
| 51.2      | 69.5      | -18.3          | 0                | 16               |
| 21.7      | 69.5      | -47.8          | 0                | 17               |
| 79        | 69.5      | 9.5            | 1                | 17               |
| 44.4      | 69.5      | -25.1          | 1                | 18               |
| 161       | 69.5      | 91.5           | 2                | 18               |
| 21.6      | 69.5      | -47.9          | 2                | 19               |
| 47.5      | 67.6      | -20.1          | 2                | 20               |
| 43.6      | 67.6      | -24            | 2                | 21               |
| 48.6      | 67.6      | -19            | 2                | 22               |
| 51.2      | 67.6      | -16.4          | 2                | 23               |
| 21.7      | 67.6      | -45.9          | 2                | 24               |
| 79        | 67.6      | 11.4           | 3                | 24               |
| 44.4      | 67.6      | -23.2          | 3                | 25               |
| 161       | 67.6      | 93.4           | 4                | 25               |
| 21.6      | 67.6      | -46            | 4                | 26               |
| 43.6      | 47.5      | -3.9           | 4                | 27               |
| 48.6      | 47.5      | 1.1            | 5                | 27               |
| 51.2      | 47.5      | 3.7            | 6                | 27               |
| 21.7      | 47.5      | -25.8          | 6                | 28               |
| 79        | 47.5      | 31.5           | 7                | 28               |
| 44.4      | 47.5      | -3.1           | 7                | 29               |
| 161       | 47.5      | 113.5          | 8                | 29               |
| 21.6      | 47.5      | -25.9          | 8                | 30               |
| 48.6      | 43.6      | 5              | 9                | 30               |
| 51.2      | 43.6      | 7.6            | 10               | 30               |
| 21.7      | 43.6      | -21.9          | 10               | 31               |
| 79        | 43.6      | 35.4           | 11               | 31               |
| 44.4      | 43.6      | 0.8            | 12               | 31               |

|      |      |        |    |    |
|------|------|--------|----|----|
| 161  | 43.6 | 117.4  | 13 | 31 |
| 21.6 | 43.6 | -22    | 13 | 32 |
| 51.2 | 48.6 | 2.6    | 14 | 32 |
| 21.7 | 48.6 | -26.9  | 14 | 33 |
| 79   | 48.6 | 30.4   | 15 | 33 |
| 44.4 | 48.6 | -4.2   | 15 | 34 |
| 161  | 48.6 | 112.4  | 16 | 34 |
| 21.6 | 48.6 | -27    | 16 | 35 |
| 21.7 | 51.2 | -29.5  | 16 | 36 |
| 79   | 51.2 | 27.8   | 17 | 36 |
| 44.4 | 51.2 | -6.8   | 17 | 37 |
| 161  | 51.2 | 109.8  | 18 | 37 |
| 21.6 | 51.2 | -29.6  | 18 | 38 |
| 79   | 21.7 | 57.3   | 19 | 38 |
| 44.4 | 21.7 | 22.7   | 20 | 38 |
| 161  | 21.7 | 139.3  | 21 | 38 |
| 21.6 | 21.7 | -0.1   | 21 | 39 |
| 44.4 | 79   | -34.6  | 21 | 40 |
| 161  | 79   | 82     | 22 | 40 |
| 21.6 | 79   | -57.4  | 22 | 41 |
| 161  | 44.4 | 116.6  | 23 | 41 |
| 21.6 | 44.4 | -22.8  | 23 | 42 |
| 21.6 | 161  | -139.4 | 23 | 43 |

S Statistic = 23 - 43 = -20

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/17/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 4/13/2019                                   | 1            |         |
| 10/1/2019                                   | 1            |         |
| 4/7/2020                                    | 1            |         |
| 9/30/2020                                   | 1            |         |
| 4/14/2021                                   | 1            |         |
| 10/12/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/29/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

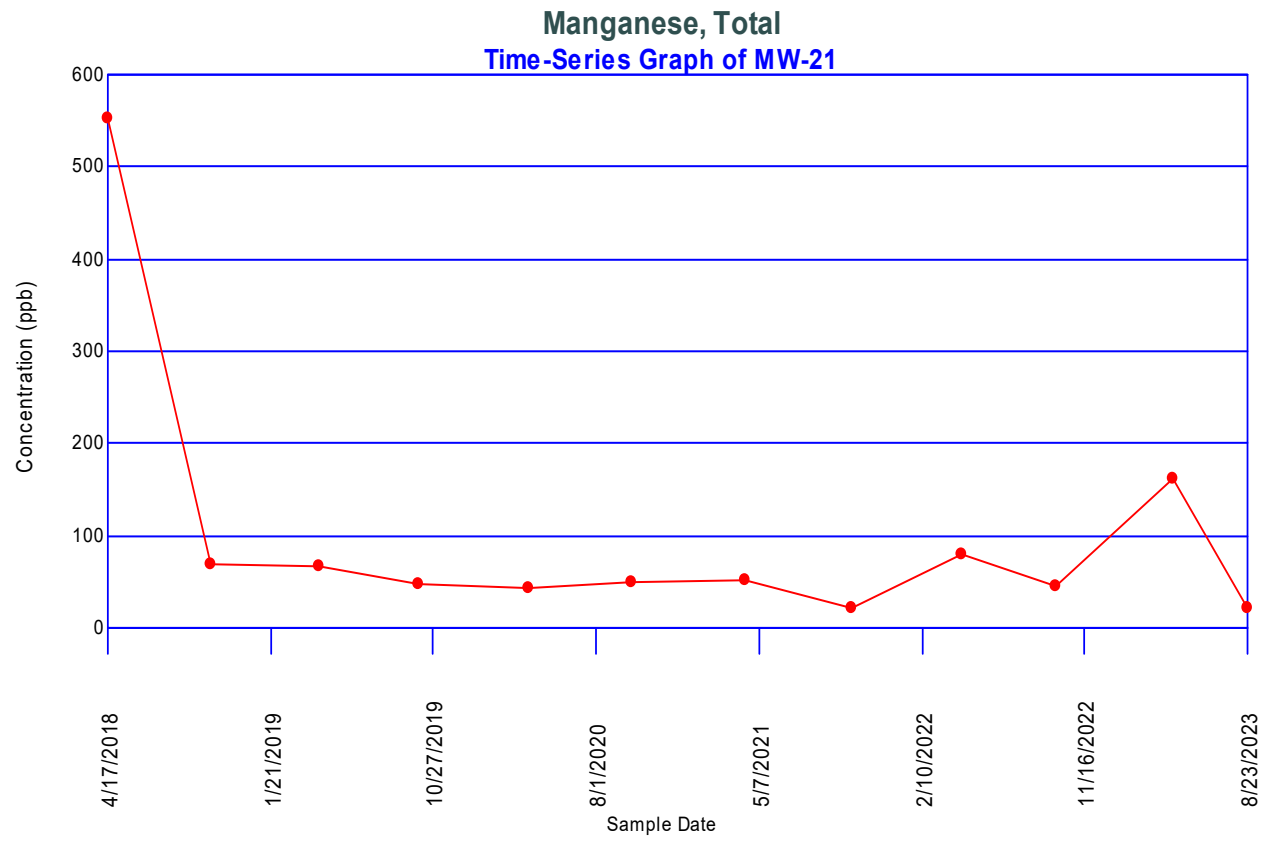
c = 264

Group Variance = 212.667

Z-Score = -1.30288

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.30288| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: MW-26

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest    | Critical | Outlier |
|-----------|----------|-----------|----------|---------|
| 1         | 0.670635 | 0.0866667 | 0.546    | 5140    |
| 2         | 0.442029 | 0.136842  | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-26 | 4/17/2018  | 4000  | FALSE   |
|       | 10/9/2018  | 5140  | TRUE    |
|       | 4/13/2019  | 2630  | FALSE   |
|       | 10/1/2019  | 3450  | FALSE   |
|       | 4/8/2020   | 2620  | FALSE   |
|       | 10/1/2020  | 3070  | FALSE   |
|       | 4/14/2021  | 2720  | FALSE   |
|       | 10/13/2021 | 2500  | FALSE   |
|       | 4/19/2022  | 2670  | FALSE   |
|       | 9/29/2022  | 3390  | FALSE   |
|       | 4/19/2023  | 3350  | FALSE   |
|       | 8/24/2023  | 2830  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: MW-26

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 2500 | 5140     | 2640          | 0.5475   | 1445.4  |
| 2  | 2620 | 4000     | 1380          | 0.3325   | 458.85  |
| 3  | 2630 | 3450     | 820           | 0.2347   | 192.454 |
| 4  | 2670 | 3390     | 720           | 0.1586   | 114.192 |
| 5  | 2720 | 3350     | 630           | 0.0922   | 58.086  |
| 6  | 2830 | 3070     | 240           | 0.0303   | 7.272   |
| 7  | 3070 | 2830     | -240          |          |         |
| 8  | 3350 | 2720     | -630          |          |         |
| 9  | 3390 | 2670     | -720          |          |         |
| 10 | 3450 | 2630     | -820          |          |         |
| 11 | 4000 | 2620     | -1380         |          |         |
| 12 | 5140 | 2500     | -2640         |          |         |

---

Sum of b values = 2276.25

Sample Standard Deviation = 759.248

W Statistic = 0.817113

**5% Critical value of 0.859 exceeds 0.817113**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.817113

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: MW-26**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 5140      | 4000      | 1140           | 1                | 0                |
| 2630      | 4000      | -1370          | 1                | 1                |
| 3450      | 4000      | -550           | 1                | 2                |
| 2620      | 4000      | -1380          | 1                | 3                |
| 3070      | 4000      | -930           | 1                | 4                |
| 2720      | 4000      | -1280          | 1                | 5                |
| 2500      | 4000      | -1500          | 1                | 6                |
| 2670      | 4000      | -1330          | 1                | 7                |
| 3390      | 4000      | -610           | 1                | 8                |
| 3350      | 4000      | -650           | 1                | 9                |
| 2830      | 4000      | -1170          | 1                | 10               |
|           |           |                |                  |                  |
| 2630      | 5140      | -2510          | 1                | 11               |
| 3450      | 5140      | -1690          | 1                | 12               |
| 2620      | 5140      | -2520          | 1                | 13               |
| 3070      | 5140      | -2070          | 1                | 14               |
| 2720      | 5140      | -2420          | 1                | 15               |
| 2500      | 5140      | -2640          | 1                | 16               |
| 2670      | 5140      | -2470          | 1                | 17               |
| 3390      | 5140      | -1750          | 1                | 18               |
| 3350      | 5140      | -1790          | 1                | 19               |
| 2830      | 5140      | -2310          | 1                | 20               |
|           |           |                |                  |                  |
| 3450      | 2630      | 820            | 2                | 20               |
| 2620      | 2630      | -10            | 2                | 21               |
| 3070      | 2630      | 440            | 3                | 21               |
| 2720      | 2630      | 90             | 4                | 21               |
| 2500      | 2630      | -130           | 4                | 22               |
| 2670      | 2630      | 40             | 5                | 22               |
| 3390      | 2630      | 760            | 6                | 22               |
| 3350      | 2630      | 720            | 7                | 22               |
| 2830      | 2630      | 200            | 8                | 22               |
|           |           |                |                  |                  |
| 2620      | 3450      | -830           | 8                | 23               |
| 3070      | 3450      | -380           | 8                | 24               |
| 2720      | 3450      | -730           | 8                | 25               |
| 2500      | 3450      | -950           | 8                | 26               |
| 2670      | 3450      | -780           | 8                | 27               |
| 3390      | 3450      | -60            | 8                | 28               |
| 3350      | 3450      | -100           | 8                | 29               |
| 2830      | 3450      | -620           | 8                | 30               |
|           |           |                |                  |                  |
| 3070      | 2620      | 450            | 9                | 30               |
| 2720      | 2620      | 100            | 10               | 30               |
| 2500      | 2620      | -120           | 10               | 31               |
| 2670      | 2620      | 50             | 11               | 31               |
| 3390      | 2620      | 770            | 12               | 31               |

|      |      |      |    |    |
|------|------|------|----|----|
| 3350 | 2620 | 730  | 13 | 31 |
| 2830 | 2620 | 210  | 14 | 31 |
| 2720 | 3070 | -350 | 14 | 32 |
| 2500 | 3070 | -570 | 14 | 33 |
| 2670 | 3070 | -400 | 14 | 34 |
| 3390 | 3070 | 320  | 15 | 34 |
| 3350 | 3070 | 280  | 16 | 34 |
| 2830 | 3070 | -240 | 16 | 35 |
| 2500 | 2720 | -220 | 16 | 36 |
| 2670 | 2720 | -50  | 16 | 37 |
| 3390 | 2720 | 670  | 17 | 37 |
| 3350 | 2720 | 630  | 18 | 37 |
| 2830 | 2720 | 110  | 19 | 37 |
| 2670 | 2500 | 170  | 20 | 37 |
| 3390 | 2500 | 890  | 21 | 37 |
| 3350 | 2500 | 850  | 22 | 37 |
| 2830 | 2500 | 330  | 23 | 37 |
| 3390 | 2670 | 720  | 24 | 37 |
| 3350 | 2670 | 680  | 25 | 37 |
| 2830 | 2670 | 160  | 26 | 37 |
| 3350 | 3390 | -40  | 26 | 38 |
| 2830 | 3390 | -560 | 26 | 39 |
| 2830 | 3350 | -520 | 26 | 40 |

S Statistic = 26 - 40 = -14

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/17/2018                                   | 1            |         |
| 10/9/2018                                   | 1            |         |
| 4/13/2019                                   | 1            |         |
| 10/1/2019                                   | 1            |         |
| 4/8/2020                                    | 1            |         |
| 10/1/2020                                   | 1            |         |
| 4/14/2021                                   | 1            |         |
| 10/13/2021                                  | 1            |         |
| 4/19/2022                                   | 1            |         |
| 9/29/2022                                   | 1            |         |
| 4/19/2023                                   | 1            |         |
| 8/24/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

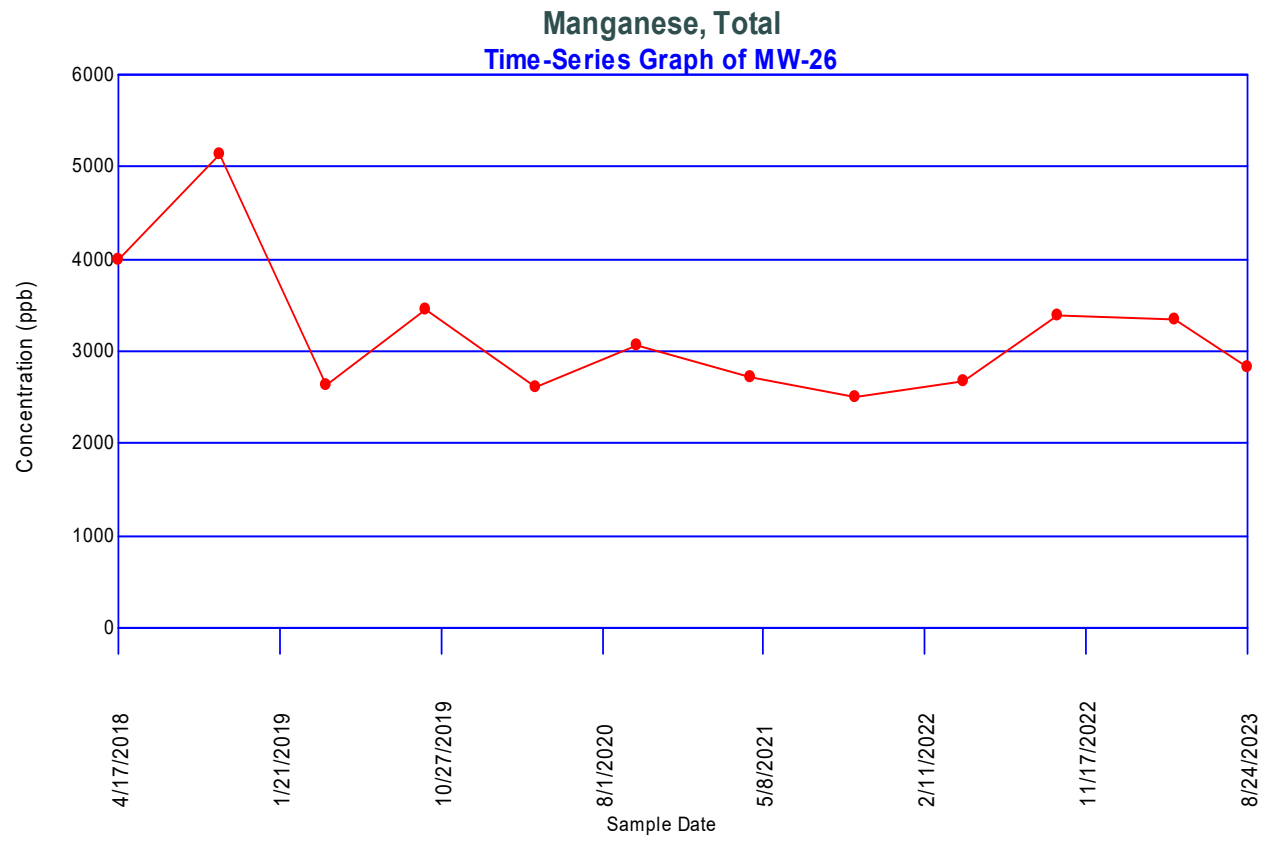
c = 264

Group Variance = 212.667

Z-Score = -0.891443

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-0.891443| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: SW-01

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest  | Critical | Outlier |
|-----------|----------|---------|----------|---------|
| 1         | 0.428322 | 0.13308 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| SW-01 | 4/16/2018  | 375   | FALSE   |
|       | 10/8/2018  | 184   | FALSE   |
|       | 4/13/2019  | 510   | FALSE   |
|       | 9/30/2019  | 275   | FALSE   |
|       | 4/7/2020   | 817   | FALSE   |
|       | 10/2/2020  | 533   | FALSE   |
|       | 4/13/2021  | 254   | FALSE   |
|       | 10/14/2021 | 245   | FALSE   |
|       | 4/19/2022  | 340   | FALSE   |
|       | 9/27/2022  | 572   | FALSE   |
|       | 4/18/2023  | 497   | FALSE   |
|       | 8/22/2023  | 710   | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: SW-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 184  | 817      | 633           | 0.5475   | 346.568 |
| 2  | 245  | 710      | 465           | 0.3325   | 154.613 |
| 3  | 254  | 572      | 318           | 0.2347   | 74.6346 |
| 4  | 275  | 533      | 258           | 0.1586   | 40.9188 |
| 5  | 340  | 510      | 170           | 0.0922   | 15.674  |
| 6  | 375  | 497      | 122           | 0.0303   | 3.6966  |
| 7  | 497  | 375      | -122          |          |         |
| 8  | 510  | 340      | -170          |          |         |
| 9  | 533  | 275      | -258          |          |         |
| 10 | 572  | 254      | -318          |          |         |
| 11 | 710  | 245      | -465          |          |         |
| 12 | 817  | 184      | -633          |          |         |

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Sum of b values = 636.104

Sample Standard Deviation = 197.432

W Statistic = 0.94369

5% Critical value of 0.859 is less than 0.94369

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.94369

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: SW-01**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 184       | 375       | -191           | 0                | 1                |
| 510       | 375       | 135            | 1                | 1                |
| 275       | 375       | -100           | 1                | 2                |
| 817       | 375       | 442            | 2                | 2                |
| 533       | 375       | 158            | 3                | 2                |
| 254       | 375       | -121           | 3                | 3                |
| 245       | 375       | -130           | 3                | 4                |
| 340       | 375       | -35            | 3                | 5                |
| 572       | 375       | 197            | 4                | 5                |
| 497       | 375       | 122            | 5                | 5                |
| 710       | 375       | 335            | 6                | 5                |
|           |           |                |                  |                  |
| 510       | 184       | 326            | 7                | 5                |
| 275       | 184       | 91             | 8                | 5                |
| 817       | 184       | 633            | 9                | 5                |
| 533       | 184       | 349            | 10               | 5                |
| 254       | 184       | 70             | 11               | 5                |
| 245       | 184       | 61             | 12               | 5                |
| 340       | 184       | 156            | 13               | 5                |
| 572       | 184       | 388            | 14               | 5                |
| 497       | 184       | 313            | 15               | 5                |
| 710       | 184       | 526            | 16               | 5                |
|           |           |                |                  |                  |
| 275       | 510       | -235           | 16               | 6                |
| 817       | 510       | 307            | 17               | 6                |
| 533       | 510       | 23             | 18               | 6                |
| 254       | 510       | -256           | 18               | 7                |
| 245       | 510       | -265           | 18               | 8                |
| 340       | 510       | -170           | 18               | 9                |
| 572       | 510       | 62             | 19               | 9                |
| 497       | 510       | -13            | 19               | 10               |
| 710       | 510       | 200            | 20               | 10               |
|           |           |                |                  |                  |
| 817       | 275       | 542            | 21               | 10               |
| 533       | 275       | 258            | 22               | 10               |
| 254       | 275       | -21            | 22               | 11               |
| 245       | 275       | -30            | 22               | 12               |
| 340       | 275       | 65             | 23               | 12               |
| 572       | 275       | 297            | 24               | 12               |
| 497       | 275       | 222            | 25               | 12               |
| 710       | 275       | 435            | 26               | 12               |
|           |           |                |                  |                  |
| 533       | 817       | -284           | 26               | 13               |
| 254       | 817       | -563           | 26               | 14               |
| 245       | 817       | -572           | 26               | 15               |
| 340       | 817       | -477           | 26               | 16               |
| 572       | 817       | -245           | 26               | 17               |

|     |     |      |    |    |
|-----|-----|------|----|----|
| 497 | 817 | -320 | 26 | 18 |
| 710 | 817 | -107 | 26 | 19 |
| 254 | 533 | -279 | 26 | 20 |
| 245 | 533 | -288 | 26 | 21 |
| 340 | 533 | -193 | 26 | 22 |
| 572 | 533 | 39   | 27 | 22 |
| 497 | 533 | -36  | 27 | 23 |
| 710 | 533 | 177  | 28 | 23 |
| 245 | 254 | -9   | 28 | 24 |
| 340 | 254 | 86   | 29 | 24 |
| 572 | 254 | 318  | 30 | 24 |
| 497 | 254 | 243  | 31 | 24 |
| 710 | 254 | 456  | 32 | 24 |
| 340 | 245 | 95   | 33 | 24 |
| 572 | 245 | 327  | 34 | 24 |
| 497 | 245 | 252  | 35 | 24 |
| 710 | 245 | 465  | 36 | 24 |
| 572 | 340 | 232  | 37 | 24 |
| 497 | 340 | 157  | 38 | 24 |
| 710 | 340 | 370  | 39 | 24 |
| 497 | 572 | -75  | 39 | 25 |
| 710 | 572 | 138  | 40 | 25 |
| 710 | 497 | 213  | 41 | 25 |

S Statistic = 41 - 25 = 16

| Tied Group  | Value        | Members |
|-------------|--------------|---------|
| Time Period | Observations |         |
| 4/16/2018   | 1            |         |
| 10/8/2018   | 1            |         |
| 4/13/2019   | 1            |         |
| 9/30/2019   | 1            |         |
| 4/7/2020    | 1            |         |
| 10/2/2020   | 1            |         |
| 4/13/2021   | 1            |         |
| 10/14/2021  | 1            |         |
| 4/19/2022   | 1            |         |
| 9/27/2022   | 1            |         |
| 4/18/2023   | 1            |         |
| 8/22/2023   | 1            |         |

There are 0 time periods with multiple data

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

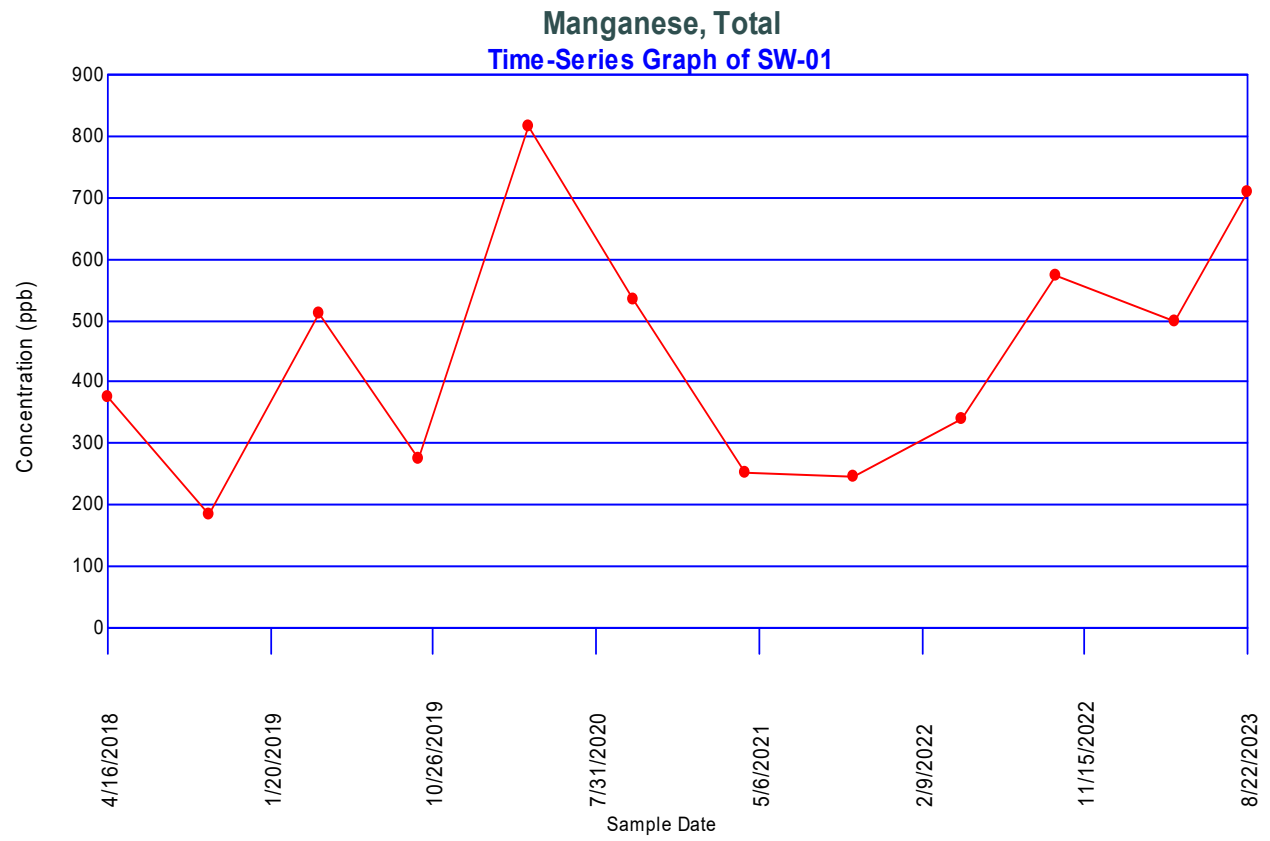
c = 264

Group Variance = 212.667

Z-Score = 1.02859

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|1.02859| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Manganese, Total

Location: SW-02

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.361538 | 0.141471 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| SW-02 | 4/16/2018  | 506   | FALSE   |
|       | 10/8/2018  | 188   | FALSE   |
|       | 4/13/2019  | 350   | FALSE   |
|       | 9/30/2019  | 91    | FALSE   |
|       | 4/7/2020   | 417   | FALSE   |
|       | 10/2/2020  | 292   | FALSE   |
|       | 4/13/2021  | 88.2  | FALSE   |
|       | 10/14/2021 | 195   | FALSE   |
|       | 4/19/2022  | 624   | FALSE   |
|       | 9/27/2022  | 164   | FALSE   |
|       | 4/18/2023  | 741   | FALSE   |
|       | 8/22/2023  | 229   | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Manganese, Total

Location: SW-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i) | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|------|----------|---------------|----------|---------|
| 1  | 88.2 | 741      | 652.8         | 0.5475   | 357.408 |
| 2  | 91   | 624      | 533           | 0.3325   | 177.223 |
| 3  | 164  | 506      | 342           | 0.2347   | 80.2674 |
| 4  | 188  | 417      | 229           | 0.1586   | 36.3194 |
| 5  | 195  | 350      | 155           | 0.0922   | 14.291  |
| 6  | 229  | 292      | 63            | 0.0303   | 1.9089  |
| 7  | 292  | 229      | -63           |          |         |
| 8  | 350  | 195      | -155          |          |         |
| 9  | 417  | 188      | -229          |          |         |
| 10 | 506  | 164      | -342          |          |         |
| 11 | 624  | 91       | -533          |          |         |
| 12 | 741  | 88.2     | -652.8        |          |         |

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Sum of b values = 667.417

Sample Standard Deviation = 210.414

W Statistic = 0.914647

5% Critical value of 0.859 is less than 0.914647

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.914647

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Manganese, Total**  
**Location: SW-02**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 188       | 506       | -318           | 0                | 1                |
| 350       | 506       | -156           | 0                | 2                |
| 91        | 506       | -415           | 0                | 3                |
| 417       | 506       | -89            | 0                | 4                |
| 292       | 506       | -214           | 0                | 5                |
| 88.2      | 506       | -417.8         | 0                | 6                |
| 195       | 506       | -311           | 0                | 7                |
| 624       | 506       | 118            | 1                | 7                |
| 164       | 506       | -342           | 1                | 8                |
| 741       | 506       | 235            | 2                | 8                |
| 229       | 506       | -277           | 2                | 9                |
|           |           |                |                  |                  |
| 350       | 188       | 162            | 3                | 9                |
| 91        | 188       | -97            | 3                | 10               |
| 417       | 188       | 229            | 4                | 10               |
| 292       | 188       | 104            | 5                | 10               |
| 88.2      | 188       | -99.8          | 5                | 11               |
| 195       | 188       | 7              | 6                | 11               |
| 624       | 188       | 436            | 7                | 11               |
| 164       | 188       | -24            | 7                | 12               |
| 741       | 188       | 553            | 8                | 12               |
| 229       | 188       | 41             | 9                | 12               |
|           |           |                |                  |                  |
| 91        | 350       | -259           | 9                | 13               |
| 417       | 350       | 67             | 10               | 13               |
| 292       | 350       | -58            | 10               | 14               |
| 88.2      | 350       | -261.8         | 10               | 15               |
| 195       | 350       | -155           | 10               | 16               |
| 624       | 350       | 274            | 11               | 16               |
| 164       | 350       | -186           | 11               | 17               |
| 741       | 350       | 391            | 12               | 17               |
| 229       | 350       | -121           | 12               | 18               |
|           |           |                |                  |                  |
| 417       | 91        | 326            | 13               | 18               |
| 292       | 91        | 201            | 14               | 18               |
| 88.2      | 91        | -2.8           | 14               | 19               |
| 195       | 91        | 104            | 15               | 19               |
| 624       | 91        | 533            | 16               | 19               |
| 164       | 91        | 73             | 17               | 19               |
| 741       | 91        | 650            | 18               | 19               |
| 229       | 91        | 138            | 19               | 19               |
|           |           |                |                  |                  |
| 292       | 417       | -125           | 19               | 20               |
| 88.2      | 417       | -328.8         | 19               | 21               |
| 195       | 417       | -222           | 19               | 22               |
| 624       | 417       | 207            | 20               | 22               |
| 164       | 417       | -253           | 20               | 23               |

|      |      |        |    |    |
|------|------|--------|----|----|
| 741  | 417  | 324    | 21 | 23 |
| 229  | 417  | -188   | 21 | 24 |
| 88.2 | 292  | -203.8 | 21 | 25 |
| 195  | 292  | -97    | 21 | 26 |
| 624  | 292  | 332    | 22 | 26 |
| 164  | 292  | -128   | 22 | 27 |
| 741  | 292  | 449    | 23 | 27 |
| 229  | 292  | -63    | 23 | 28 |
| 195  | 88.2 | 106.8  | 24 | 28 |
| 624  | 88.2 | 535.8  | 25 | 28 |
| 164  | 88.2 | 75.8   | 26 | 28 |
| 741  | 88.2 | 652.8  | 27 | 28 |
| 229  | 88.2 | 140.8  | 28 | 28 |
| 624  | 195  | 429    | 29 | 28 |
| 164  | 195  | -31    | 29 | 29 |
| 741  | 195  | 546    | 30 | 29 |
| 229  | 195  | 34     | 31 | 29 |
| 164  | 624  | -460   | 31 | 30 |
| 741  | 624  | 117    | 32 | 30 |
| 229  | 624  | -395   | 32 | 31 |
| 741  | 164  | 577    | 33 | 31 |
| 229  | 164  | 65     | 34 | 31 |
| 229  | 741  | -512   | 34 | 32 |

S Statistic = 34 - 32 = 2

| Tied Group  | Value        | Members |
|-------------|--------------|---------|
| Time Period | Observations |         |
| 4/16/2018   | 1            |         |
| 10/8/2018   | 1            |         |
| 4/13/2019   | 1            |         |
| 9/30/2019   | 1            |         |
| 4/7/2020    | 1            |         |
| 10/2/2020   | 1            |         |
| 4/13/2021   | 1            |         |
| 10/14/2021  | 1            |         |
| 4/19/2022   | 1            |         |
| 9/27/2022   | 1            |         |
| 4/18/2023   | 1            |         |
| 8/22/2023   | 1            |         |

There are 0 time periods with multiple data

A = 0  
B = 0  
C = 0  
D = 0  
E = 0  
F = 0  
a = 3828

b = 11880

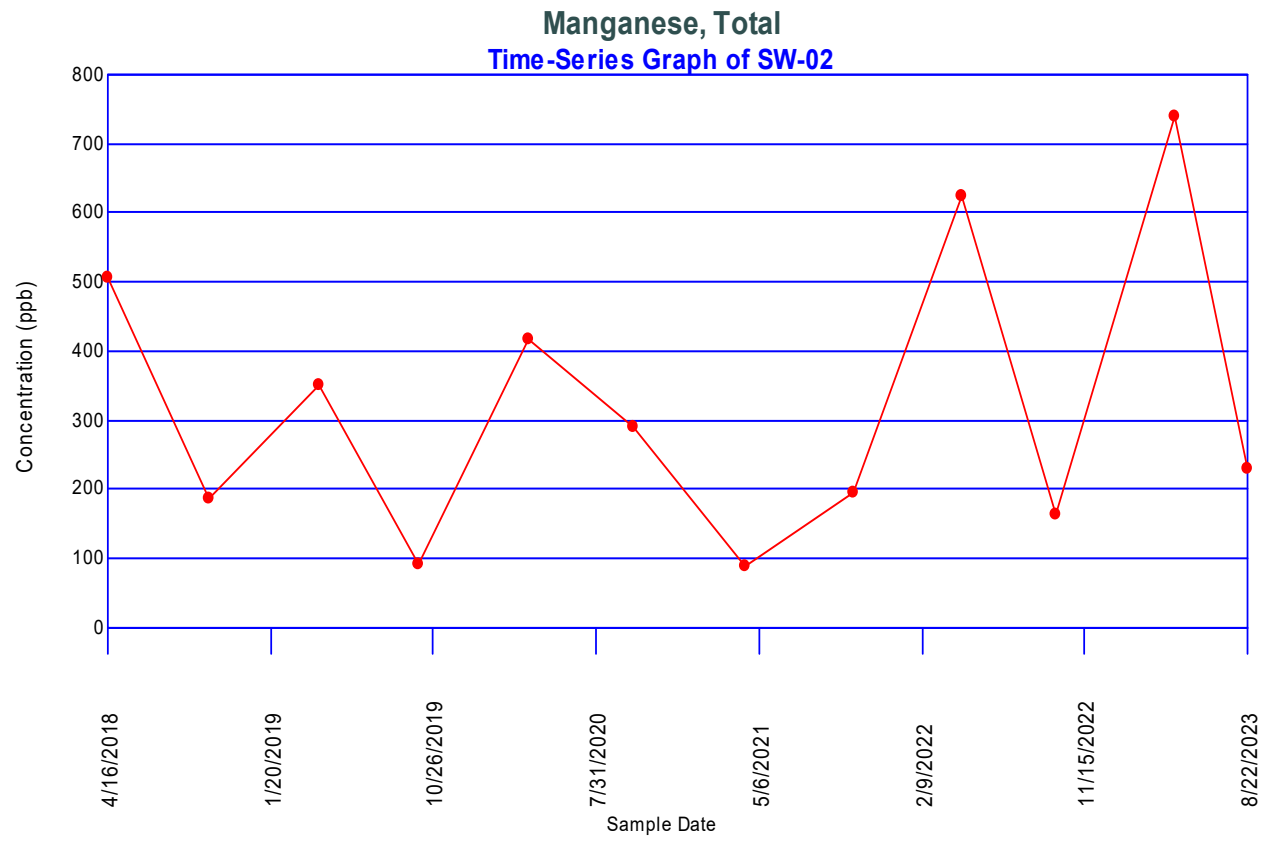
c = 264

Group Variance = 212.667

Z-Score = 0.0685725

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|0.0685725| \leq 1.97737$  indicating no evidence of a trend



## Concentrations (ppb)

Parameter: Sodium, Total

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 144

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

There are 12 compliance locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
| MW-05 | 12 | 0 (0%) | 4/18/2018  | 42900 | 42900 |
|       |    |        | 10/10/2018 | 57100 | 57100 |
|       |    |        | 4/13/2019  | 26900 | 26900 |
|       |    |        | 10/1/2019  | 41200 | 41200 |
|       |    |        | 4/9/2020   | 42700 | 42700 |
|       |    |        | 10/1/2020  | 41900 | 41900 |
|       |    |        | 4/14/2021  | 40800 | 40800 |
|       |    |        | 10/13/2021 | 42200 | 42200 |
|       |    |        | 4/20/2022  | 44300 | 44300 |
|       |    |        | 9/28/2022  | 42600 | 42600 |
|       |    |        | 4/19/2023  | 42900 | 42900 |
|       |    |        | 8/24/2023  | 43400 | 43400 |

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
| MW-06 | 12 | 0 (0%) | 4/18/2018  | 38500 | 38500 |
|       |    |        | 10/10/2018 | 61500 | 61500 |
|       |    |        | 4/14/2019  | 43500 | 43500 |
|       |    |        | 10/2/2019  | 41500 | 41500 |
|       |    |        | 4/8/2020   | 42200 | 42200 |
|       |    |        | 9/30/2020  | 44800 | 44800 |
|       |    |        | 4/13/2021  | 41400 | 41400 |
|       |    |        | 10/14/2021 | 45900 | 45900 |
|       |    |        | 4/20/2022  | 39900 | 39900 |
|       |    |        | 9/27/2022  | 43200 | 43200 |
|       |    |        | 4/18/2023  | 42500 | 42500 |
|       |    |        | 8/23/2023  | 44700 | 44700 |

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
| MW-07 | 12 | 0 (0%) | 4/18/2018  | 64400 | 64400 |
|       |    |        | 10/10/2018 | 79100 | 79100 |
|       |    |        | 4/14/2019  | 69400 | 69400 |
|       |    |        | 10/2/2019  | 57700 | 57700 |
|       |    |        | 4/8/2020   | 63400 | 63400 |
|       |    |        | 9/30/2020  | 58300 | 58300 |
|       |    |        | 4/13/2021  | 60900 | 60900 |
|       |    |        | 10/14/2021 | 60200 | 60200 |
|       |    |        | 4/20/2022  | 65800 | 65800 |
|       |    |        | 9/27/2022  | 62100 | 62100 |
|       |    |        | 4/18/2023  | 59100 | 59100 |
|       |    |        | 8/23/2023  | 59400 | 59400 |

|       |    |        |           |       |       |
|-------|----|--------|-----------|-------|-------|
| MW-12 | 12 | 0 (0%) | 4/17/2018 | 34200 | 34200 |
|       |    |        | 10/9/2018 | 34600 | 34600 |

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
|       |    |        | 4/14/2019  | 34900 | 34900 |
|       |    |        | 10/2/2019  | 24900 | 24900 |
|       |    |        | 4/8/2020   | 34400 | 34400 |
|       |    |        | 10/1/2020  | 28400 | 28400 |
|       |    |        | 4/15/2021  | 31100 | 31100 |
|       |    |        | 10/14/2021 | 27400 | 27400 |
|       |    |        | 4/19/2022  | 32000 | 32000 |
|       |    |        | 9/28/2022  | 24300 | 24300 |
|       |    |        | 4/18/2023  | 30800 | 30800 |
|       |    |        | 8/24/2023  | 23900 | 23900 |
| <hr/> |    |        |            |       |       |
| MW-16 | 12 | 0 (0%) | 4/17/2018  | 47200 | 47200 |
|       |    |        | 10/9/2018  | 64700 | 64700 |
|       |    |        | 4/14/2019  | 53100 | 53100 |
|       |    |        | 10/2/2019  | 44800 | 44800 |
|       |    |        | 4/9/2020   | 47600 | 47600 |
|       |    |        | 10/1/2020  | 45100 | 45100 |
|       |    |        | 4/15/2021  | 47600 | 47600 |
|       |    |        | 10/14/2021 | 49300 | 49300 |
|       |    |        | 4/19/2022  | 50900 | 50900 |
|       |    |        | 9/28/2022  | 46800 | 46800 |
|       |    |        | 4/18/2023  | 51600 | 51600 |
|       |    |        | 8/24/2023  | 47700 | 47700 |
| <hr/> |    |        |            |       |       |
| MW-20 | 12 | 0 (0%) | 4/17/2018  | 67700 | 67700 |
|       |    |        | 10/10/2018 | 97800 | 97800 |
|       |    |        | 4/14/2019  | 86900 | 86900 |
|       |    |        | 10/2/2019  | 67600 | 67600 |
|       |    |        | 4/9/2020   | 82600 | 82600 |
|       |    |        | 10/2/2020  | 66200 | 66200 |
|       |    |        | 4/15/2021  | 73700 | 73700 |
|       |    |        | 10/12/2021 | 66900 | 66900 |
|       |    |        | 4/20/2022  | 77400 | 77400 |
|       |    |        | 9/28/2022  | 71000 | 71000 |
|       |    |        | 4/19/2023  | 76200 | 76200 |
|       |    |        | 8/23/2023  | 66700 | 66700 |
| <hr/> |    |        |            |       |       |
| MW-21 | 12 | 0 (0%) | 4/17/2018  | 63900 | 63900 |
|       |    |        | 10/10/2018 | 63200 | 63200 |
|       |    |        | 4/13/2019  | 62000 | 62000 |
|       |    |        | 10/1/2019  | 54200 | 54200 |
|       |    |        | 4/7/2020   | 54800 | 54800 |
|       |    |        | 9/30/2020  | 50100 | 50100 |
|       |    |        | 4/14/2021  | 51400 | 51400 |
|       |    |        | 10/12/2021 | 54500 | 54500 |
|       |    |        | 4/20/2022  | 57200 | 57200 |
|       |    |        | 9/29/2022  | 51100 | 51100 |
|       |    |        | 4/18/2023  | 58000 | 58000 |
|       |    |        | 8/23/2023  | 52700 | 52700 |
| <hr/> |    |        |            |       |       |
| MW-25 | 12 | 0 (0%) | 4/17/2018  | 51700 | 51700 |
|       |    |        | 10/9/2018  | 85400 | 85400 |
|       |    |        | 4/13/2019  | 42300 | 42300 |
|       |    |        | 10/1/2019  | 50000 | 50000 |
|       |    |        | 4/8/2020   | 46500 | 46500 |
|       |    |        | 10/1/2020  | 49800 | 49800 |
|       |    |        | 4/14/2021  | 26500 | 26500 |

|       |    |        |            |        |        |
|-------|----|--------|------------|--------|--------|
|       |    |        | 10/13/2021 | 53000  | 53000  |
|       |    |        | 4/19/2022  | 61900  | 61900  |
|       |    |        | 9/29/2022  | 59500  | 59500  |
|       |    |        | 4/19/2023  | 49800  | 49800  |
|       |    |        | 8/24/2023  | 61100  | 61100  |
| <hr/> |    |        |            |        |        |
| MW-26 | 12 | 0 (0%) | 4/17/2018  | 89600  | 89600  |
|       |    |        | 10/9/2018  | 123000 | 123000 |
|       |    |        | 4/13/2019  | 87000  | 87000  |
|       |    |        | 10/1/2019  | 82500  | 82500  |
|       |    |        | 4/8/2020   | 85700  | 85700  |
|       |    |        | 10/1/2020  | 81100  | 81100  |
|       |    |        | 4/14/2021  | 81500  | 81500  |
|       |    |        | 10/13/2021 | 74700  | 74700  |
|       |    |        | 4/19/2022  | 81300  | 81300  |
|       |    |        | 9/29/2022  | 81300  | 81300  |
|       |    |        | 4/19/2023  | 86700  | 86700  |
|       |    |        | 8/24/2023  | 83100  | 83100  |
| <hr/> |    |        |            |        |        |
| MW-27 | 12 | 0 (0%) | 4/18/2018  | 44800  | 44800  |
|       |    |        | 10/9/2018  | 59100  | 59100  |
|       |    |        | 4/13/2019  | 46600  | 46600  |
|       |    |        | 10/1/2019  | 41400  | 41400  |
|       |    |        | 4/9/2020   | 43600  | 43600  |
|       |    |        | 10/1/2020  | 41300  | 41300  |
|       |    |        | 4/14/2021  | 40700  | 40700  |
|       |    |        | 10/13/2021 | 37700  | 37700  |
|       |    |        | 4/20/2022  | 42800  | 42800  |
|       |    |        | 9/28/2022  | 43400  | 43400  |
|       |    |        | 4/19/2023  | 43900  | 43900  |
|       |    |        | 8/24/2023  | 43600  | 43600  |
| <hr/> |    |        |            |        |        |
| SW-01 | 12 | 0 (0%) | 4/16/2018  | 19600  | 19600  |
|       |    |        | 10/8/2018  | 14800  | 14800  |
|       |    |        | 4/13/2019  | 19400  | 19400  |
|       |    |        | 9/30/2019  | 12300  | 12300  |
|       |    |        | 4/7/2020   | 19800  | 19800  |
|       |    |        | 10/2/2020  | 13100  | 13100  |
|       |    |        | 4/13/2021  | 14300  | 14300  |
|       |    |        | 10/14/2021 | 16900  | 16900  |
|       |    |        | 4/19/2022  | 18200  | 18200  |
|       |    |        | 9/27/2022  | 19700  | 19700  |
|       |    |        | 4/18/2023  | 19700  | 19700  |
|       |    |        | 8/22/2023  | 25200  | 25200  |
| <hr/> |    |        |            |        |        |
| SW-02 | 12 | 0 (0%) | 4/16/2018  | 71200  | 71200  |
|       |    |        | 10/8/2018  | 40600  | 40600  |
|       |    |        | 4/13/2019  | 47900  | 47900  |
|       |    |        | 9/30/2019  | 24400  | 24400  |
|       |    |        | 4/7/2020   | 41000  | 41000  |
|       |    |        | 10/2/2020  | 35600  | 35600  |
|       |    |        | 4/13/2021  | 33900  | 33900  |
|       |    |        | 10/14/2021 | 33700  | 33700  |
|       |    |        | 4/19/2022  | 44100  | 44100  |
|       |    |        | 9/27/2022  | 36400  | 36400  |
|       |    |        | 4/18/2023  | 39300  | 39300  |
|       |    |        | 8/22/2023  | 35200  | 35200  |

There are 0 unused locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-05

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.840491 | 0.821839 | 0.546    | 57100   |
| 2         | 0.4      | 0.866667 | 0.576    | 26900   |
| 3         | 0.290323 | 0.153846 | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-05 | 4/18/2018  | 42900 | FALSE   |
|       | 10/10/2018 | 57100 | TRUE    |
|       | 4/13/2019  | 26900 | TRUE    |
|       | 10/1/2019  | 41200 | FALSE   |
|       | 4/9/2020   | 42700 | FALSE   |
|       | 10/1/2020  | 41900 | FALSE   |
|       | 4/14/2021  | 40800 | FALSE   |
|       | 10/13/2021 | 42200 | FALSE   |
|       | 4/20/2022  | 44300 | FALSE   |
|       | 9/28/2022  | 42600 | FALSE   |
|       | 4/19/2023  | 42900 | FALSE   |
|       | 8/24/2023  | 43400 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-05

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 26900 | 57100    | 30200         | 0.5475   | 16534.5 |
| 2  | 40800 | 44300    | 3500          | 0.3325   | 1163.75 |
| 3  | 41200 | 43400    | 2200          | 0.2347   | 516.34  |
| 4  | 41900 | 42900    | 1000          | 0.1586   | 158.6   |
| 5  | 42200 | 42900    | 700           | 0.0922   | 64.54   |
| 6  | 42600 | 42700    | 100           | 0.0303   | 3.03    |
| 7  | 42700 | 42600    | -100          |          |         |
| 8  | 42900 | 42200    | -700          |          |         |
| 9  | 42900 | 41900    | -1000         |          |         |
| 10 | 43400 | 41200    | -2200         |          |         |
| 11 | 44300 | 40800    | -3500         |          |         |
| 12 | 57100 | 26900    | -30200        |          |         |

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Sum of b values = 18440.8

Sample Standard Deviation = 6507.82

W Statistic = 0.729951

**5% Critical value of 0.859 exceeds 0.729951**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.729951**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-05**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 57100     | 42900     | 14200          | 1                | 0                |
| 26900     | 42900     | -16000         | 1                | 1                |
| 41200     | 42900     | -1700          | 1                | 2                |
| 42700     | 42900     | -200           | 1                | 3                |
| 41900     | 42900     | -1000          | 1                | 4                |
| 40800     | 42900     | -2100          | 1                | 5                |
| 42200     | 42900     | -700           | 1                | 6                |
| 44300     | 42900     | 1400           | 2                | 6                |
| 42600     | 42900     | -300           | 2                | 7                |
| 42900     | 42900     | 0              | 2                | 7                |
| 43400     | 42900     | 500            | 3                | 7                |
|           |           |                |                  |                  |
| 26900     | 57100     | -30200         | 3                | 8                |
| 41200     | 57100     | -15900         | 3                | 9                |
| 42700     | 57100     | -14400         | 3                | 10               |
| 41900     | 57100     | -15200         | 3                | 11               |
| 40800     | 57100     | -16300         | 3                | 12               |
| 42200     | 57100     | -14900         | 3                | 13               |
| 44300     | 57100     | -12800         | 3                | 14               |
| 42600     | 57100     | -14500         | 3                | 15               |
| 42900     | 57100     | -14200         | 3                | 16               |
| 43400     | 57100     | -13700         | 3                | 17               |
|           |           |                |                  |                  |
| 41200     | 26900     | 14300          | 4                | 17               |
| 42700     | 26900     | 15800          | 5                | 17               |
| 41900     | 26900     | 15000          | 6                | 17               |
| 40800     | 26900     | 13900          | 7                | 17               |
| 42200     | 26900     | 15300          | 8                | 17               |
| 44300     | 26900     | 17400          | 9                | 17               |
| 42600     | 26900     | 15700          | 10               | 17               |
| 42900     | 26900     | 16000          | 11               | 17               |
| 43400     | 26900     | 16500          | 12               | 17               |
|           |           |                |                  |                  |
| 42700     | 41200     | 1500           | 13               | 17               |
| 41900     | 41200     | 700            | 14               | 17               |
| 40800     | 41200     | -400           | 14               | 18               |
| 42200     | 41200     | 1000           | 15               | 18               |
| 44300     | 41200     | 3100           | 16               | 18               |
| 42600     | 41200     | 1400           | 17               | 18               |
| 42900     | 41200     | 1700           | 18               | 18               |
| 43400     | 41200     | 2200           | 19               | 18               |
|           |           |                |                  |                  |
| 41900     | 42700     | -800           | 19               | 19               |
| 40800     | 42700     | -1900          | 19               | 20               |
| 42200     | 42700     | -500           | 19               | 21               |
| 44300     | 42700     | 1600           | 20               | 21               |
| 42600     | 42700     | -100           | 20               | 22               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 42900 | 42700 | 200   | 21 | 22 |
| 43400 | 42700 | 700   | 22 | 22 |
| 40800 | 41900 | -1100 | 22 | 23 |
| 42200 | 41900 | 300   | 23 | 23 |
| 44300 | 41900 | 2400  | 24 | 23 |
| 42600 | 41900 | 700   | 25 | 23 |
| 42900 | 41900 | 1000  | 26 | 23 |
| 43400 | 41900 | 1500  | 27 | 23 |
| 42200 | 40800 | 1400  | 28 | 23 |
| 44300 | 40800 | 3500  | 29 | 23 |
| 42600 | 40800 | 1800  | 30 | 23 |
| 42900 | 40800 | 2100  | 31 | 23 |
| 43400 | 40800 | 2600  | 32 | 23 |
| 44300 | 42200 | 2100  | 33 | 23 |
| 42600 | 42200 | 400   | 34 | 23 |
| 42900 | 42200 | 700   | 35 | 23 |
| 43400 | 42200 | 1200  | 36 | 23 |
| 42600 | 44300 | -1700 | 36 | 24 |
| 42900 | 44300 | -1400 | 36 | 25 |
| 43400 | 44300 | -900  | 36 | 26 |
| 42900 | 42600 | 300   | 37 | 26 |
| 43400 | 42600 | 800   | 38 | 26 |
| 43400 | 42900 | 500   | 39 | 26 |

S Statistic = 39 - 26 = 13

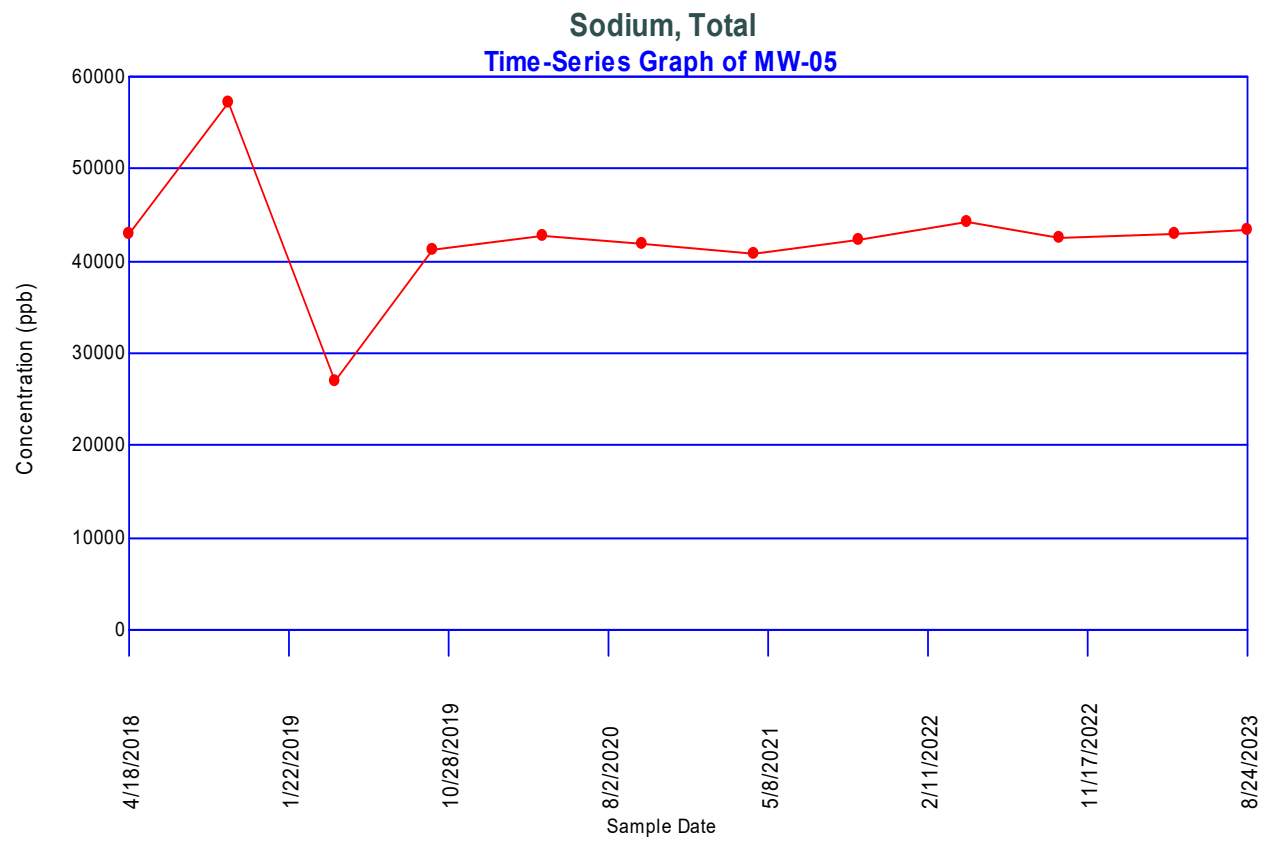
| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 42900 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/10/2018  | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/20/2022   | 1            |
| 9/28/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 18  
 B = 0  
 C = 0  
 D = 0  
 E = 2  
 F = 0

a = 3828  
b = 11880  
c = 264  
Group Variance = 211.667  
Z-Score = 0.824812  
Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)  
 $|0.824812| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-06

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.773148 | 0.391892 | 0.546    | 61500   |
| 2         | 0.2      | 0.460317 | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-06 | 4/18/2018  | 38500 | FALSE   |
|       | 10/10/2018 | 61500 | TRUE    |
|       | 4/14/2019  | 43500 | FALSE   |
|       | 10/2/2019  | 41500 | FALSE   |
|       | 4/8/2020   | 42200 | FALSE   |
|       | 9/30/2020  | 44800 | FALSE   |
|       | 4/13/2021  | 41400 | FALSE   |
|       | 10/14/2021 | 45900 | FALSE   |
|       | 4/20/2022  | 39900 | FALSE   |
|       | 9/27/2022  | 43200 | FALSE   |
|       | 4/18/2023  | 42500 | FALSE   |
|       | 8/23/2023  | 44700 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-06

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 38500 | 61500    | 23000         | 0.5475   | 12592.5 |
| 2  | 39900 | 45900    | 6000          | 0.3325   | 1995    |
| 3  | 41400 | 44800    | 3400          | 0.2347   | 797.98  |
| 4  | 41500 | 44700    | 3200          | 0.1586   | 507.52  |
| 5  | 42200 | 43500    | 1300          | 0.0922   | 119.86  |
| 6  | 42500 | 43200    | 700           | 0.0303   | 21.21   |
| 7  | 43200 | 42500    | -700          |          |         |
| 8  | 43500 | 42200    | -1300         |          |         |
| 9  | 44700 | 41500    | -3200         |          |         |
| 10 | 44800 | 41400    | -3400         |          |         |
| 11 | 45900 | 39900    | -6000         |          |         |
| 12 | 61500 | 38500    | -23000        |          |         |

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Sum of b values = 16034.1

Sample Standard Deviation = 5856.05

W Statistic = 0.68153

**5% Critical value of 0.859 exceeds 0.68153**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.68153**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-06**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 61500     | 38500     | 23000          | 1                | 0                |
| 43500     | 38500     | 5000           | 2                | 0                |
| 41500     | 38500     | 3000           | 3                | 0                |
| 42200     | 38500     | 3700           | 4                | 0                |
| 44800     | 38500     | 6300           | 5                | 0                |
| 41400     | 38500     | 2900           | 6                | 0                |
| 45900     | 38500     | 7400           | 7                | 0                |
| 39900     | 38500     | 1400           | 8                | 0                |
| 43200     | 38500     | 4700           | 9                | 0                |
| 42500     | 38500     | 4000           | 10               | 0                |
| 44700     | 38500     | 6200           | 11               | 0                |
|           |           |                |                  |                  |
| 43500     | 61500     | -18000         | 11               | 1                |
| 41500     | 61500     | -20000         | 11               | 2                |
| 42200     | 61500     | -19300         | 11               | 3                |
| 44800     | 61500     | -16700         | 11               | 4                |
| 41400     | 61500     | -20100         | 11               | 5                |
| 45900     | 61500     | -15600         | 11               | 6                |
| 39900     | 61500     | -21600         | 11               | 7                |
| 43200     | 61500     | -18300         | 11               | 8                |
| 42500     | 61500     | -19000         | 11               | 9                |
| 44700     | 61500     | -16800         | 11               | 10               |
|           |           |                |                  |                  |
| 41500     | 43500     | -2000          | 11               | 11               |
| 42200     | 43500     | -1300          | 11               | 12               |
| 44800     | 43500     | 1300           | 12               | 12               |
| 41400     | 43500     | -2100          | 12               | 13               |
| 45900     | 43500     | 2400           | 13               | 13               |
| 39900     | 43500     | -3600          | 13               | 14               |
| 43200     | 43500     | -300           | 13               | 15               |
| 42500     | 43500     | -1000          | 13               | 16               |
| 44700     | 43500     | 1200           | 14               | 16               |
|           |           |                |                  |                  |
| 42200     | 41500     | 700            | 15               | 16               |
| 44800     | 41500     | 3300           | 16               | 16               |
| 41400     | 41500     | -100           | 16               | 17               |
| 45900     | 41500     | 4400           | 17               | 17               |
| 39900     | 41500     | -1600          | 17               | 18               |
| 43200     | 41500     | 1700           | 18               | 18               |
| 42500     | 41500     | 1000           | 19               | 18               |
| 44700     | 41500     | 3200           | 20               | 18               |
|           |           |                |                  |                  |
| 44800     | 42200     | 2600           | 21               | 18               |
| 41400     | 42200     | -800           | 21               | 19               |
| 45900     | 42200     | 3700           | 22               | 19               |
| 39900     | 42200     | -2300          | 22               | 20               |
| 43200     | 42200     | 1000           | 23               | 20               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 42500 | 42200 | 300   | 24 | 20 |
| 44700 | 42200 | 2500  | 25 | 20 |
| 41400 | 44800 | -3400 | 25 | 21 |
| 45900 | 44800 | 1100  | 26 | 21 |
| 39900 | 44800 | -4900 | 26 | 22 |
| 43200 | 44800 | -1600 | 26 | 23 |
| 42500 | 44800 | -2300 | 26 | 24 |
| 44700 | 44800 | -100  | 26 | 25 |
| 45900 | 41400 | 4500  | 27 | 25 |
| 39900 | 41400 | -1500 | 27 | 26 |
| 43200 | 41400 | 1800  | 28 | 26 |
| 42500 | 41400 | 1100  | 29 | 26 |
| 44700 | 41400 | 3300  | 30 | 26 |
| 39900 | 45900 | -6000 | 30 | 27 |
| 43200 | 45900 | -2700 | 30 | 28 |
| 42500 | 45900 | -3400 | 30 | 29 |
| 44700 | 45900 | -1200 | 30 | 30 |
| 43200 | 39900 | 3300  | 31 | 30 |
| 42500 | 39900 | 2600  | 32 | 30 |
| 44700 | 39900 | 4800  | 33 | 30 |
| 42500 | 43200 | -700  | 33 | 31 |
| 44700 | 43200 | 1500  | 34 | 31 |
| 44700 | 42500 | 2200  | 35 | 31 |

S Statistic = 35 - 31 = 4

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/18/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 4/14/2019                                   | 1            |         |
| 10/2/2019                                   | 1            |         |
| 4/8/2020                                    | 1            |         |
| 9/30/2020                                   | 1            |         |
| 4/13/2021                                   | 1            |         |
| 10/14/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/27/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

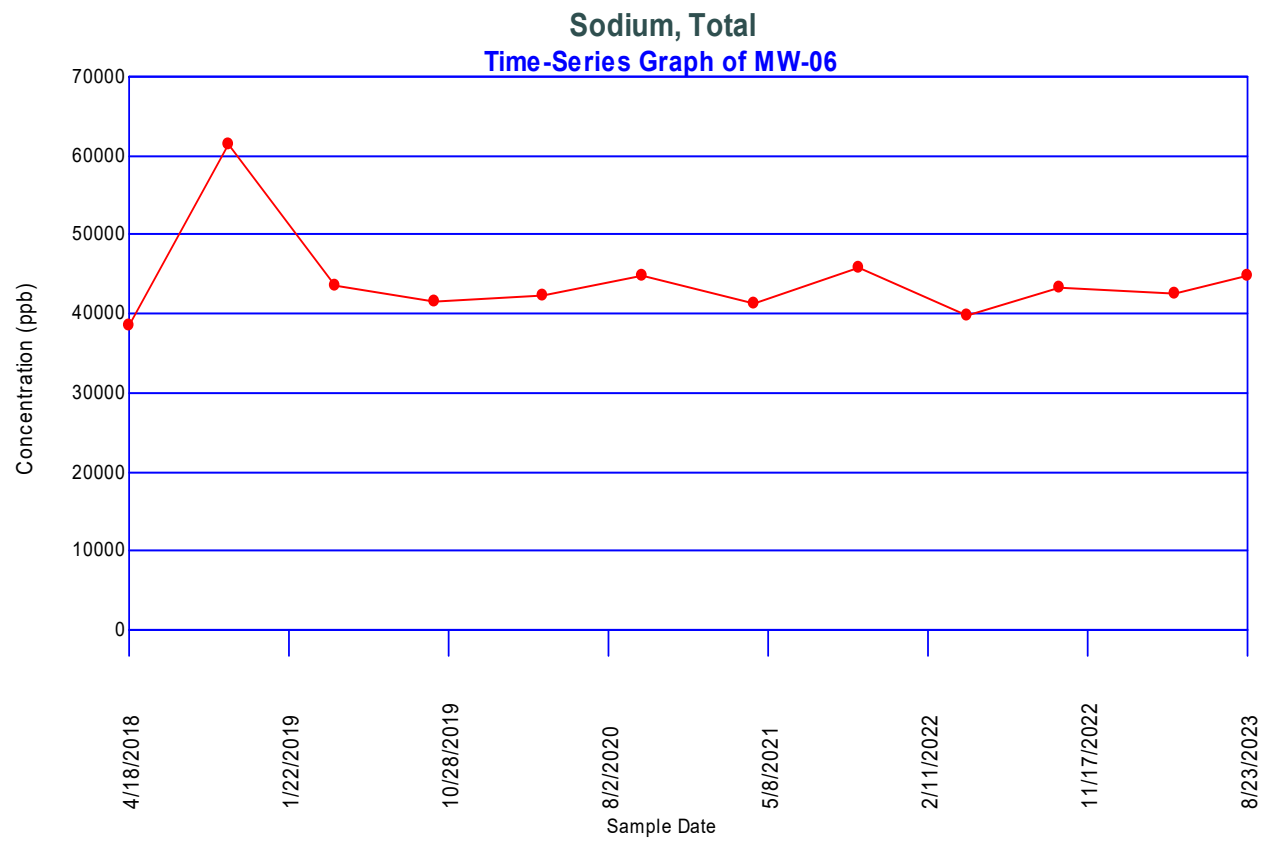
c = 264

Group Variance = 212.667

Z-Score = 0.205718

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|0.205718| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-07

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.639423 | 0.119658 | 0.546    | 79100   |
| 2         | 0.45045  | 0.17284  | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-07 | 4/18/2018  | 64400 | FALSE   |
|       | 10/10/2018 | 79100 | TRUE    |
|       | 4/14/2019  | 69400 | FALSE   |
|       | 10/2/2019  | 57700 | FALSE   |
|       | 4/8/2020   | 63400 | FALSE   |
|       | 9/30/2020  | 58300 | FALSE   |
|       | 4/13/2021  | 60900 | FALSE   |
|       | 10/14/2021 | 60200 | FALSE   |
|       | 4/20/2022  | 65800 | FALSE   |
|       | 9/27/2022  | 62100 | FALSE   |
|       | 4/18/2023  | 59100 | FALSE   |
|       | 8/23/2023  | 59400 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-07

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 57700 | 79100    | 21400         | 0.5475   | 11716.5 |
| 2  | 58300 | 69400    | 11100         | 0.3325   | 3690.75 |
| 3  | 59100 | 65800    | 6700          | 0.2347   | 1572.49 |
| 4  | 59400 | 64400    | 5000          | 0.1586   | 793     |
| 5  | 60200 | 63400    | 3200          | 0.0922   | 295.04  |
| 6  | 60900 | 62100    | 1200          | 0.0303   | 36.36   |
| 7  | 62100 | 60900    | -1200         |          |         |
| 8  | 63400 | 60200    | -3200         |          |         |
| 9  | 64400 | 59400    | -5000         |          |         |
| 10 | 65800 | 59100    | -6700         |          |         |
| 11 | 69400 | 58300    | -11100        |          |         |
| 12 | 79100 | 57700    | -21400        |          |         |

---

Sum of b values = 18104.1

Sample Standard Deviation = 6032.76

W Statistic = 0.818711

**5% Critical value of 0.859 exceeds 0.818711**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.818711

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-07**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 79100     | 64400     | 14700          | 1                | 0                |
| 69400     | 64400     | 5000           | 2                | 0                |
| 57700     | 64400     | -6700          | 2                | 1                |
| 63400     | 64400     | -1000          | 2                | 2                |
| 58300     | 64400     | -6100          | 2                | 3                |
| 60900     | 64400     | -3500          | 2                | 4                |
| 60200     | 64400     | -4200          | 2                | 5                |
| 65800     | 64400     | 1400           | 3                | 5                |
| 62100     | 64400     | -2300          | 3                | 6                |
| 59100     | 64400     | -5300          | 3                | 7                |
| 59400     | 64400     | -5000          | 3                | 8                |
| 69400     | 79100     | -9700          | 3                | 9                |
| 57700     | 79100     | -21400         | 3                | 10               |
| 63400     | 79100     | -15700         | 3                | 11               |
| 58300     | 79100     | -20800         | 3                | 12               |
| 60900     | 79100     | -18200         | 3                | 13               |
| 60200     | 79100     | -18900         | 3                | 14               |
| 65800     | 79100     | -13300         | 3                | 15               |
| 62100     | 79100     | -17000         | 3                | 16               |
| 59100     | 79100     | -20000         | 3                | 17               |
| 59400     | 79100     | -19700         | 3                | 18               |
| 57700     | 69400     | -11700         | 3                | 19               |
| 63400     | 69400     | -6000          | 3                | 20               |
| 58300     | 69400     | -11100         | 3                | 21               |
| 60900     | 69400     | -8500          | 3                | 22               |
| 60200     | 69400     | -9200          | 3                | 23               |
| 65800     | 69400     | -3600          | 3                | 24               |
| 62100     | 69400     | -7300          | 3                | 25               |
| 59100     | 69400     | -10300         | 3                | 26               |
| 59400     | 69400     | -10000         | 3                | 27               |
| 63400     | 57700     | 5700           | 4                | 27               |
| 58300     | 57700     | 600            | 5                | 27               |
| 60900     | 57700     | 3200           | 6                | 27               |
| 60200     | 57700     | 2500           | 7                | 27               |
| 65800     | 57700     | 8100           | 8                | 27               |
| 62100     | 57700     | 4400           | 9                | 27               |
| 59100     | 57700     | 1400           | 10               | 27               |
| 59400     | 57700     | 1700           | 11               | 27               |
| 58300     | 63400     | -5100          | 11               | 28               |
| 60900     | 63400     | -2500          | 11               | 29               |
| 60200     | 63400     | -3200          | 11               | 30               |
| 65800     | 63400     | 2400           | 12               | 30               |
| 62100     | 63400     | -1300          | 12               | 31               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 59100 | 63400 | -4300 | 12 | 32 |
| 59400 | 63400 | -4000 | 12 | 33 |
| 60900 | 58300 | 2600  | 13 | 33 |
| 60200 | 58300 | 1900  | 14 | 33 |
| 65800 | 58300 | 7500  | 15 | 33 |
| 62100 | 58300 | 3800  | 16 | 33 |
| 59100 | 58300 | 800   | 17 | 33 |
| 59400 | 58300 | 1100  | 18 | 33 |
| 60200 | 60900 | -700  | 18 | 34 |
| 65800 | 60900 | 4900  | 19 | 34 |
| 62100 | 60900 | 1200  | 20 | 34 |
| 59100 | 60900 | -1800 | 20 | 35 |
| 59400 | 60900 | -1500 | 20 | 36 |
| 65800 | 60200 | 5600  | 21 | 36 |
| 62100 | 60200 | 1900  | 22 | 36 |
| 59100 | 60200 | -1100 | 22 | 37 |
| 59400 | 60200 | -800  | 22 | 38 |
| 62100 | 65800 | -3700 | 22 | 39 |
| 59100 | 65800 | -6700 | 22 | 40 |
| 59400 | 65800 | -6400 | 22 | 41 |
| 59100 | 62100 | -3000 | 22 | 42 |
| 59400 | 62100 | -2700 | 22 | 43 |
| 59400 | 59100 | 300   | 23 | 43 |

S Statistic = 23 - 43 = -20

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/18/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 4/14/2019                                   | 1            |         |
| 10/2/2019                                   | 1            |         |
| 4/8/2020                                    | 1            |         |
| 9/30/2020                                   | 1            |         |
| 4/13/2021                                   | 1            |         |
| 10/14/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/27/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

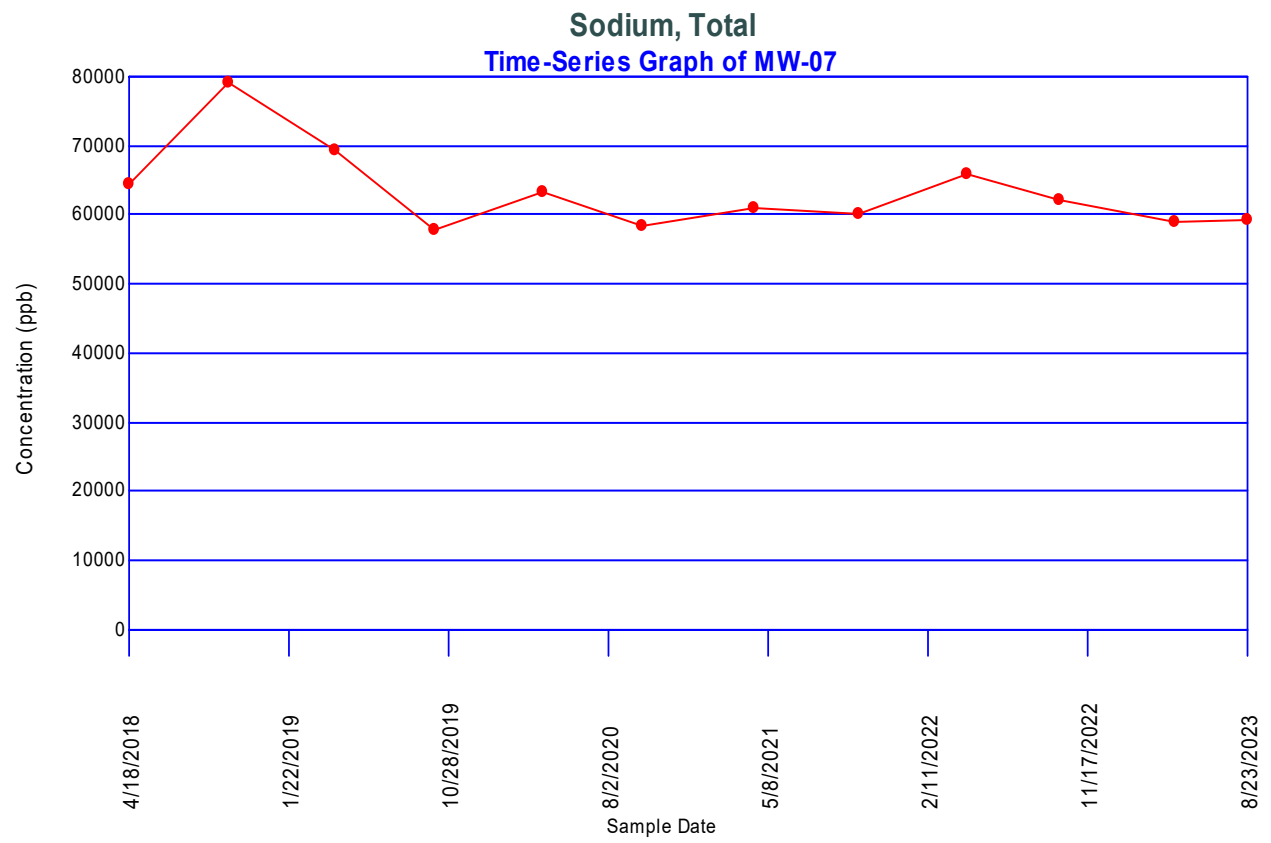
c = 264

Group Variance = 212.667

Z-Score = -1.30288

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.30288| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-12

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest   | Lowest    | Critical | Outlier |
|-----------|-----------|-----------|----------|---------|
| 1         | 0.0471698 | 0.0934579 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-12 | 4/17/2018  | 34200 | FALSE   |
|       | 10/9/2018  | 34600 | FALSE   |
|       | 4/14/2019  | 34900 | FALSE   |
|       | 10/2/2019  | 24900 | FALSE   |
|       | 4/8/2020   | 34400 | FALSE   |
|       | 10/1/2020  | 28400 | FALSE   |
|       | 4/15/2021  | 31100 | FALSE   |
|       | 10/14/2021 | 27400 | FALSE   |
|       | 4/19/2022  | 32000 | FALSE   |
|       | 9/28/2022  | 24300 | FALSE   |
|       | 4/18/2023  | 30800 | FALSE   |
|       | 8/24/2023  | 23900 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-12

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 23900 | 34900    | 11000         | 0.5475   | 6022.5  |
| 2  | 24300 | 34600    | 10300         | 0.3325   | 3424.75 |
| 3  | 24900 | 34400    | 9500          | 0.2347   | 2229.65 |
| 4  | 27400 | 34200    | 6800          | 0.1586   | 1078.48 |
| 5  | 28400 | 32000    | 3600          | 0.0922   | 331.92  |
| 6  | 30800 | 31100    | 300           | 0.0303   | 9.09    |
| 7  | 31100 | 30800    | -300          |          |         |
| 8  | 32000 | 28400    | -3600         |          |         |
| 9  | 34200 | 27400    | -6800         |          |         |
| 10 | 34400 | 24900    | -9500         |          |         |
| 11 | 34600 | 24300    | -10300        |          |         |
| 12 | 34900 | 23900    | -11000        |          |         |

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Sum of b values = 13096.4

Sample Standard Deviation = 4188.54

W Statistic = 0.888762

5% Critical value of 0.859 is less than 0.888762

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.888762

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-12**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 34600     | 34200     | 400            | 1                | 0                |
| 34900     | 34200     | 700            | 2                | 0                |
| 24900     | 34200     | -9300          | 2                | 1                |
| 34400     | 34200     | 200            | 3                | 1                |
| 28400     | 34200     | -5800          | 3                | 2                |
| 31100     | 34200     | -3100          | 3                | 3                |
| 27400     | 34200     | -6800          | 3                | 4                |
| 32000     | 34200     | -2200          | 3                | 5                |
| 24300     | 34200     | -9900          | 3                | 6                |
| 30800     | 34200     | -3400          | 3                | 7                |
| 23900     | 34200     | -10300         | 3                | 8                |
|           |           |                |                  |                  |
| 34900     | 34600     | 300            | 4                | 8                |
| 24900     | 34600     | -9700          | 4                | 9                |
| 34400     | 34600     | -200           | 4                | 10               |
| 28400     | 34600     | -6200          | 4                | 11               |
| 31100     | 34600     | -3500          | 4                | 12               |
| 27400     | 34600     | -7200          | 4                | 13               |
| 32000     | 34600     | -2600          | 4                | 14               |
| 24300     | 34600     | -10300         | 4                | 15               |
| 30800     | 34600     | -3800          | 4                | 16               |
| 23900     | 34600     | -10700         | 4                | 17               |
|           |           |                |                  |                  |
| 24900     | 34900     | -10000         | 4                | 18               |
| 34400     | 34900     | -500           | 4                | 19               |
| 28400     | 34900     | -6500          | 4                | 20               |
| 31100     | 34900     | -3800          | 4                | 21               |
| 27400     | 34900     | -7500          | 4                | 22               |
| 32000     | 34900     | -2900          | 4                | 23               |
| 24300     | 34900     | -10600         | 4                | 24               |
| 30800     | 34900     | -4100          | 4                | 25               |
| 23900     | 34900     | -11000         | 4                | 26               |
|           |           |                |                  |                  |
| 34400     | 24900     | 9500           | 5                | 26               |
| 28400     | 24900     | 3500           | 6                | 26               |
| 31100     | 24900     | 6200           | 7                | 26               |
| 27400     | 24900     | 2500           | 8                | 26               |
| 32000     | 24900     | 7100           | 9                | 26               |
| 24300     | 24900     | -600           | 9                | 27               |
| 30800     | 24900     | 5900           | 10               | 27               |
| 23900     | 24900     | -1000          | 10               | 28               |
|           |           |                |                  |                  |
| 28400     | 34400     | -6000          | 10               | 29               |
| 31100     | 34400     | -3300          | 10               | 30               |
| 27400     | 34400     | -7000          | 10               | 31               |
| 32000     | 34400     | -2400          | 10               | 32               |
| 24300     | 34400     | -10100         | 10               | 33               |

|       |       |        |    |    |
|-------|-------|--------|----|----|
| 30800 | 34400 | -3600  | 10 | 34 |
| 23900 | 34400 | -10500 | 10 | 35 |
| 31100 | 28400 | 2700   | 11 | 35 |
| 27400 | 28400 | -1000  | 11 | 36 |
| 32000 | 28400 | 3600   | 12 | 36 |
| 24300 | 28400 | -4100  | 12 | 37 |
| 30800 | 28400 | 2400   | 13 | 37 |
| 23900 | 28400 | -4500  | 13 | 38 |
| 27400 | 31100 | -3700  | 13 | 39 |
| 32000 | 31100 | 900    | 14 | 39 |
| 24300 | 31100 | -6800  | 14 | 40 |
| 30800 | 31100 | -300   | 14 | 41 |
| 23900 | 31100 | -7200  | 14 | 42 |
| 32000 | 27400 | 4600   | 15 | 42 |
| 24300 | 27400 | -3100  | 15 | 43 |
| 30800 | 27400 | 3400   | 16 | 43 |
| 23900 | 27400 | -3500  | 16 | 44 |
| 24300 | 32000 | -7700  | 16 | 45 |
| 30800 | 32000 | -1200  | 16 | 46 |
| 23900 | 32000 | -8100  | 16 | 47 |
| 30800 | 24300 | 6500   | 17 | 47 |
| 23900 | 24300 | -400   | 17 | 48 |
| 23900 | 30800 | -6900  | 17 | 49 |

S Statistic = 17 - 49 = -32

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/17/2018                                   | 1            |         |
| 10/9/2018                                   | 1            |         |
| 4/14/2019                                   | 1            |         |
| 10/2/2019                                   | 1            |         |
| 4/8/2020                                    | 1            |         |
| 10/1/2020                                   | 1            |         |
| 4/15/2021                                   | 1            |         |
| 10/14/2021                                  | 1            |         |
| 4/19/2022                                   | 1            |         |
| 9/28/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/24/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

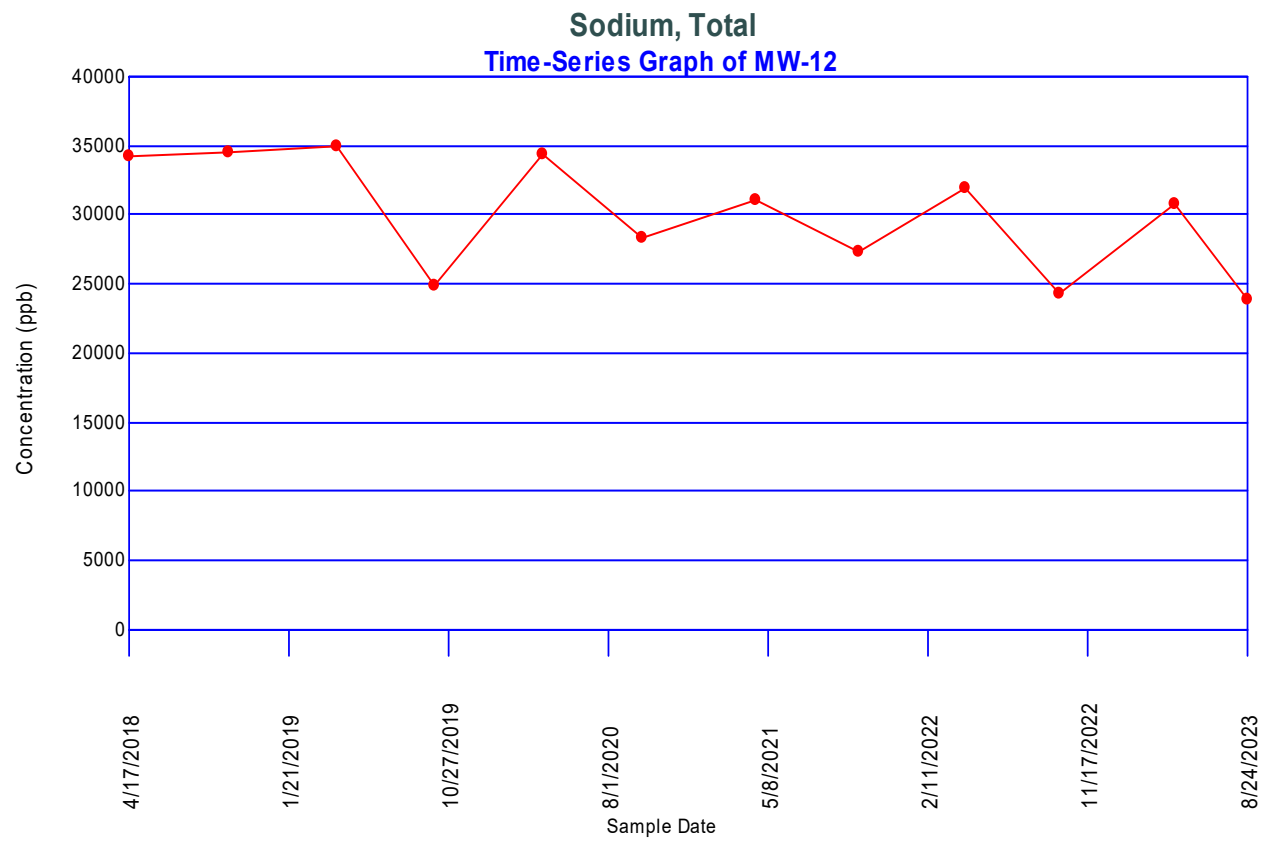
c = 264

Group Variance = 212.667

Z-Score = -2.12575

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

**$|-2.12575| > 1.97737$  indicating a trend**



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-16

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.668367 | 0.240964 | 0.546    | 64700   |
| 2         | 0.275    | 0.294118 | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-16 | 4/17/2018  | 47200 | FALSE   |
|       | 10/9/2018  | 64700 | TRUE    |
|       | 4/14/2019  | 53100 | FALSE   |
|       | 10/2/2019  | 44800 | FALSE   |
|       | 4/9/2020   | 47600 | FALSE   |
|       | 10/1/2020  | 45100 | FALSE   |
|       | 4/15/2021  | 47600 | FALSE   |
|       | 10/14/2021 | 49300 | FALSE   |
|       | 4/19/2022  | 50900 | FALSE   |
|       | 9/28/2022  | 46800 | FALSE   |
|       | 4/18/2023  | 51600 | FALSE   |
|       | 8/24/2023  | 47700 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-16

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 44800 | 64700    | 19900         | 0.5475   | 10895.3 |
| 2  | 45100 | 53100    | 8000          | 0.3325   | 2660    |
| 3  | 46800 | 51600    | 4800          | 0.2347   | 1126.56 |
| 4  | 47200 | 50900    | 3700          | 0.1586   | 586.82  |
| 5  | 47600 | 49300    | 1700          | 0.0922   | 156.74  |
| 6  | 47600 | 47700    | 100           | 0.0303   | 3.03    |
| 7  | 47700 | 47600    | -100          |          |         |
| 8  | 49300 | 47600    | -1700         |          |         |
| 9  | 50900 | 47200    | -3700         |          |         |
| 10 | 51600 | 46800    | -4800         |          |         |
| 11 | 53100 | 45100    | -8000         |          |         |
| 12 | 64700 | 44800    | -19900        |          |         |

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Sum of b values = 15428.4

Sample Standard Deviation = 5346.37

W Statistic = 0.757062

**5% Critical value of 0.859 exceeds 0.757062**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.757062**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-16**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 64700     | 47200     | 17500          | 1                | 0                |
| 53100     | 47200     | 5900           | 2                | 0                |
| 44800     | 47200     | -2400          | 2                | 1                |
| 47600     | 47200     | 400            | 3                | 1                |
| 45100     | 47200     | -2100          | 3                | 2                |
| 47600     | 47200     | 400            | 4                | 2                |
| 49300     | 47200     | 2100           | 5                | 2                |
| 50900     | 47200     | 3700           | 6                | 2                |
| 46800     | 47200     | -400           | 6                | 3                |
| 51600     | 47200     | 4400           | 7                | 3                |
| 47700     | 47200     | 500            | 8                | 3                |
|           |           |                |                  |                  |
| 53100     | 64700     | -11600         | 8                | 4                |
| 44800     | 64700     | -19900         | 8                | 5                |
| 47600     | 64700     | -17100         | 8                | 6                |
| 45100     | 64700     | -19600         | 8                | 7                |
| 47600     | 64700     | -17100         | 8                | 8                |
| 49300     | 64700     | -15400         | 8                | 9                |
| 50900     | 64700     | -13800         | 8                | 10               |
| 46800     | 64700     | -17900         | 8                | 11               |
| 51600     | 64700     | -13100         | 8                | 12               |
| 47700     | 64700     | -17000         | 8                | 13               |
|           |           |                |                  |                  |
| 44800     | 53100     | -8300          | 8                | 14               |
| 47600     | 53100     | -5500          | 8                | 15               |
| 45100     | 53100     | -8000          | 8                | 16               |
| 47600     | 53100     | -5500          | 8                | 17               |
| 49300     | 53100     | -3800          | 8                | 18               |
| 50900     | 53100     | -2200          | 8                | 19               |
| 46800     | 53100     | -6300          | 8                | 20               |
| 51600     | 53100     | -1500          | 8                | 21               |
| 47700     | 53100     | -5400          | 8                | 22               |
|           |           |                |                  |                  |
| 47600     | 44800     | 2800           | 9                | 22               |
| 45100     | 44800     | 300            | 10               | 22               |
| 47600     | 44800     | 2800           | 11               | 22               |
| 49300     | 44800     | 4500           | 12               | 22               |
| 50900     | 44800     | 6100           | 13               | 22               |
| 46800     | 44800     | 2000           | 14               | 22               |
| 51600     | 44800     | 6800           | 15               | 22               |
| 47700     | 44800     | 2900           | 16               | 22               |
|           |           |                |                  |                  |
| 45100     | 47600     | -2500          | 16               | 23               |
| 47600     | 47600     | 0              | 16               | 23               |
| 49300     | 47600     | 1700           | 17               | 23               |
| 50900     | 47600     | 3300           | 18               | 23               |
| 46800     | 47600     | -800           | 18               | 24               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 51600 | 47600 | 4000  | 19 | 24 |
| 47700 | 47600 | 100   | 20 | 24 |
| 47600 | 45100 | 2500  | 21 | 24 |
| 49300 | 45100 | 4200  | 22 | 24 |
| 50900 | 45100 | 5800  | 23 | 24 |
| 46800 | 45100 | 1700  | 24 | 24 |
| 51600 | 45100 | 6500  | 25 | 24 |
| 47700 | 45100 | 2600  | 26 | 24 |
| 49300 | 47600 | 1700  | 27 | 24 |
| 50900 | 47600 | 3300  | 28 | 24 |
| 46800 | 47600 | -800  | 28 | 25 |
| 51600 | 47600 | 4000  | 29 | 25 |
| 47700 | 47600 | 100   | 30 | 25 |
| 50900 | 49300 | 1600  | 31 | 25 |
| 46800 | 49300 | -2500 | 31 | 26 |
| 51600 | 49300 | 2300  | 32 | 26 |
| 47700 | 49300 | -1600 | 32 | 27 |
| 46800 | 50900 | -4100 | 32 | 28 |
| 51600 | 50900 | 700   | 33 | 28 |
| 47700 | 50900 | -3200 | 33 | 29 |
| 51600 | 46800 | 4800  | 34 | 29 |
| 47700 | 46800 | 900   | 35 | 29 |
| 47700 | 51600 | -3900 | 35 | 30 |

S Statistic = 35 - 30 = 5

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 47600 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 4/14/2019   | 1            |
| 10/2/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/15/2021   | 1            |
| 10/14/2021  | 1            |
| 4/19/2022   | 1            |
| 9/28/2022   | 1            |
| 4/18/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 18  
 B = 0  
 C = 0  
 D = 0  
 E = 2  
 F = 0

a = 3828

b = 11880

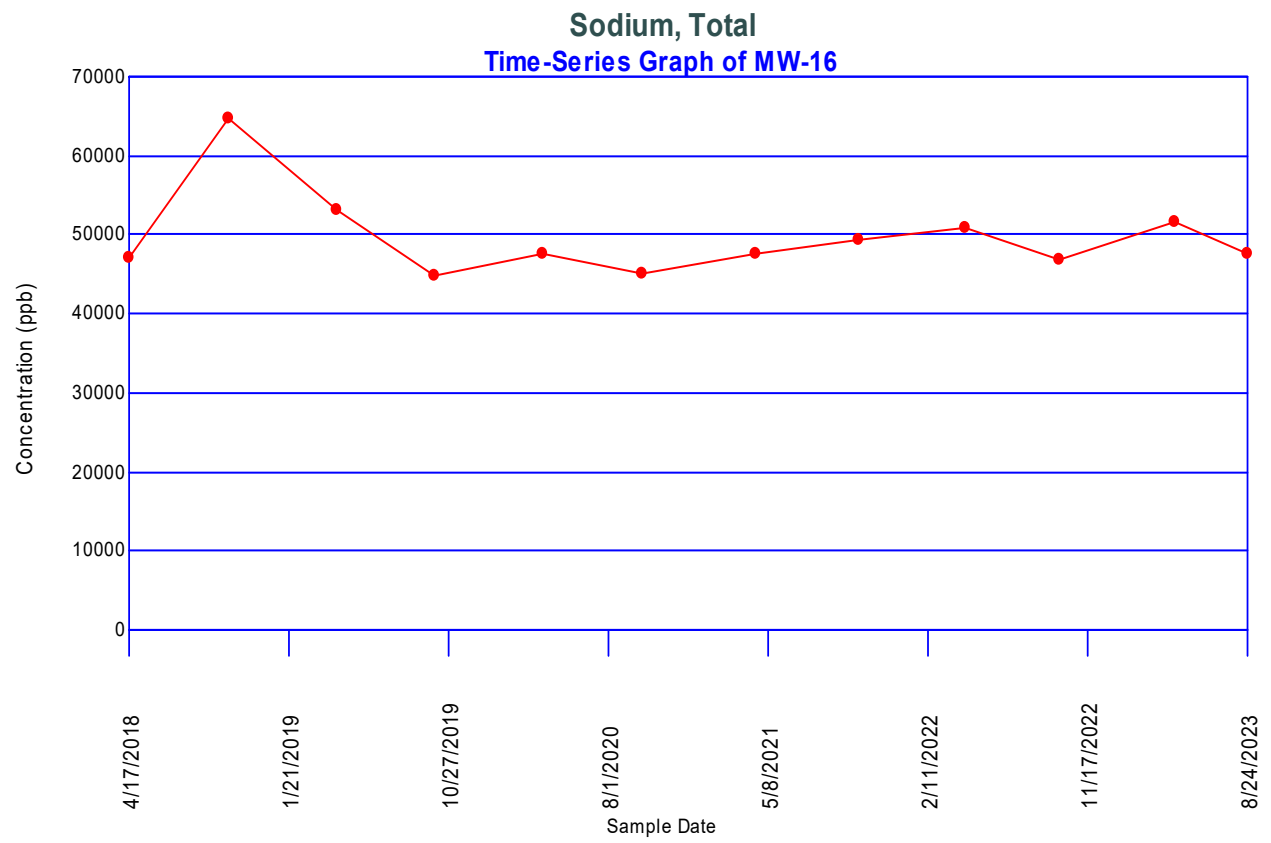
c = 264

Group Variance = 211.667

Z-Score = 0.274937

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|0.274937| <= 1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-20

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest    | Critical | Outlier |
|-----------|----------|-----------|----------|---------|
| 1         | 0.488746 | 0.0338164 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-20 | 4/17/2018  | 67700 | FALSE   |
|       | 10/10/2018 | 97800 | FALSE   |
|       | 4/14/2019  | 86900 | FALSE   |
|       | 10/2/2019  | 67600 | FALSE   |
|       | 4/9/2020   | 82600 | FALSE   |
|       | 10/2/2020  | 66200 | FALSE   |
|       | 4/15/2021  | 73700 | FALSE   |
|       | 10/12/2021 | 66900 | FALSE   |
|       | 4/20/2022  | 77400 | FALSE   |
|       | 9/28/2022  | 71000 | FALSE   |
|       | 4/19/2023  | 76200 | FALSE   |
|       | 8/23/2023  | 66700 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-20

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 66200 | 97800    | 31600         | 0.5475   | 17301   |
| 2  | 66700 | 86900    | 20200         | 0.3325   | 6716.5  |
| 3  | 66900 | 82600    | 15700         | 0.2347   | 3684.79 |
| 4  | 67600 | 77400    | 9800          | 0.1586   | 1554.28 |
| 5  | 67700 | 76200    | 8500          | 0.0922   | 783.7   |
| 6  | 71000 | 73700    | 2700          | 0.0303   | 81.81   |
| 7  | 73700 | 71000    | -2700         |          |         |
| 8  | 76200 | 67700    | -8500         |          |         |
| 9  | 77400 | 67600    | -9800         |          |         |
| 10 | 82600 | 66900    | -15700        |          |         |
| 11 | 86900 | 66700    | -20200        |          |         |
| 12 | 97800 | 66200    | -31600        |          |         |

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Sum of b values = 30122.1

Sample Standard Deviation = 9835.23

W Statistic = 0.852723

**5% Critical value of 0.859 exceeds 0.852723**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.852723

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-20**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 97800     | 67700     | 30100          | 1                | 0                |
| 86900     | 67700     | 19200          | 2                | 0                |
| 67600     | 67700     | -100           | 2                | 1                |
| 82600     | 67700     | 14900          | 3                | 1                |
| 66200     | 67700     | -1500          | 3                | 2                |
| 73700     | 67700     | 6000           | 4                | 2                |
| 66900     | 67700     | -800           | 4                | 3                |
| 77400     | 67700     | 9700           | 5                | 3                |
| 71000     | 67700     | 3300           | 6                | 3                |
| 76200     | 67700     | 8500           | 7                | 3                |
| 66700     | 67700     | -1000          | 7                | 4                |
|           |           |                |                  |                  |
| 86900     | 97800     | -10900         | 7                | 5                |
| 67600     | 97800     | -30200         | 7                | 6                |
| 82600     | 97800     | -15200         | 7                | 7                |
| 66200     | 97800     | -31600         | 7                | 8                |
| 73700     | 97800     | -24100         | 7                | 9                |
| 66900     | 97800     | -30900         | 7                | 10               |
| 77400     | 97800     | -20400         | 7                | 11               |
| 71000     | 97800     | -26800         | 7                | 12               |
| 76200     | 97800     | -21600         | 7                | 13               |
| 66700     | 97800     | -31100         | 7                | 14               |
|           |           |                |                  |                  |
| 67600     | 86900     | -19300         | 7                | 15               |
| 82600     | 86900     | -4300          | 7                | 16               |
| 66200     | 86900     | -20700         | 7                | 17               |
| 73700     | 86900     | -13200         | 7                | 18               |
| 66900     | 86900     | -20000         | 7                | 19               |
| 77400     | 86900     | -9500          | 7                | 20               |
| 71000     | 86900     | -15900         | 7                | 21               |
| 76200     | 86900     | -10700         | 7                | 22               |
| 66700     | 86900     | -20200         | 7                | 23               |
|           |           |                |                  |                  |
| 82600     | 67600     | 15000          | 8                | 23               |
| 66200     | 67600     | -1400          | 8                | 24               |
| 73700     | 67600     | 6100           | 9                | 24               |
| 66900     | 67600     | -700           | 9                | 25               |
| 77400     | 67600     | 9800           | 10               | 25               |
| 71000     | 67600     | 3400           | 11               | 25               |
| 76200     | 67600     | 8600           | 12               | 25               |
| 66700     | 67600     | -900           | 12               | 26               |
|           |           |                |                  |                  |
| 66200     | 82600     | -16400         | 12               | 27               |
| 73700     | 82600     | -8900          | 12               | 28               |
| 66900     | 82600     | -15700         | 12               | 29               |
| 77400     | 82600     | -5200          | 12               | 30               |
| 71000     | 82600     | -11600         | 12               | 31               |

|       |       |        |    |    |
|-------|-------|--------|----|----|
| 76200 | 82600 | -6400  | 12 | 32 |
| 66700 | 82600 | -15900 | 12 | 33 |
| 73700 | 66200 | 7500   | 13 | 33 |
| 66900 | 66200 | 700    | 14 | 33 |
| 77400 | 66200 | 11200  | 15 | 33 |
| 71000 | 66200 | 4800   | 16 | 33 |
| 76200 | 66200 | 10000  | 17 | 33 |
| 66700 | 66200 | 500    | 18 | 33 |
| 66900 | 73700 | -6800  | 18 | 34 |
| 77400 | 73700 | 3700   | 19 | 34 |
| 71000 | 73700 | -2700  | 19 | 35 |
| 76200 | 73700 | 2500   | 20 | 35 |
| 66700 | 73700 | -7000  | 20 | 36 |
| 77400 | 66900 | 10500  | 21 | 36 |
| 71000 | 66900 | 4100   | 22 | 36 |
| 76200 | 66900 | 9300   | 23 | 36 |
| 66700 | 66900 | -200   | 23 | 37 |
| 71000 | 77400 | -6400  | 23 | 38 |
| 76200 | 77400 | -1200  | 23 | 39 |
| 66700 | 77400 | -10700 | 23 | 40 |
| 76200 | 71000 | 5200   | 24 | 40 |
| 66700 | 71000 | -4300  | 24 | 41 |
| 66700 | 76200 | -9500  | 24 | 42 |

S Statistic = 24 - 42 = -18

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/17/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 4/14/2019                                   | 1            |         |
| 10/2/2019                                   | 1            |         |
| 4/9/2020                                    | 1            |         |
| 10/2/2020                                   | 1            |         |
| 4/15/2021                                   | 1            |         |
| 10/12/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/28/2022                                   | 1            |         |
| 4/19/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

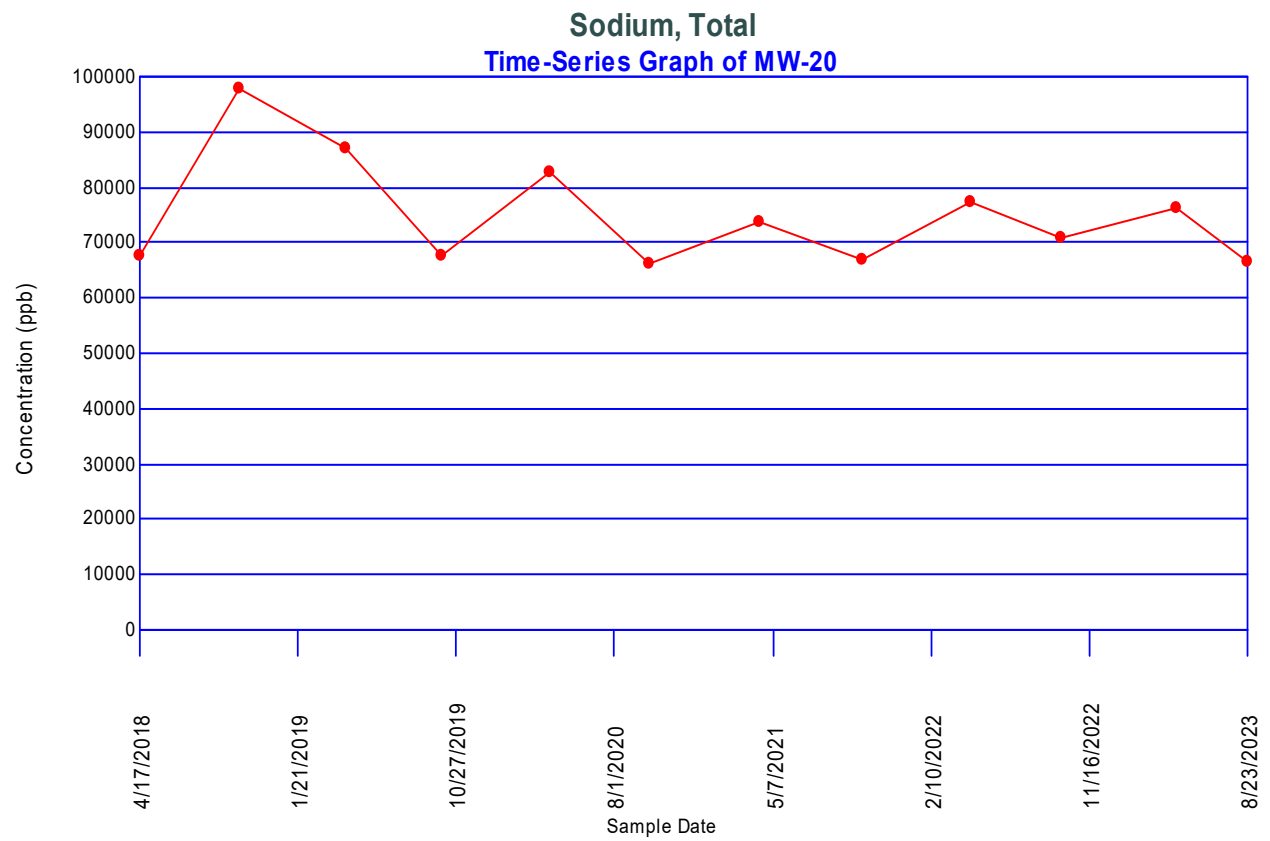
c = 264

Group Variance = 212.667

Z-Score = -1.16573

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.16573| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-21

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest    | Critical | Outlier |
|-----------|----------|-----------|----------|---------|
| 1         | 0.148438 | 0.0992366 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-21 | 4/17/2018  | 63900 | FALSE   |
|       | 10/10/2018 | 63200 | FALSE   |
|       | 4/13/2019  | 62000 | FALSE   |
|       | 10/1/2019  | 54200 | FALSE   |
|       | 4/7/2020   | 54800 | FALSE   |
|       | 9/30/2020  | 50100 | FALSE   |
|       | 4/14/2021  | 51400 | FALSE   |
|       | 10/12/2021 | 54500 | FALSE   |
|       | 4/20/2022  | 57200 | FALSE   |
|       | 9/29/2022  | 51100 | FALSE   |
|       | 4/18/2023  | 58000 | FALSE   |
|       | 8/23/2023  | 52700 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-21

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 50100 | 63900    | 13800         | 0.5475   | 7555.5  |
| 2  | 51100 | 63200    | 12100         | 0.3325   | 4023.25 |
| 3  | 51400 | 62000    | 10600         | 0.2347   | 2487.82 |
| 4  | 52700 | 58000    | 5300          | 0.1586   | 840.58  |
| 5  | 54200 | 57200    | 3000          | 0.0922   | 276.6   |
| 6  | 54500 | 54800    | 300           | 0.0303   | 9.09    |
| 7  | 54800 | 54500    | -300          |          |         |
| 8  | 57200 | 54200    | -3000         |          |         |
| 9  | 58000 | 52700    | -5300         |          |         |
| 10 | 62000 | 51400    | -10600        |          |         |
| 11 | 63200 | 51100    | -12100        |          |         |
| 12 | 63900 | 50100    | -13800        |          |         |

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Sum of b values = 15192.8

Sample Standard Deviation = 4799.52

W Statistic = 0.91094

5% Critical value of 0.859 is less than 0.91094

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.91094

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-21**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 63200     | 63900     | -700           | 0                | 1                |
| 62000     | 63900     | -1900          | 0                | 2                |
| 54200     | 63900     | -9700          | 0                | 3                |
| 54800     | 63900     | -9100          | 0                | 4                |
| 50100     | 63900     | -13800         | 0                | 5                |
| 51400     | 63900     | -12500         | 0                | 6                |
| 54500     | 63900     | -9400          | 0                | 7                |
| 57200     | 63900     | -6700          | 0                | 8                |
| 51100     | 63900     | -12800         | 0                | 9                |
| 58000     | 63900     | -5900          | 0                | 10               |
| 52700     | 63900     | -11200         | 0                | 11               |
| 62000     | 63200     | -1200          | 0                | 12               |
| 54200     | 63200     | -9000          | 0                | 13               |
| 54800     | 63200     | -8400          | 0                | 14               |
| 50100     | 63200     | -13100         | 0                | 15               |
| 51400     | 63200     | -11800         | 0                | 16               |
| 54500     | 63200     | -8700          | 0                | 17               |
| 57200     | 63200     | -6000          | 0                | 18               |
| 51100     | 63200     | -12100         | 0                | 19               |
| 58000     | 63200     | -5200          | 0                | 20               |
| 52700     | 63200     | -10500         | 0                | 21               |
| 54200     | 62000     | -7800          | 0                | 22               |
| 54800     | 62000     | -7200          | 0                | 23               |
| 50100     | 62000     | -11900         | 0                | 24               |
| 51400     | 62000     | -10600         | 0                | 25               |
| 54500     | 62000     | -7500          | 0                | 26               |
| 57200     | 62000     | -4800          | 0                | 27               |
| 51100     | 62000     | -10900         | 0                | 28               |
| 58000     | 62000     | -4000          | 0                | 29               |
| 52700     | 62000     | -9300          | 0                | 30               |
| 54800     | 54200     | 600            | 1                | 30               |
| 50100     | 54200     | -4100          | 1                | 31               |
| 51400     | 54200     | -2800          | 1                | 32               |
| 54500     | 54200     | 300            | 2                | 32               |
| 57200     | 54200     | 3000           | 3                | 32               |
| 51100     | 54200     | -3100          | 3                | 33               |
| 58000     | 54200     | 3800           | 4                | 33               |
| 52700     | 54200     | -1500          | 4                | 34               |
| 50100     | 54800     | -4700          | 4                | 35               |
| 51400     | 54800     | -3400          | 4                | 36               |
| 54500     | 54800     | -300           | 4                | 37               |
| 57200     | 54800     | 2400           | 5                | 37               |
| 51100     | 54800     | -3700          | 5                | 38               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 58000 | 54800 | 3200  | 6  | 38 |
| 52700 | 54800 | -2100 | 6  | 39 |
| 51400 | 50100 | 1300  | 7  | 39 |
| 54500 | 50100 | 4400  | 8  | 39 |
| 57200 | 50100 | 7100  | 9  | 39 |
| 51100 | 50100 | 1000  | 10 | 39 |
| 58000 | 50100 | 7900  | 11 | 39 |
| 52700 | 50100 | 2600  | 12 | 39 |
| 54500 | 51400 | 3100  | 13 | 39 |
| 57200 | 51400 | 5800  | 14 | 39 |
| 51100 | 51400 | -300  | 14 | 40 |
| 58000 | 51400 | 6600  | 15 | 40 |
| 52700 | 51400 | 1300  | 16 | 40 |
| 57200 | 54500 | 2700  | 17 | 40 |
| 51100 | 54500 | -3400 | 17 | 41 |
| 58000 | 54500 | 3500  | 18 | 41 |
| 52700 | 54500 | -1800 | 18 | 42 |
| 51100 | 57200 | -6100 | 18 | 43 |
| 58000 | 57200 | 800   | 19 | 43 |
| 52700 | 57200 | -4500 | 19 | 44 |
| 58000 | 51100 | 6900  | 20 | 44 |
| 52700 | 51100 | 1600  | 21 | 44 |
| 52700 | 58000 | -5300 | 21 | 45 |

S Statistic = 21 - 45 = -24

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/17/2018                                   | 1            |         |
| 10/10/2018                                  | 1            |         |
| 4/13/2019                                   | 1            |         |
| 10/1/2019                                   | 1            |         |
| 4/7/2020                                    | 1            |         |
| 9/30/2020                                   | 1            |         |
| 4/14/2021                                   | 1            |         |
| 10/12/2021                                  | 1            |         |
| 4/20/2022                                   | 1            |         |
| 9/29/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/23/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

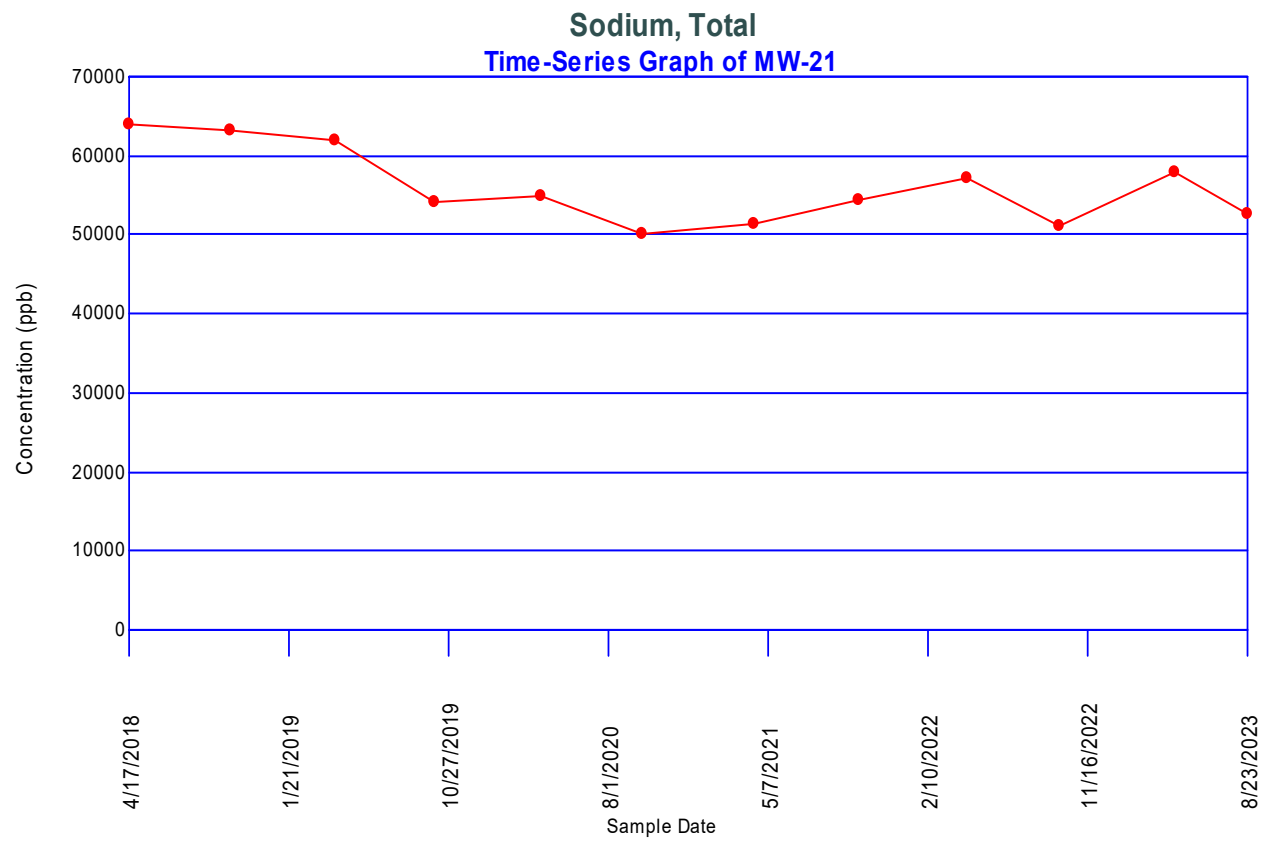
c = 264

Group Variance = 212.667

Z-Score = -1.57717

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.57717| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-25

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest   | Lowest   | Critical | Outlier |
|-----------|-----------|----------|----------|---------|
| 1         | 0.563805  | 0.564972 | 0.546    | 85400   |
| 2         | 0.122449  | 0.578035 | 0.576    | 26500   |
| 3         | 0.0519481 | 0.223404 | 0.477    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-25 | 4/17/2018  | 51700 | FALSE   |
|       | 10/9/2018  | 85400 | TRUE    |
|       | 4/13/2019  | 42300 | FALSE   |
|       | 10/1/2019  | 50000 | FALSE   |
|       | 4/8/2020   | 46500 | FALSE   |
|       | 10/1/2020  | 49800 | FALSE   |
|       | 4/14/2021  | 26500 | TRUE    |
|       | 10/13/2021 | 53000 | FALSE   |
|       | 4/19/2022  | 61900 | FALSE   |
|       | 9/29/2022  | 59500 | FALSE   |
|       | 4/19/2023  | 49800 | FALSE   |
|       | 8/24/2023  | 61100 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-25

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 26500 | 85400    | 58900         | 0.5475   | 32247.8 |
| 2  | 42300 | 61900    | 19600         | 0.3325   | 6517    |
| 3  | 46500 | 61100    | 14600         | 0.2347   | 3426.62 |
| 4  | 49800 | 59500    | 9700          | 0.1586   | 1538.42 |
| 5  | 49800 | 53000    | 3200          | 0.0922   | 295.04  |
| 6  | 50000 | 51700    | 1700          | 0.0303   | 51.51   |
| 7  | 51700 | 50000    | -1700         |          |         |
| 8  | 53000 | 49800    | -3200         |          |         |
| 9  | 59500 | 49800    | -9700         |          |         |
| 10 | 61100 | 46500    | -14600        |          |         |
| 11 | 61900 | 42300    | -19600        |          |         |
| 12 | 85400 | 26500    | -58900        |          |         |

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Sum of b values = 44076.3

Sample Standard Deviation = 13904.9

W Statistic = 0.913448

5% Critical value of 0.859 is less than 0.913448

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.913448

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-25**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 85400     | 51700     | 33700          | 1                | 0                |
| 42300     | 51700     | -9400          | 1                | 1                |
| 50000     | 51700     | -1700          | 1                | 2                |
| 46500     | 51700     | -5200          | 1                | 3                |
| 49800     | 51700     | -1900          | 1                | 4                |
| 26500     | 51700     | -25200         | 1                | 5                |
| 53000     | 51700     | 1300           | 2                | 5                |
| 61900     | 51700     | 10200          | 3                | 5                |
| 59500     | 51700     | 7800           | 4                | 5                |
| 49800     | 51700     | -1900          | 4                | 6                |
| 61100     | 51700     | 9400           | 5                | 6                |
|           |           |                |                  |                  |
| 42300     | 85400     | -43100         | 5                | 7                |
| 50000     | 85400     | -35400         | 5                | 8                |
| 46500     | 85400     | -38900         | 5                | 9                |
| 49800     | 85400     | -35600         | 5                | 10               |
| 26500     | 85400     | -58900         | 5                | 11               |
| 53000     | 85400     | -32400         | 5                | 12               |
| 61900     | 85400     | -23500         | 5                | 13               |
| 59500     | 85400     | -25900         | 5                | 14               |
| 49800     | 85400     | -35600         | 5                | 15               |
| 61100     | 85400     | -24300         | 5                | 16               |
|           |           |                |                  |                  |
| 50000     | 42300     | 7700           | 6                | 16               |
| 46500     | 42300     | 4200           | 7                | 16               |
| 49800     | 42300     | 7500           | 8                | 16               |
| 26500     | 42300     | -15800         | 8                | 17               |
| 53000     | 42300     | 10700          | 9                | 17               |
| 61900     | 42300     | 19600          | 10               | 17               |
| 59500     | 42300     | 17200          | 11               | 17               |
| 49800     | 42300     | 7500           | 12               | 17               |
| 61100     | 42300     | 18800          | 13               | 17               |
|           |           |                |                  |                  |
| 46500     | 50000     | -3500          | 13               | 18               |
| 49800     | 50000     | -200           | 13               | 19               |
| 26500     | 50000     | -23500         | 13               | 20               |
| 53000     | 50000     | 3000           | 14               | 20               |
| 61900     | 50000     | 11900          | 15               | 20               |
| 59500     | 50000     | 9500           | 16               | 20               |
| 49800     | 50000     | -200           | 16               | 21               |
| 61100     | 50000     | 11100          | 17               | 21               |
|           |           |                |                  |                  |
| 49800     | 46500     | 3300           | 18               | 21               |
| 26500     | 46500     | -20000         | 18               | 22               |
| 53000     | 46500     | 6500           | 19               | 22               |
| 61900     | 46500     | 15400          | 20               | 22               |
| 59500     | 46500     | 13000          | 21               | 22               |

|       |       |        |    |    |
|-------|-------|--------|----|----|
| 49800 | 46500 | 3300   | 22 | 22 |
| 61100 | 46500 | 14600  | 23 | 22 |
| 26500 | 49800 | -23300 | 23 | 23 |
| 53000 | 49800 | 3200   | 24 | 23 |
| 61900 | 49800 | 12100  | 25 | 23 |
| 59500 | 49800 | 9700   | 26 | 23 |
| 49800 | 49800 | 0      | 26 | 23 |
| 61100 | 49800 | 11300  | 27 | 23 |
| 53000 | 26500 | 26500  | 28 | 23 |
| 61900 | 26500 | 35400  | 29 | 23 |
| 59500 | 26500 | 33000  | 30 | 23 |
| 49800 | 26500 | 23300  | 31 | 23 |
| 61100 | 26500 | 34600  | 32 | 23 |
| 61900 | 53000 | 8900   | 33 | 23 |
| 59500 | 53000 | 6500   | 34 | 23 |
| 49800 | 53000 | -3200  | 34 | 24 |
| 61100 | 53000 | 8100   | 35 | 24 |
| 59500 | 61900 | -2400  | 35 | 25 |
| 49800 | 61900 | -12100 | 35 | 26 |
| 61100 | 61900 | -800   | 35 | 27 |
| 49800 | 59500 | -9700  | 35 | 28 |
| 61100 | 59500 | 1600   | 36 | 28 |
| 61100 | 49800 | 11300  | 37 | 28 |

S Statistic = 37 - 28 = 9

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 49800 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/8/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/19/2022   | 1            |
| 9/29/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 18  
 B = 0  
 C = 0  
 D = 0  
 E = 2  
 F = 0

a = 3828

b = 11880

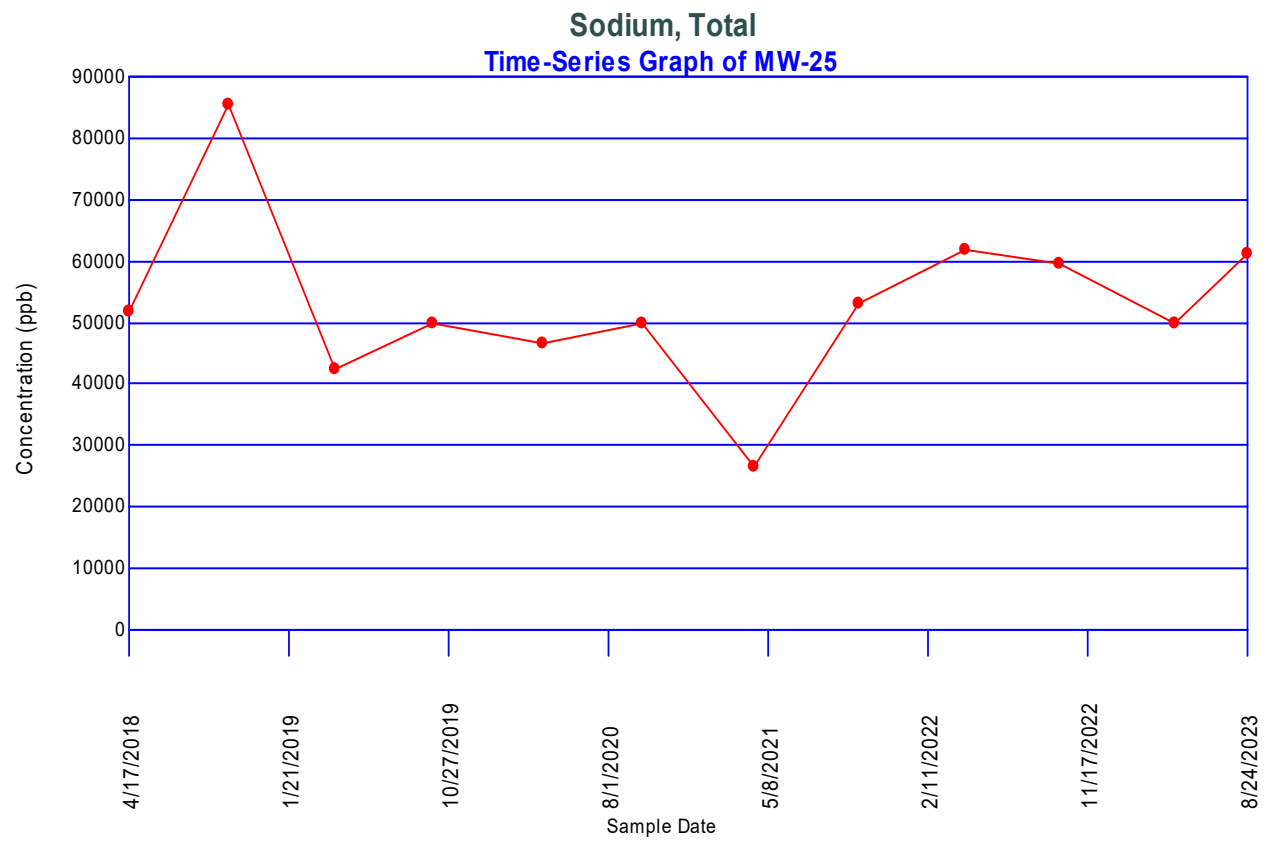
c = 264

Group Variance = 211.667

Z-Score = 0.549875

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|0.549875|  $\leq$  1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-26

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.859189 | 0.442953 | 0.546    | 123000  |
| 2         | 0.341176 | 0.536585 | 0.576    | None    |

| Loc.  | Date       | Conc.  | Outlier |
|-------|------------|--------|---------|
| MW-26 | 4/17/2018  | 89600  | FALSE   |
|       | 10/9/2018  | 123000 | TRUE    |
|       | 4/13/2019  | 87000  | FALSE   |
|       | 10/1/2019  | 82500  | FALSE   |
|       | 4/8/2020   | 85700  | FALSE   |
|       | 10/1/2020  | 81100  | FALSE   |
|       | 4/14/2021  | 81500  | FALSE   |
|       | 10/13/2021 | 74700  | FALSE   |
|       | 4/19/2022  | 81300  | FALSE   |
|       | 9/29/2022  | 81300  | FALSE   |
|       | 4/19/2023  | 86700  | FALSE   |
|       | 8/24/2023  | 83100  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-26

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)   | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|--------|----------|---------------|----------|---------|
| 1  | 74700  | 123000   | 48300         | 0.5475   | 26444.3 |
| 2  | 81100  | 89600    | 8500          | 0.3325   | 2826.25 |
| 3  | 81300  | 87000    | 5700          | 0.2347   | 1337.79 |
| 4  | 81300  | 86700    | 5400          | 0.1586   | 856.44  |
| 5  | 81500  | 85700    | 4200          | 0.0922   | 387.24  |
| 6  | 82500  | 83100    | 600           | 0.0303   | 18.18   |
| 7  | 83100  | 82500    | -600          |          |         |
| 8  | 85700  | 81500    | -4200         |          |         |
| 9  | 86700  | 81300    | -5400         |          |         |
| 10 | 87000  | 81300    | -5700         |          |         |
| 11 | 89600  | 81100    | -8500         |          |         |
| 12 | 123000 | 74700    | -48300        |          |         |

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Sum of b values = 31870.2

Sample Standard Deviation = 12127.4

W Statistic = 0.627828

**5% Critical value of 0.859 exceeds 0.627828**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.627828**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-26**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 123000    | 89600     | 33400          | 1                | 0                |
| 87000     | 89600     | -2600          | 1                | 1                |
| 82500     | 89600     | -7100          | 1                | 2                |
| 85700     | 89600     | -3900          | 1                | 3                |
| 81100     | 89600     | -8500          | 1                | 4                |
| 81500     | 89600     | -8100          | 1                | 5                |
| 74700     | 89600     | -14900         | 1                | 6                |
| 81300     | 89600     | -8300          | 1                | 7                |
| 81300     | 89600     | -8300          | 1                | 8                |
| 86700     | 89600     | -2900          | 1                | 9                |
| 83100     | 89600     | -6500          | 1                | 10               |
| 87000     | 123000    | -36000         | 1                | 11               |
| 82500     | 123000    | -40500         | 1                | 12               |
| 85700     | 123000    | -37300         | 1                | 13               |
| 81100     | 123000    | -41900         | 1                | 14               |
| 81500     | 123000    | -41500         | 1                | 15               |
| 74700     | 123000    | -48300         | 1                | 16               |
| 81300     | 123000    | -41700         | 1                | 17               |
| 81300     | 123000    | -41700         | 1                | 18               |
| 86700     | 123000    | -36300         | 1                | 19               |
| 83100     | 123000    | -39900         | 1                | 20               |
| 82500     | 87000     | -4500          | 1                | 21               |
| 85700     | 87000     | -1300          | 1                | 22               |
| 81100     | 87000     | -5900          | 1                | 23               |
| 81500     | 87000     | -5500          | 1                | 24               |
| 74700     | 87000     | -12300         | 1                | 25               |
| 81300     | 87000     | -5700          | 1                | 26               |
| 81300     | 87000     | -5700          | 1                | 27               |
| 86700     | 87000     | -300           | 1                | 28               |
| 83100     | 87000     | -3900          | 1                | 29               |
| 85700     | 82500     | 3200           | 2                | 29               |
| 81100     | 82500     | -1400          | 2                | 30               |
| 81500     | 82500     | -1000          | 2                | 31               |
| 74700     | 82500     | -7800          | 2                | 32               |
| 81300     | 82500     | -1200          | 2                | 33               |
| 81300     | 82500     | -1200          | 2                | 34               |
| 86700     | 82500     | 4200           | 3                | 34               |
| 83100     | 82500     | 600            | 4                | 34               |
| 81100     | 85700     | -4600          | 4                | 35               |
| 81500     | 85700     | -4200          | 4                | 36               |
| 74700     | 85700     | -11000         | 4                | 37               |
| 81300     | 85700     | -4400          | 4                | 38               |
| 81300     | 85700     | -4400          | 4                | 39               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 86700 | 85700 | 1000  | 5  | 39 |
| 83100 | 85700 | -2600 | 5  | 40 |
| 81500 | 81100 | 400   | 6  | 40 |
| 74700 | 81100 | -6400 | 6  | 41 |
| 81300 | 81100 | 200   | 7  | 41 |
| 81300 | 81100 | 200   | 8  | 41 |
| 86700 | 81100 | 5600  | 9  | 41 |
| 83100 | 81100 | 2000  | 10 | 41 |
| 74700 | 81500 | -6800 | 10 | 42 |
| 81300 | 81500 | -200  | 10 | 43 |
| 81300 | 81500 | -200  | 10 | 44 |
| 86700 | 81500 | 5200  | 11 | 44 |
| 83100 | 81500 | 1600  | 12 | 44 |
| 81300 | 74700 | 6600  | 13 | 44 |
| 81300 | 74700 | 6600  | 14 | 44 |
| 86700 | 74700 | 12000 | 15 | 44 |
| 83100 | 74700 | 8400  | 16 | 44 |
| 81300 | 81300 | 0     | 16 | 44 |
| 86700 | 81300 | 5400  | 17 | 44 |
| 83100 | 81300 | 1800  | 18 | 44 |
| 86700 | 81300 | 5400  | 19 | 44 |
| 83100 | 81300 | 1800  | 20 | 44 |
| 83100 | 86700 | -3600 | 20 | 45 |

S Statistic = 20 - 45 = -25

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 81300 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/8/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/19/2022   | 1            |
| 9/29/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 18  
B = 0  
C = 0  
D = 0  
E = 2  
F = 0

a = 3828

b = 11880

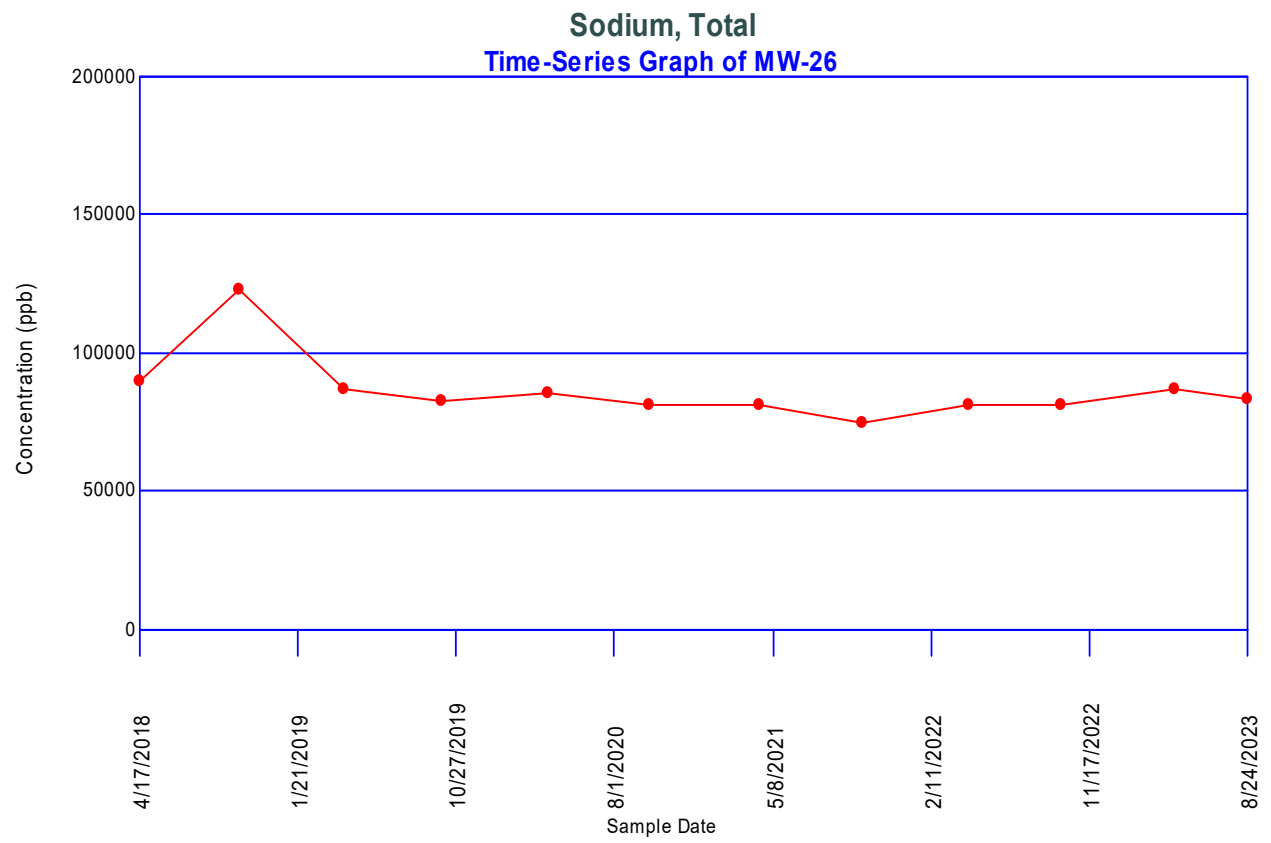
c = 264

Group Variance = 211.667

Z-Score = -1.64962

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|-1.64962| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: MW-27

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.777174 | 0.404494 | 0.546    | 59100   |
| 2         | 0.457627 | 0.507042 | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| MW-27 | 4/18/2018  | 44800 | FALSE   |
|       | 10/9/2018  | 59100 | TRUE    |
|       | 4/13/2019  | 46600 | FALSE   |
|       | 10/1/2019  | 41400 | FALSE   |
|       | 4/9/2020   | 43600 | FALSE   |
|       | 10/1/2020  | 41300 | FALSE   |
|       | 4/14/2021  | 40700 | FALSE   |
|       | 10/13/2021 | 37700 | FALSE   |
|       | 4/20/2022  | 42800 | FALSE   |
|       | 9/28/2022  | 43400 | FALSE   |
|       | 4/19/2023  | 43900 | FALSE   |
|       | 8/24/2023  | 43600 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: MW-27

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 37700 | 59100    | 21400         | 0.5475   | 11716.5 |
| 2  | 40700 | 46600    | 5900          | 0.3325   | 1961.75 |
| 3  | 41300 | 44800    | 3500          | 0.2347   | 821.45  |
| 4  | 41400 | 43900    | 2500          | 0.1586   | 396.5   |
| 5  | 42800 | 43600    | 800           | 0.0922   | 73.76   |
| 6  | 43400 | 43600    | 200           | 0.0303   | 6.06    |
| 7  | 43600 | 43400    | -200          |          |         |
| 8  | 43600 | 42800    | -800          |          |         |
| 9  | 43900 | 41400    | -2500         |          |         |
| 10 | 44800 | 41300    | -3500         |          |         |
| 11 | 46600 | 40700    | -5900         |          |         |
| 12 | 59100 | 37700    | -21400        |          |         |

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Sum of b values = 14976

Sample Standard Deviation = 5240.6

W Statistic = 0.742401

**5% Critical value of 0.859 exceeds 0.742401**

**Evidence of non-normality at 95% level of significance**

**1% Critical value of 0.805 exceeds 0.742401**

**Evidence of non-normality at 99% level of significance**

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: MW-27**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 59100     | 44800     | 14300          | 1                | 0                |
| 46600     | 44800     | 1800           | 2                | 0                |
| 41400     | 44800     | -3400          | 2                | 1                |
| 43600     | 44800     | -1200          | 2                | 2                |
| 41300     | 44800     | -3500          | 2                | 3                |
| 40700     | 44800     | -4100          | 2                | 4                |
| 37700     | 44800     | -7100          | 2                | 5                |
| 42800     | 44800     | -2000          | 2                | 6                |
| 43400     | 44800     | -1400          | 2                | 7                |
| 43900     | 44800     | -900           | 2                | 8                |
| 43600     | 44800     | -1200          | 2                | 9                |
| 46600     | 59100     | -12500         | 2                | 10               |
| 41400     | 59100     | -17700         | 2                | 11               |
| 43600     | 59100     | -15500         | 2                | 12               |
| 41300     | 59100     | -17800         | 2                | 13               |
| 40700     | 59100     | -18400         | 2                | 14               |
| 37700     | 59100     | -21400         | 2                | 15               |
| 42800     | 59100     | -16300         | 2                | 16               |
| 43400     | 59100     | -15700         | 2                | 17               |
| 43900     | 59100     | -15200         | 2                | 18               |
| 43600     | 59100     | -15500         | 2                | 19               |
| 41400     | 46600     | -5200          | 2                | 20               |
| 43600     | 46600     | -3000          | 2                | 21               |
| 41300     | 46600     | -5300          | 2                | 22               |
| 40700     | 46600     | -5900          | 2                | 23               |
| 37700     | 46600     | -8900          | 2                | 24               |
| 42800     | 46600     | -3800          | 2                | 25               |
| 43400     | 46600     | -3200          | 2                | 26               |
| 43900     | 46600     | -2700          | 2                | 27               |
| 43600     | 46600     | -3000          | 2                | 28               |
| 43600     | 41400     | 2200           | 3                | 28               |
| 41300     | 41400     | -100           | 3                | 29               |
| 40700     | 41400     | -700           | 3                | 30               |
| 37700     | 41400     | -3700          | 3                | 31               |
| 42800     | 41400     | 1400           | 4                | 31               |
| 43400     | 41400     | 2000           | 5                | 31               |
| 43900     | 41400     | 2500           | 6                | 31               |
| 43600     | 41400     | 2200           | 7                | 31               |
| 41300     | 43600     | -2300          | 7                | 32               |
| 40700     | 43600     | -2900          | 7                | 33               |
| 37700     | 43600     | -5900          | 7                | 34               |
| 42800     | 43600     | -800           | 7                | 35               |
| 43400     | 43600     | -200           | 7                | 36               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 43900 | 43600 | 300   | 8  | 36 |
| 43600 | 43600 | 0     | 8  | 36 |
| 40700 | 41300 | -600  | 8  | 37 |
| 37700 | 41300 | -3600 | 8  | 38 |
| 42800 | 41300 | 1500  | 9  | 38 |
| 43400 | 41300 | 2100  | 10 | 38 |
| 43900 | 41300 | 2600  | 11 | 38 |
| 43600 | 41300 | 2300  | 12 | 38 |
| 37700 | 40700 | -3000 | 12 | 39 |
| 42800 | 40700 | 2100  | 13 | 39 |
| 43400 | 40700 | 2700  | 14 | 39 |
| 43900 | 40700 | 3200  | 15 | 39 |
| 43600 | 40700 | 2900  | 16 | 39 |
| 42800 | 37700 | 5100  | 17 | 39 |
| 43400 | 37700 | 5700  | 18 | 39 |
| 43900 | 37700 | 6200  | 19 | 39 |
| 43600 | 37700 | 5900  | 20 | 39 |
| 43400 | 42800 | 600   | 21 | 39 |
| 43900 | 42800 | 1100  | 22 | 39 |
| 43600 | 42800 | 800   | 23 | 39 |
| 43900 | 43400 | 500   | 24 | 39 |
| 43600 | 43400 | 200   | 25 | 39 |
| 43600 | 43900 | -300  | 25 | 40 |

S Statistic = 25 - 40 = -15

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| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 43600 | 2       |

---

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/20/2022   | 1            |
| 9/28/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

---

A = 18  
 B = 0  
 C = 0  
 D = 0  
 E = 2  
 F = 0

a = 3828

b = 11880

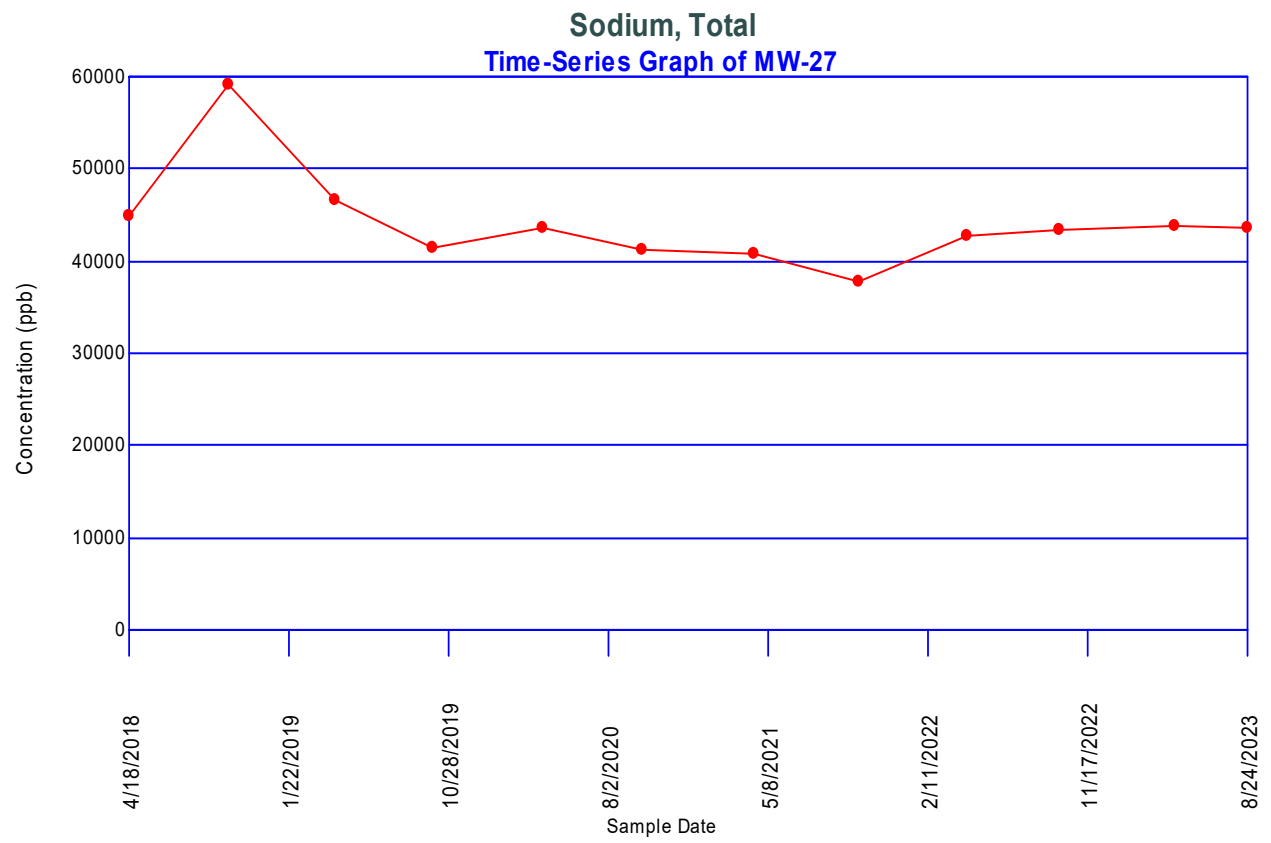
c = 264

Group Variance = 211.667

Z-Score = -0.962281

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-0.962281| \leq 1.97737$  indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: SW-01

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.454545 | 0.266667 | 0.546    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| SW-01 | 4/16/2018  | 19600 | FALSE   |
|       | 10/8/2018  | 14800 | FALSE   |
|       | 4/13/2019  | 19400 | FALSE   |
|       | 9/30/2019  | 12300 | FALSE   |
|       | 4/7/2020   | 19800 | FALSE   |
|       | 10/2/2020  | 13100 | FALSE   |
|       | 4/13/2021  | 14300 | FALSE   |
|       | 10/14/2021 | 16900 | FALSE   |
|       | 4/19/2022  | 18200 | FALSE   |
|       | 9/27/2022  | 19700 | FALSE   |
|       | 4/18/2023  | 19700 | FALSE   |
|       | 8/22/2023  | 25200 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: SW-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 12300 | 25200    | 12900         | 0.5475   | 7062.75 |
| 2  | 13100 | 19800    | 6700          | 0.3325   | 2227.75 |
| 3  | 14300 | 19700    | 5400          | 0.2347   | 1267.38 |
| 4  | 14800 | 19700    | 4900          | 0.1586   | 777.14  |
| 5  | 16900 | 19600    | 2700          | 0.0922   | 248.94  |
| 6  | 18200 | 19400    | 1200          | 0.0303   | 36.36   |
| 7  | 19400 | 18200    | -1200         |          |         |
| 8  | 19600 | 16900    | -2700         |          |         |
| 9  | 19700 | 14800    | -4900         |          |         |
| 10 | 19700 | 14300    | -5400         |          |         |
| 11 | 19800 | 13100    | -6700         |          |         |
| 12 | 25200 | 12300    | -12900        |          |         |

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Sum of b values = 11620.3

Sample Standard Deviation = 3647.04

W Statistic = 0.922916

5% Critical value of 0.859 is less than 0.922916

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.922916

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: SW-01**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 14800     | 19600     | -4800          | 0                | 1                |
| 19400     | 19600     | -200           | 0                | 2                |
| 12300     | 19600     | -7300          | 0                | 3                |
| 19800     | 19600     | 200            | 1                | 3                |
| 13100     | 19600     | -6500          | 1                | 4                |
| 14300     | 19600     | -5300          | 1                | 5                |
| 16900     | 19600     | -2700          | 1                | 6                |
| 18200     | 19600     | -1400          | 1                | 7                |
| 19700     | 19600     | 100            | 2                | 7                |
| 19700     | 19600     | 100            | 3                | 7                |
| 25200     | 19600     | 5600           | 4                | 7                |
|           |           |                |                  |                  |
| 19400     | 14800     | 4600           | 5                | 7                |
| 12300     | 14800     | -2500          | 5                | 8                |
| 19800     | 14800     | 5000           | 6                | 8                |
| 13100     | 14800     | -1700          | 6                | 9                |
| 14300     | 14800     | -500           | 6                | 10               |
| 16900     | 14800     | 2100           | 7                | 10               |
| 18200     | 14800     | 3400           | 8                | 10               |
| 19700     | 14800     | 4900           | 9                | 10               |
| 19700     | 14800     | 4900           | 10               | 10               |
| 25200     | 14800     | 10400          | 11               | 10               |
|           |           |                |                  |                  |
| 12300     | 19400     | -7100          | 11               | 11               |
| 19800     | 19400     | 400            | 12               | 11               |
| 13100     | 19400     | -6300          | 12               | 12               |
| 14300     | 19400     | -5100          | 12               | 13               |
| 16900     | 19400     | -2500          | 12               | 14               |
| 18200     | 19400     | -1200          | 12               | 15               |
| 19700     | 19400     | 300            | 13               | 15               |
| 19700     | 19400     | 300            | 14               | 15               |
| 25200     | 19400     | 5800           | 15               | 15               |
|           |           |                |                  |                  |
| 19800     | 12300     | 7500           | 16               | 15               |
| 13100     | 12300     | 800            | 17               | 15               |
| 14300     | 12300     | 2000           | 18               | 15               |
| 16900     | 12300     | 4600           | 19               | 15               |
| 18200     | 12300     | 5900           | 20               | 15               |
| 19700     | 12300     | 7400           | 21               | 15               |
| 19700     | 12300     | 7400           | 22               | 15               |
| 25200     | 12300     | 12900          | 23               | 15               |
|           |           |                |                  |                  |
| 13100     | 19800     | -6700          | 23               | 16               |
| 14300     | 19800     | -5500          | 23               | 17               |
| 16900     | 19800     | -2900          | 23               | 18               |
| 18200     | 19800     | -1600          | 23               | 19               |
| 19700     | 19800     | -100           | 23               | 20               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 19700 | 19800 | -100  | 23 | 21 |
| 25200 | 19800 | 5400  | 24 | 21 |
| 14300 | 13100 | 1200  | 25 | 21 |
| 16900 | 13100 | 3800  | 26 | 21 |
| 18200 | 13100 | 5100  | 27 | 21 |
| 19700 | 13100 | 6600  | 28 | 21 |
| 19700 | 13100 | 6600  | 29 | 21 |
| 25200 | 13100 | 12100 | 30 | 21 |
| 16900 | 14300 | 2600  | 31 | 21 |
| 18200 | 14300 | 3900  | 32 | 21 |
| 19700 | 14300 | 5400  | 33 | 21 |
| 19700 | 14300 | 5400  | 34 | 21 |
| 25200 | 14300 | 10900 | 35 | 21 |
| 18200 | 16900 | 1300  | 36 | 21 |
| 19700 | 16900 | 2800  | 37 | 21 |
| 19700 | 16900 | 2800  | 38 | 21 |
| 25200 | 16900 | 8300  | 39 | 21 |
| 19700 | 18200 | 1500  | 40 | 21 |
| 19700 | 18200 | 1500  | 41 | 21 |
| 25200 | 18200 | 7000  | 42 | 21 |
| 19700 | 19700 | 0     | 42 | 21 |
| 25200 | 19700 | 5500  | 43 | 21 |
| 25200 | 19700 | 5500  | 44 | 21 |

S Statistic = 44 - 21 = 23

| Tied Group | Value | Members |
|------------|-------|---------|
| 1          | 19700 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/16/2018   | 1            |
| 10/8/2018   | 1            |
| 4/13/2019   | 1            |
| 9/30/2019   | 1            |
| 4/7/2020    | 1            |
| 10/2/2020   | 1            |
| 4/13/2021   | 1            |
| 10/14/2021  | 1            |
| 4/19/2022   | 1            |
| 9/27/2022   | 1            |
| 4/18/2023   | 1            |
| 8/22/2023   | 1            |

There are 0 time periods with multiple data

A = 18  
 B = 0  
 C = 0  
 D = 0  
 E = 2  
 F = 0

a = 3828

b = 11880

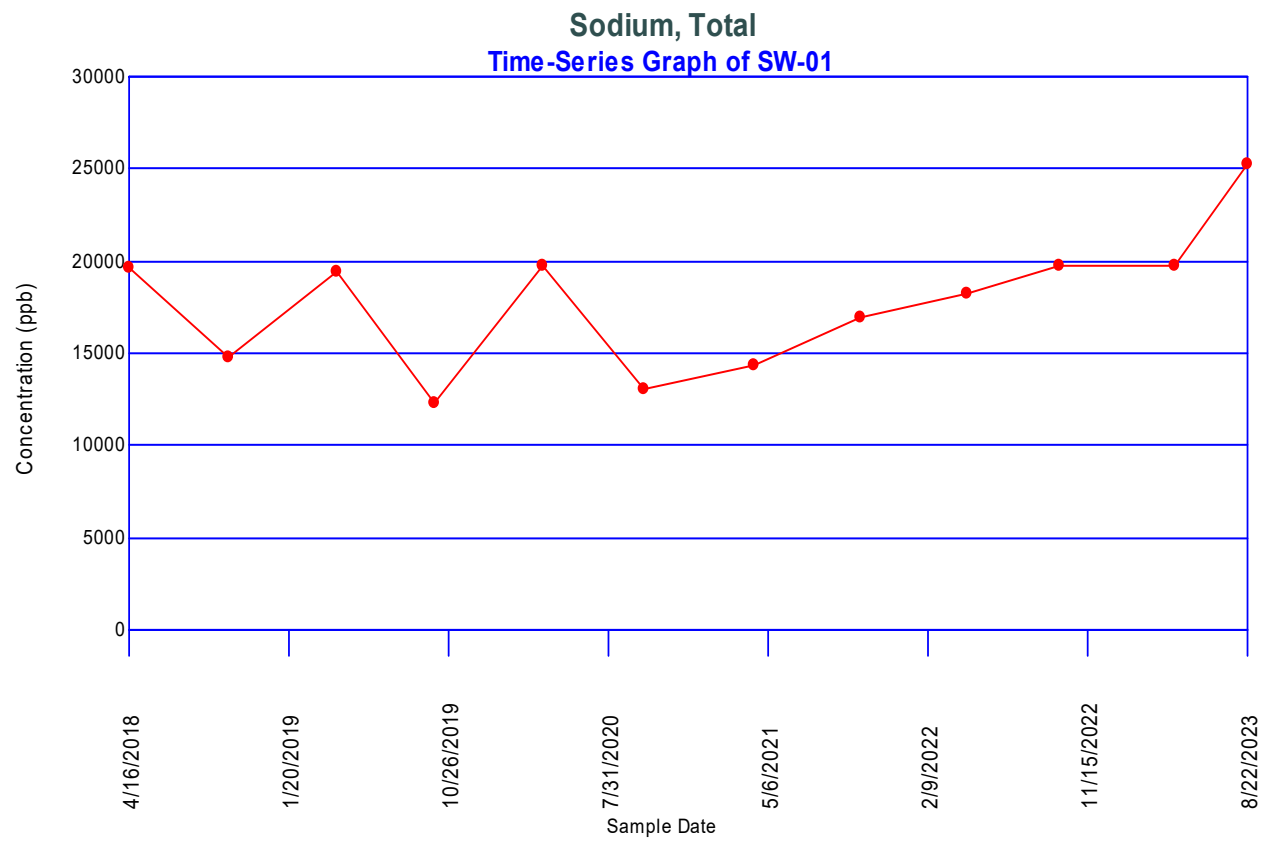
c = 264

Group Variance = 211.667

Z-Score = 1.51216

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

|1.51216|  $\leq$  1.97737 indicating no evidence of a trend



## Dixon's Test for Outliers

Parameter: Sodium, Total

Location: SW-02

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.722667 | 0.404255 | 0.546    | 71200   |
| 2         | 0.485915 | 0.482234 | 0.576    | None    |

| Loc.  | Date       | Conc. | Outlier |
|-------|------------|-------|---------|
| SW-02 | 4/16/2018  | 71200 | TRUE    |
|       | 10/8/2018  | 40600 | FALSE   |
|       | 4/13/2019  | 47900 | FALSE   |
|       | 9/30/2019  | 24400 | FALSE   |
|       | 4/7/2020   | 41000 | FALSE   |
|       | 10/2/2020  | 35600 | FALSE   |
|       | 4/13/2021  | 33900 | FALSE   |
|       | 10/14/2021 | 33700 | FALSE   |
|       | 4/19/2022  | 44100 | FALSE   |
|       | 9/27/2022  | 36400 | FALSE   |
|       | 4/18/2023  | 39300 | FALSE   |
|       | 8/22/2023  | 35200 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sodium, Total

Location: SW-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)  | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|-------|----------|---------------|----------|---------|
| 1  | 24400 | 71200    | 46800         | 0.5475   | 25623   |
| 2  | 33700 | 47900    | 14200         | 0.3325   | 4721.5  |
| 3  | 33900 | 44100    | 10200         | 0.2347   | 2393.94 |
| 4  | 35200 | 41000    | 5800          | 0.1586   | 919.88  |
| 5  | 35600 | 40600    | 5000          | 0.0922   | 461     |
| 6  | 36400 | 39300    | 2900          | 0.0303   | 87.87   |
| 7  | 39300 | 36400    | -2900         |          |         |
| 8  | 40600 | 35600    | -5000         |          |         |
| 9  | 41000 | 35200    | -5800         |          |         |
| 10 | 44100 | 33900    | -10200        |          |         |
| 11 | 47900 | 33700    | -14200        |          |         |
| 12 | 71200 | 24400    | -46800        |          |         |

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Sum of b values = 34207.2

Sample Standard Deviation = 11398.7

W Statistic = 0.818719

**5% Critical value of 0.859 exceeds 0.818719**

**Evidence of non-normality at 95% level of significance**

1% Critical value of 0.805 is less than 0.818719

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sodium, Total**  
**Location: SW-02**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 40600     | 71200     | -30600         | 0                | 1                |
| 47900     | 71200     | -23300         | 0                | 2                |
| 24400     | 71200     | -46800         | 0                | 3                |
| 41000     | 71200     | -30200         | 0                | 4                |
| 35600     | 71200     | -35600         | 0                | 5                |
| 33900     | 71200     | -37300         | 0                | 6                |
| 33700     | 71200     | -37500         | 0                | 7                |
| 44100     | 71200     | -27100         | 0                | 8                |
| 36400     | 71200     | -34800         | 0                | 9                |
| 39300     | 71200     | -31900         | 0                | 10               |
| 35200     | 71200     | -36000         | 0                | 11               |
| 47900     | 40600     | 7300           | 1                | 11               |
| 24400     | 40600     | -16200         | 1                | 12               |
| 41000     | 40600     | 400            | 2                | 12               |
| 35600     | 40600     | -5000          | 2                | 13               |
| 33900     | 40600     | -6700          | 2                | 14               |
| 33700     | 40600     | -6900          | 2                | 15               |
| 44100     | 40600     | 3500           | 3                | 15               |
| 36400     | 40600     | -4200          | 3                | 16               |
| 39300     | 40600     | -1300          | 3                | 17               |
| 35200     | 40600     | -5400          | 3                | 18               |
| 24400     | 47900     | -23500         | 3                | 19               |
| 41000     | 47900     | -6900          | 3                | 20               |
| 35600     | 47900     | -12300         | 3                | 21               |
| 33900     | 47900     | -14000         | 3                | 22               |
| 33700     | 47900     | -14200         | 3                | 23               |
| 44100     | 47900     | -3800          | 3                | 24               |
| 36400     | 47900     | -11500         | 3                | 25               |
| 39300     | 47900     | -8600          | 3                | 26               |
| 35200     | 47900     | -12700         | 3                | 27               |
| 41000     | 24400     | 16600          | 4                | 27               |
| 35600     | 24400     | 11200          | 5                | 27               |
| 33900     | 24400     | 9500           | 6                | 27               |
| 33700     | 24400     | 9300           | 7                | 27               |
| 44100     | 24400     | 19700          | 8                | 27               |
| 36400     | 24400     | 12000          | 9                | 27               |
| 39300     | 24400     | 14900          | 10               | 27               |
| 35200     | 24400     | 10800          | 11               | 27               |
| 35600     | 41000     | -5400          | 11               | 28               |
| 33900     | 41000     | -7100          | 11               | 29               |
| 33700     | 41000     | -7300          | 11               | 30               |
| 44100     | 41000     | 3100           | 12               | 30               |
| 36400     | 41000     | -4600          | 12               | 31               |

|       |       |       |    |    |
|-------|-------|-------|----|----|
| 39300 | 41000 | -1700 | 12 | 32 |
| 35200 | 41000 | -5800 | 12 | 33 |
| 33900 | 35600 | -1700 | 12 | 34 |
| 33700 | 35600 | -1900 | 12 | 35 |
| 44100 | 35600 | 8500  | 13 | 35 |
| 36400 | 35600 | 800   | 14 | 35 |
| 39300 | 35600 | 3700  | 15 | 35 |
| 35200 | 35600 | -400  | 15 | 36 |
| 33700 | 33900 | -200  | 15 | 37 |
| 44100 | 33900 | 10200 | 16 | 37 |
| 36400 | 33900 | 2500  | 17 | 37 |
| 39300 | 33900 | 5400  | 18 | 37 |
| 35200 | 33900 | 1300  | 19 | 37 |
| 44100 | 33700 | 10400 | 20 | 37 |
| 36400 | 33700 | 2700  | 21 | 37 |
| 39300 | 33700 | 5600  | 22 | 37 |
| 35200 | 33700 | 1500  | 23 | 37 |
| 36400 | 44100 | -7700 | 23 | 38 |
| 39300 | 44100 | -4800 | 23 | 39 |
| 35200 | 44100 | -8900 | 23 | 40 |
| 39300 | 36400 | 2900  | 24 | 40 |
| 35200 | 36400 | -1200 | 24 | 41 |
| 35200 | 39300 | -4100 | 24 | 42 |

S Statistic = 24 - 42 = -18

| Tied Group                                  | Value        | Members |
|---------------------------------------------|--------------|---------|
| Time Period                                 | Observations |         |
| 4/16/2018                                   | 1            |         |
| 10/8/2018                                   | 1            |         |
| 4/13/2019                                   | 1            |         |
| 9/30/2019                                   | 1            |         |
| 4/7/2020                                    | 1            |         |
| 10/2/2020                                   | 1            |         |
| 4/13/2021                                   | 1            |         |
| 10/14/2021                                  | 1            |         |
| 4/19/2022                                   | 1            |         |
| 9/27/2022                                   | 1            |         |
| 4/18/2023                                   | 1            |         |
| 8/22/2023                                   | 1            |         |
| There are 0 time periods with multiple data |              |         |

A = 0  
 B = 0  
 C = 0  
 D = 0  
 E = 0  
 F = 0  
 a = 3828

b = 11880

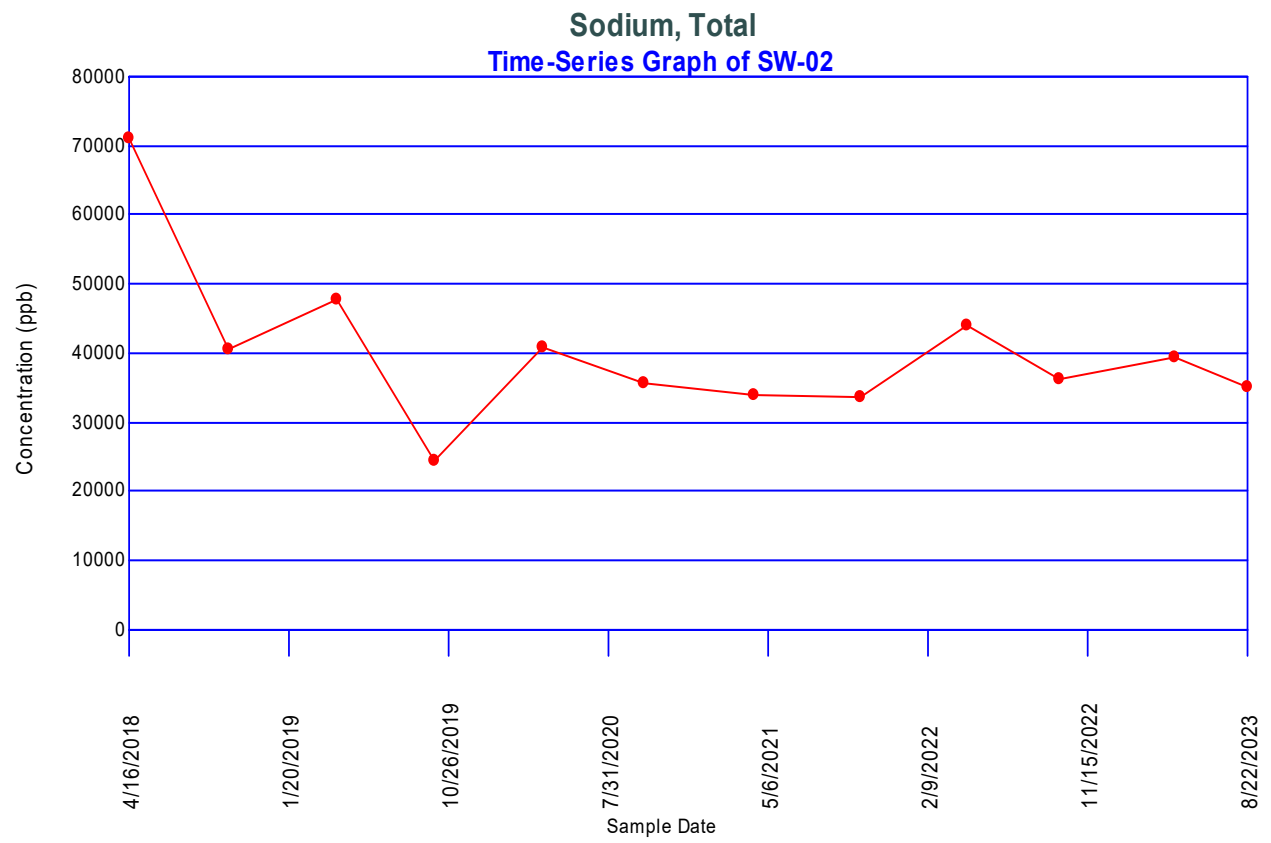
c = 264

Group Variance = 212.667

Z-Score = -1.16573

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

$|-1.16573| \leq 1.97737$  indicating no evidence of a trend



## Concentrations (ppb)

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 144

Total Non-Detect: 0

Percent Non-Detects: 0%

Total Background Measurements: 0

There are 0 background locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

There are 12 compliance locations

| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
| MW-05 | 12 | 0 (0%) | 4/18/2018  | 36400 | 36400 |
|       |    |        | 10/10/2018 | 38700 | 38700 |
|       |    |        | 4/13/2019  | 40400 | 40400 |
|       |    |        | 10/1/2019  | 41000 | 41000 |
|       |    |        | 4/9/2020   | 38500 | 38500 |
|       |    |        | 10/1/2020  | 39000 | 39000 |
|       |    |        | 4/14/2021  | 35700 | 35700 |
|       |    |        | 10/13/2021 | 38500 | 38500 |
|       |    |        | 4/20/2022  | 30300 | 30300 |
|       |    |        | 9/28/2022  | 33200 | 33200 |
|       |    |        | 4/19/2023  | 36100 | 36100 |
|       |    |        | 8/24/2023  | 33900 | 33900 |

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
| MW-06 | 12 | 0 (0%) | 4/18/2018  | 12700 | 12700 |
|       |    |        | 10/10/2018 | 10500 | 10500 |
|       |    |        | 4/14/2019  | 13000 | 13000 |
|       |    |        | 10/2/2019  | 14800 | 14800 |
|       |    |        | 4/8/2020   | 12200 | 12200 |
|       |    |        | 9/30/2020  | 13700 | 13700 |
|       |    |        | 4/13/2021  | 13200 | 13200 |
|       |    |        | 10/14/2021 | 8350  | 8350  |
|       |    |        | 4/20/2022  | 12300 | 12300 |
|       |    |        | 9/27/2022  | 11000 | 11000 |
|       |    |        | 4/18/2023  | 15700 | 15700 |
|       |    |        | 8/23/2023  | 9620  | 9620  |

|       |    |        |            |           |           |
|-------|----|--------|------------|-----------|-----------|
| MW-07 | 12 | 0 (0%) | 4/18/2018  | 1.25e+006 | 1.25e+006 |
|       |    |        | 10/10/2018 | 1.22e+006 | 1.22e+006 |
|       |    |        | 4/14/2019  | 1.25e+006 | 1.25e+006 |
|       |    |        | 10/2/2019  | 1.24e+006 | 1.24e+006 |
|       |    |        | 4/8/2020   | 1.32e+006 | 1.32e+006 |
|       |    |        | 9/30/2020  | 1.24e+006 | 1.24e+006 |
|       |    |        | 4/13/2021  | 1.37e+006 | 1.37e+006 |
|       |    |        | 10/14/2021 | 1.44e+006 | 1.44e+006 |
|       |    |        | 4/20/2022  | 1.34e+006 | 1.34e+006 |
|       |    |        | 9/27/2022  | 1.32e+006 | 1.32e+006 |
|       |    |        | 4/18/2023  | 1.33e+006 | 1.33e+006 |
|       |    |        | 8/23/2023  | 1.35e+006 | 1.35e+006 |

|       |    |        |           |       |       |
|-------|----|--------|-----------|-------|-------|
| MW-12 | 12 | 0 (0%) | 4/17/2018 | 46600 | 46600 |
|       |    |        | 10/9/2018 | 47800 | 47800 |

|       |    |        |            |       |       |
|-------|----|--------|------------|-------|-------|
|       |    |        | 4/14/2019  | 48200 | 48200 |
|       |    |        | 10/2/2019  | 38900 | 38900 |
|       |    |        | 4/8/2020   | 44000 | 44000 |
|       |    |        | 10/1/2020  | 40700 | 40700 |
|       |    |        | 4/15/2021  | 46400 | 46400 |
|       |    |        | 10/14/2021 | 38400 | 38400 |
|       |    |        | 4/19/2022  | 43300 | 43300 |
|       |    |        | 9/28/2022  | 35100 | 35100 |
|       |    |        | 4/18/2023  | 45600 | 45600 |
|       |    |        | 8/24/2023  | 37000 | 37000 |
| <hr/> |    |        |            |       |       |
| MW-16 | 12 | 0 (0%) | 4/17/2018  | 67100 | 67100 |
|       |    |        | 10/9/2018  | 62600 | 62600 |
|       |    |        | 4/14/2019  | 63000 | 63000 |
|       |    |        | 10/2/2019  | 69800 | 69800 |
|       |    |        | 4/9/2020   | 60200 | 60200 |
|       |    |        | 10/1/2020  | 69800 | 69800 |
|       |    |        | 4/15/2021  | 65700 | 65700 |
|       |    |        | 10/14/2021 | 71900 | 71900 |
|       |    |        | 4/19/2022  | 66800 | 66800 |
|       |    |        | 9/28/2022  | 70300 | 70300 |
|       |    |        | 4/18/2023  | 72400 | 72400 |
|       |    |        | 8/24/2023  | 70000 | 70000 |
| <hr/> |    |        |            |       |       |
| MW-20 | 12 | 0 (0%) | 4/17/2018  | 41300 | 41300 |
|       |    |        | 10/10/2018 | 30900 | 30900 |
|       |    |        | 4/14/2019  | 61300 | 61300 |
|       |    |        | 10/2/2019  | 40000 | 40000 |
|       |    |        | 4/9/2020   | 63700 | 63700 |
|       |    |        | 10/2/2020  | 27800 | 27800 |
|       |    |        | 4/15/2021  | 39800 | 39800 |
|       |    |        | 10/12/2021 | 26900 | 26900 |
|       |    |        | 4/20/2022  | 48700 | 48700 |
|       |    |        | 9/28/2022  | 24600 | 24600 |
|       |    |        | 4/19/2023  | 40000 | 40000 |
|       |    |        | 8/23/2023  | 23300 | 23300 |
| <hr/> |    |        |            |       |       |
| MW-21 | 12 | 0 (0%) | 4/17/2018  | 45900 | 45900 |
|       |    |        | 10/10/2018 | 31900 | 31900 |
|       |    |        | 4/13/2019  | 20700 | 20700 |
|       |    |        | 10/1/2019  | 29100 | 29100 |
|       |    |        | 4/7/2020   | 19700 | 19700 |
|       |    |        | 9/30/2020  | 23500 | 23500 |
|       |    |        | 4/14/2021  | 18500 | 18500 |
|       |    |        | 10/12/2021 | 19700 | 19700 |
|       |    |        | 4/20/2022  | 18200 | 18200 |
|       |    |        | 9/29/2022  | 17900 | 17900 |
|       |    |        | 4/18/2023  | 32300 | 32300 |
|       |    |        | 8/23/2023  | 14900 | 14900 |
| <hr/> |    |        |            |       |       |
| MW-25 | 12 | 0 (0%) | 4/17/2018  | 62700 | 62700 |
|       |    |        | 10/9/2018  | 53300 | 53300 |
|       |    |        | 4/13/2019  | 43200 | 43200 |
|       |    |        | 10/1/2019  | 49900 | 49900 |
|       |    |        | 4/8/2020   | 50000 | 50000 |
|       |    |        | 10/1/2020  | 57300 | 57300 |
|       |    |        | 4/14/2021  | 40700 | 40700 |

|       |    |        |            |           |           |
|-------|----|--------|------------|-----------|-----------|
|       |    |        | 10/13/2021 | 60600     | 60600     |
|       |    |        | 4/19/2022  | 55300     | 55300     |
|       |    |        | 9/29/2022  | 57700     | 57700     |
|       |    |        | 4/19/2023  | 61500     | 61500     |
|       |    |        | 8/24/2023  | 55800     | 55800     |
| <hr/> |    |        |            |           |           |
| MW-26 | 12 | 0 (0%) | 4/17/2018  | 1.39e+006 | 1.39e+006 |
|       |    |        | 10/9/2018  | 1.33e+006 | 1.33e+006 |
|       |    |        | 4/13/2019  | 1.42e+006 | 1.42e+006 |
|       |    |        | 10/1/2019  | 1.37e+006 | 1.37e+006 |
|       |    |        | 4/8/2020   | 1.43e+006 | 1.43e+006 |
|       |    |        | 10/1/2020  | 1.41e+006 | 1.41e+006 |
|       |    |        | 4/14/2021  | 1.39e+006 | 1.39e+006 |
|       |    |        | 10/13/2021 | 1.6e+006  | 1.6e+006  |
|       |    |        | 4/19/2022  | 1.44e+006 | 1.44e+006 |
|       |    |        | 9/29/2022  | 1.45e+006 | 1.45e+006 |
|       |    |        | 4/19/2023  | 1.5e+006  | 1.5e+006  |
|       |    |        | 8/24/2023  | 1.5e+006  | 1.5e+006  |
| <hr/> |    |        |            |           |           |
| MW-27 | 12 | 0 (0%) | 4/18/2018  | 263000    | 263000    |
|       |    |        | 10/9/2018  | 263000    | 263000    |
|       |    |        | 4/13/2019  | 266000    | 266000    |
|       |    |        | 10/1/2019  | 268000    | 268000    |
|       |    |        | 4/9/2020   | 264000    | 264000    |
|       |    |        | 10/1/2020  | 275000    | 275000    |
|       |    |        | 4/14/2021  | 264000    | 264000    |
|       |    |        | 10/13/2021 | 270000    | 270000    |
|       |    |        | 4/20/2022  | 275000    | 275000    |
|       |    |        | 9/28/2022  | 261000    | 261000    |
|       |    |        | 4/19/2023  | 257000    | 257000    |
|       |    |        | 8/24/2023  | 254000    | 254000    |
| <hr/> |    |        |            |           |           |
| SW-01 | 12 | 0 (0%) | 4/16/2018  | 56200     | 56200     |
|       |    |        | 10/8/2018  | 26300     | 26300     |
|       |    |        | 4/13/2019  | 27000     | 27000     |
|       |    |        | 9/30/2019  | 37000     | 37000     |
|       |    |        | 4/7/2020   | 29700     | 29700     |
|       |    |        | 10/2/2020  | 16900     | 16900     |
|       |    |        | 4/13/2021  | 31300     | 31300     |
|       |    |        | 10/14/2021 | 33100     | 33100     |
|       |    |        | 4/19/2022  | 38000     | 38000     |
|       |    |        | 9/27/2022  | 29500     | 29500     |
|       |    |        | 4/18/2023  | 38800     | 38800     |
|       |    |        | 8/22/2023  | 69200     | 69200     |
| <hr/> |    |        |            |           |           |
| SW-02 | 12 | 0 (0%) | 4/16/2018  | 56300     | 56300     |
|       |    |        | 10/8/2018  | 31400     | 31400     |
|       |    |        | 4/13/2019  | 35700     | 35700     |
|       |    |        | 9/30/2019  | 30700     | 30700     |
|       |    |        | 4/7/2020   | 39200     | 39200     |
|       |    |        | 10/2/2020  | 25300     | 25300     |
|       |    |        | 4/13/2021  | 32000     | 32000     |
|       |    |        | 10/14/2021 | 34900     | 34900     |
|       |    |        | 4/19/2022  | 38900     | 38900     |
|       |    |        | 9/27/2022  | 37400     | 37400     |
|       |    |        | 4/18/2023  | 40000     | 40000     |
|       |    |        | 8/22/2023  | 30600     | 30600     |

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There are 0 unused locations

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| Loc. | Meas. | ND | Date | Conc. | Original |
|------|-------|----|------|-------|----------|
|------|-------|----|------|-------|----------|

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## Dixon's Test for Outliers

Parameter: Sulfate

Location: MW-07

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest | Lowest   | Critical | Outlier |
|-----------|---------|----------|----------|---------|
| 1         | 0.45    | 0.133333 | 0.546    | None    |

| Loc.  | Date       | Conc.     | Outlier |
|-------|------------|-----------|---------|
| MW-07 | 4/18/2018  | 1.25e+006 | FALSE   |
|       | 10/10/2018 | 1.22e+006 | FALSE   |
|       | 4/14/2019  | 1.25e+006 | FALSE   |
|       | 10/2/2019  | 1.24e+006 | FALSE   |
|       | 4/8/2020   | 1.32e+006 | FALSE   |
|       | 9/30/2020  | 1.24e+006 | FALSE   |
|       | 4/13/2021  | 1.37e+006 | FALSE   |
|       | 10/14/2021 | 1.44e+006 | FALSE   |
|       | 4/20/2022  | 1.34e+006 | FALSE   |
|       | 9/27/2022  | 1.32e+006 | FALSE   |
|       | 4/18/2023  | 1.33e+006 | FALSE   |
|       | 8/23/2023  | 1.35e+006 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: MW-07

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)      | x(n-i+1)  | x(n-1+1)-x(i) | a(n-i+1) | b(i)   |
|----|-----------|-----------|---------------|----------|--------|
| 1  | 1.22e+006 | 1.44e+006 | 220000        | 0.5475   | 120450 |
| 2  | 1.24e+006 | 1.37e+006 | 130000        | 0.3325   | 43225  |
| 3  | 1.24e+006 | 1.35e+006 | 110000        | 0.2347   | 25817  |
| 4  | 1.25e+006 | 1.34e+006 | 90000         | 0.1586   | 14274  |
| 5  | 1.25e+006 | 1.33e+006 | 80000         | 0.0922   | 7376   |
| 6  | 1.32e+006 | 1.32e+006 | 0             | 0.0303   | 0      |
| 7  | 1.32e+006 | 1.32e+006 | 0             |          |        |
| 8  | 1.33e+006 | 1.25e+006 | -80000        |          |        |
| 9  | 1.34e+006 | 1.25e+006 | -90000        |          |        |
| 10 | 1.35e+006 | 1.24e+006 | -110000       |          |        |
| 11 | 1.37e+006 | 1.24e+006 | -130000       |          |        |
| 12 | 1.44e+006 | 1.22e+006 | -220000       |          |        |

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Sum of b values = 211142

Sample Standard Deviation = 66395.3

W Statistic = 0.919353

5% Critical value of 0.859 is less than 0.919353

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.919353

Data is normally distributed at 99% level of significance

## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: MW-07

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

| Xj        | Xk        | Xj - Xk | Positives | Negatives |
|-----------|-----------|---------|-----------|-----------|
| 1.22e+006 | 1.25e+006 | -30000  | 0         | 1         |
| 1.25e+006 | 1.25e+006 | 0       | 0         | 1         |
| 1.24e+006 | 1.25e+006 | -10000  | 0         | 2         |
| 1.32e+006 | 1.25e+006 | 70000   | 1         | 2         |
| 1.24e+006 | 1.25e+006 | -10000  | 1         | 3         |
| 1.37e+006 | 1.25e+006 | 120000  | 2         | 3         |
| 1.44e+006 | 1.25e+006 | 190000  | 3         | 3         |
| 1.34e+006 | 1.25e+006 | 90000   | 4         | 3         |
| 1.32e+006 | 1.25e+006 | 70000   | 5         | 3         |
| 1.33e+006 | 1.25e+006 | 80000   | 6         | 3         |
| 1.35e+006 | 1.25e+006 | 100000  | 7         | 3         |
| 1.25e+006 | 1.22e+006 | 30000   | 8         | 3         |
| 1.24e+006 | 1.22e+006 | 20000   | 9         | 3         |
| 1.32e+006 | 1.22e+006 | 100000  | 10        | 3         |
| 1.24e+006 | 1.22e+006 | 20000   | 11        | 3         |
| 1.37e+006 | 1.22e+006 | 150000  | 12        | 3         |
| 1.44e+006 | 1.22e+006 | 220000  | 13        | 3         |
| 1.34e+006 | 1.22e+006 | 120000  | 14        | 3         |
| 1.32e+006 | 1.22e+006 | 100000  | 15        | 3         |
| 1.33e+006 | 1.22e+006 | 110000  | 16        | 3         |
| 1.35e+006 | 1.22e+006 | 130000  | 17        | 3         |
| 1.24e+006 | 1.25e+006 | -10000  | 17        | 4         |
| 1.32e+006 | 1.25e+006 | 70000   | 18        | 4         |
| 1.24e+006 | 1.25e+006 | -10000  | 18        | 5         |
| 1.37e+006 | 1.25e+006 | 120000  | 19        | 5         |
| 1.44e+006 | 1.25e+006 | 190000  | 20        | 5         |
| 1.34e+006 | 1.25e+006 | 90000   | 21        | 5         |
| 1.32e+006 | 1.25e+006 | 70000   | 22        | 5         |
| 1.33e+006 | 1.25e+006 | 80000   | 23        | 5         |
| 1.35e+006 | 1.25e+006 | 100000  | 24        | 5         |
| 1.32e+006 | 1.24e+006 | 80000   | 25        | 5         |
| 1.24e+006 | 1.24e+006 | 0       | 25        | 5         |
| 1.37e+006 | 1.24e+006 | 130000  | 26        | 5         |
| 1.44e+006 | 1.24e+006 | 200000  | 27        | 5         |
| 1.34e+006 | 1.24e+006 | 100000  | 28        | 5         |
| 1.32e+006 | 1.24e+006 | 80000   | 29        | 5         |
| 1.33e+006 | 1.24e+006 | 90000   | 30        | 5         |
| 1.35e+006 | 1.24e+006 | 110000  | 31        | 5         |
| 1.24e+006 | 1.32e+006 | -80000  | 31        | 6         |
| 1.37e+006 | 1.32e+006 | 50000   | 32        | 6         |
| 1.44e+006 | 1.32e+006 | 120000  | 33        | 6         |
| 1.34e+006 | 1.32e+006 | 20000   | 34        | 6         |
| 1.32e+006 | 1.32e+006 | 0       | 34        | 6         |

|           |           |         |    |    |
|-----------|-----------|---------|----|----|
| 1.33e+006 | 1.32e+006 | 10000   | 35 | 6  |
| 1.35e+006 | 1.32e+006 | 30000   | 36 | 6  |
| 1.37e+006 | 1.24e+006 | 130000  | 37 | 6  |
| 1.44e+006 | 1.24e+006 | 200000  | 38 | 6  |
| 1.34e+006 | 1.24e+006 | 100000  | 39 | 6  |
| 1.32e+006 | 1.24e+006 | 80000   | 40 | 6  |
| 1.33e+006 | 1.24e+006 | 90000   | 41 | 6  |
| 1.35e+006 | 1.24e+006 | 110000  | 42 | 6  |
| 1.44e+006 | 1.37e+006 | 70000   | 43 | 6  |
| 1.34e+006 | 1.37e+006 | -30000  | 43 | 7  |
| 1.32e+006 | 1.37e+006 | -50000  | 43 | 8  |
| 1.33e+006 | 1.37e+006 | -40000  | 43 | 9  |
| 1.35e+006 | 1.37e+006 | -20000  | 43 | 10 |
| 1.34e+006 | 1.44e+006 | -100000 | 43 | 11 |
| 1.32e+006 | 1.44e+006 | -120000 | 43 | 12 |
| 1.33e+006 | 1.44e+006 | -110000 | 43 | 13 |
| 1.35e+006 | 1.44e+006 | -90000  | 43 | 14 |
| 1.32e+006 | 1.34e+006 | -20000  | 43 | 15 |
| 1.33e+006 | 1.34e+006 | -10000  | 43 | 16 |
| 1.35e+006 | 1.34e+006 | 10000   | 44 | 16 |
| 1.33e+006 | 1.32e+006 | 10000   | 45 | 16 |
| 1.35e+006 | 1.32e+006 | 30000   | 46 | 16 |
| 1.35e+006 | 1.33e+006 | 20000   | 47 | 16 |

S Statistic = 47 - 16 = 31

| Tied Group | Value     | Members |
|------------|-----------|---------|
| 1          | 1.25e+006 | 2       |
| 2          | 1.24e+006 | 2       |
| 3          | 1.32e+006 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/10/2018  | 1            |
| 4/14/2019   | 1            |
| 10/2/2019   | 1            |
| 4/8/2020    | 1            |
| 9/30/2020   | 1            |
| 4/13/2021   | 1            |
| 10/14/2021  | 1            |
| 4/20/2022   | 1            |
| 9/27/2022   | 1            |
| 4/18/2023   | 1            |
| 8/23/2023   | 1            |

There are 0 time periods with multiple data

A = 54

B = 0

C = 0

D = 0

E = 6

F = 0

a = 3828

b = 11880

c = 264

Group Variance = 209.667

Z-Score = 2.07184

Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)

**|2.07184| > 1.97737 indicating a trend**

## Dixon's Test for Outliers

Parameter: Sulfate

Location: MW-26

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.434783 | 0.352941 | 0.546    | None    |

| Loc.  | Date       | Conc.     | Outlier |
|-------|------------|-----------|---------|
| MW-26 | 4/17/2018  | 1.39e+006 | FALSE   |
|       | 10/9/2018  | 1.33e+006 | FALSE   |
|       | 4/13/2019  | 1.42e+006 | FALSE   |
|       | 10/1/2019  | 1.37e+006 | FALSE   |
|       | 4/8/2020   | 1.43e+006 | FALSE   |
|       | 10/1/2020  | 1.41e+006 | FALSE   |
|       | 4/14/2021  | 1.39e+006 | FALSE   |
|       | 10/13/2021 | 1.6e+006  | FALSE   |
|       | 4/19/2022  | 1.44e+006 | FALSE   |
|       | 9/29/2022  | 1.45e+006 | FALSE   |
|       | 4/19/2023  | 1.5e+006  | FALSE   |
|       | 8/24/2023  | 1.5e+006  | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: MW-26

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)      | x(n-i+1)  | x(n-1+1)-x(i) | a(n-i+1) | b(i)   |
|----|-----------|-----------|---------------|----------|--------|
| 1  | 1.33e+006 | 1.6e+006  | 270000        | 0.5475   | 147825 |
| 2  | 1.37e+006 | 1.5e+006  | 130000        | 0.3325   | 43225  |
| 3  | 1.39e+006 | 1.5e+006  | 110000        | 0.2347   | 25817  |
| 4  | 1.39e+006 | 1.45e+006 | 60000         | 0.1586   | 9516   |
| 5  | 1.41e+006 | 1.44e+006 | 30000         | 0.0922   | 2766   |
| 6  | 1.42e+006 | 1.43e+006 | 10000         | 0.0303   | 303    |
| 7  | 1.43e+006 | 1.42e+006 | -10000        |          |        |
| 8  | 1.44e+006 | 1.41e+006 | -30000        |          |        |
| 9  | 1.45e+006 | 1.39e+006 | -60000        |          |        |
| 10 | 1.5e+006  | 1.39e+006 | -110000       |          |        |
| 11 | 1.5e+006  | 1.37e+006 | -130000       |          |        |
| 12 | 1.6e+006  | 1.33e+006 | -270000       |          |        |

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Sum of b values = 229452

Sample Standard Deviation = 71409

W Statistic = 0.93861

5% Critical value of 0.859 is less than 0.93861

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.93861

Data is normally distributed at 99% level of significance

## Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: MW-26

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

| Xj        | Xk        | Xj - Xk | Positives | Negatives |
|-----------|-----------|---------|-----------|-----------|
| 1.33e+006 | 1.39e+006 | -60000  | 0         | 1         |
| 1.42e+006 | 1.39e+006 | 30000   | 1         | 1         |
| 1.37e+006 | 1.39e+006 | -20000  | 1         | 2         |
| 1.43e+006 | 1.39e+006 | 40000   | 2         | 2         |
| 1.41e+006 | 1.39e+006 | 20000   | 3         | 2         |
| 1.39e+006 | 1.39e+006 | 0       | 3         | 2         |
| 1.6e+006  | 1.39e+006 | 210000  | 4         | 2         |
| 1.44e+006 | 1.39e+006 | 50000   | 5         | 2         |
| 1.45e+006 | 1.39e+006 | 60000   | 6         | 2         |
| 1.5e+006  | 1.39e+006 | 110000  | 7         | 2         |
| 1.5e+006  | 1.39e+006 | 110000  | 8         | 2         |
|           |           |         |           |           |
| 1.42e+006 | 1.33e+006 | 90000   | 9         | 2         |
| 1.37e+006 | 1.33e+006 | 40000   | 10        | 2         |
| 1.43e+006 | 1.33e+006 | 100000  | 11        | 2         |
| 1.41e+006 | 1.33e+006 | 80000   | 12        | 2         |
| 1.39e+006 | 1.33e+006 | 60000   | 13        | 2         |
| 1.6e+006  | 1.33e+006 | 270000  | 14        | 2         |
| 1.44e+006 | 1.33e+006 | 110000  | 15        | 2         |
| 1.45e+006 | 1.33e+006 | 120000  | 16        | 2         |
| 1.5e+006  | 1.33e+006 | 170000  | 17        | 2         |
| 1.5e+006  | 1.33e+006 | 170000  | 18        | 2         |
|           |           |         |           |           |
| 1.37e+006 | 1.42e+006 | -50000  | 18        | 3         |
| 1.43e+006 | 1.42e+006 | 10000   | 19        | 3         |
| 1.41e+006 | 1.42e+006 | -10000  | 19        | 4         |
| 1.39e+006 | 1.42e+006 | -30000  | 19        | 5         |
| 1.6e+006  | 1.42e+006 | 180000  | 20        | 5         |
| 1.44e+006 | 1.42e+006 | 20000   | 21        | 5         |
| 1.45e+006 | 1.42e+006 | 30000   | 22        | 5         |
| 1.5e+006  | 1.42e+006 | 80000   | 23        | 5         |
| 1.5e+006  | 1.42e+006 | 80000   | 24        | 5         |
|           |           |         |           |           |
| 1.43e+006 | 1.37e+006 | 60000   | 25        | 5         |
| 1.41e+006 | 1.37e+006 | 40000   | 26        | 5         |
| 1.39e+006 | 1.37e+006 | 20000   | 27        | 5         |
| 1.6e+006  | 1.37e+006 | 230000  | 28        | 5         |
| 1.44e+006 | 1.37e+006 | 70000   | 29        | 5         |
| 1.45e+006 | 1.37e+006 | 80000   | 30        | 5         |
| 1.5e+006  | 1.37e+006 | 130000  | 31        | 5         |
| 1.5e+006  | 1.37e+006 | 130000  | 32        | 5         |
|           |           |         |           |           |
| 1.41e+006 | 1.43e+006 | -20000  | 32        | 6         |
| 1.39e+006 | 1.43e+006 | -40000  | 32        | 7         |
| 1.6e+006  | 1.43e+006 | 170000  | 33        | 7         |
| 1.44e+006 | 1.43e+006 | 10000   | 34        | 7         |
| 1.45e+006 | 1.43e+006 | 20000   | 35        | 7         |

|           |           |         |    |    |
|-----------|-----------|---------|----|----|
| 1.5e+006  | 1.43e+006 | 70000   | 36 | 7  |
| 1.5e+006  | 1.43e+006 | 70000   | 37 | 7  |
| 1.39e+006 | 1.41e+006 | -20000  | 37 | 8  |
| 1.6e+006  | 1.41e+006 | 190000  | 38 | 8  |
| 1.44e+006 | 1.41e+006 | 30000   | 39 | 8  |
| 1.45e+006 | 1.41e+006 | 40000   | 40 | 8  |
| 1.5e+006  | 1.41e+006 | 90000   | 41 | 8  |
| 1.5e+006  | 1.41e+006 | 90000   | 42 | 8  |
| 1.6e+006  | 1.39e+006 | 210000  | 43 | 8  |
| 1.44e+006 | 1.39e+006 | 50000   | 44 | 8  |
| 1.45e+006 | 1.39e+006 | 60000   | 45 | 8  |
| 1.5e+006  | 1.39e+006 | 110000  | 46 | 8  |
| 1.5e+006  | 1.39e+006 | 110000  | 47 | 8  |
| 1.44e+006 | 1.6e+006  | -160000 | 47 | 9  |
| 1.45e+006 | 1.6e+006  | -150000 | 47 | 10 |
| 1.5e+006  | 1.6e+006  | -100000 | 47 | 11 |
| 1.5e+006  | 1.6e+006  | -100000 | 47 | 12 |
| 1.45e+006 | 1.44e+006 | 10000   | 48 | 12 |
| 1.5e+006  | 1.44e+006 | 60000   | 49 | 12 |
| 1.5e+006  | 1.44e+006 | 60000   | 50 | 12 |
| 1.5e+006  | 1.45e+006 | 50000   | 51 | 12 |
| 1.5e+006  | 1.45e+006 | 50000   | 52 | 12 |
| 1.5e+006  | 1.5e+006  | 0       | 52 | 12 |

S Statistic = 52 - 12 = 40

| Tied Group | Value     | Members |
|------------|-----------|---------|
| 1          | 1.39e+006 | 2       |
| 2          | 1.5e+006  | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/17/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/8/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/19/2022   | 1            |
| 9/29/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 36

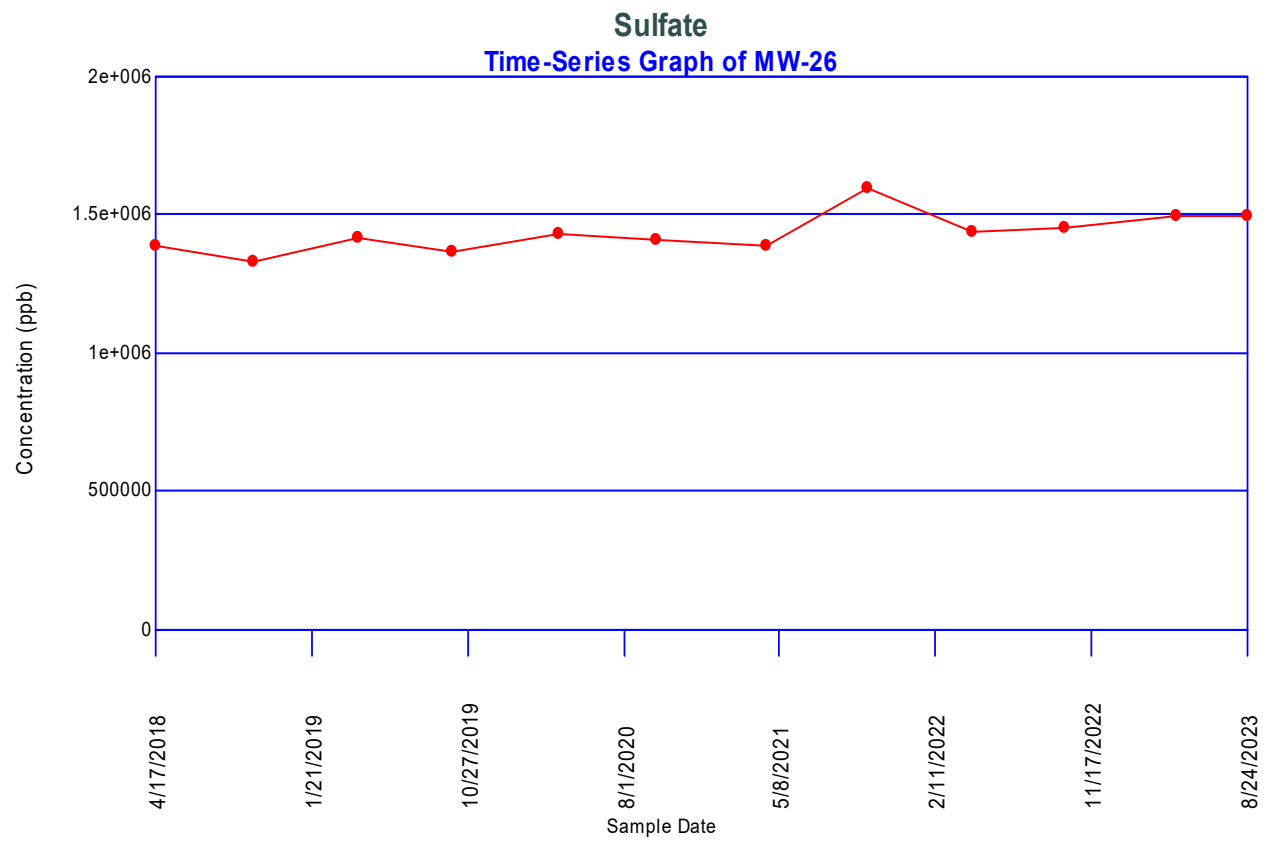
B = 0

C = 0

D = 0

E = 4

F = 0  
a = 3828  
b = 11880  
c = 264  
Group Variance = 210.667  
Z-Score = 2.68699  
Comparison Level at  $1.0 - (0.05 / 2) = 97.5\%$  confidence level = 1.97737 (two-tailed)  
**|2.68699| > 1.97737 indicating a trend**



## Dixon's Test for Outliers

Parameter: Sulfate

Location: MW-27

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

For 12 Measurements...

5% Level of Significance

| Iteration | Highest  | Lowest   | Critical | Outlier |
|-----------|----------|----------|----------|---------|
| 1         | 0.277778 | 0.333333 | 0.546    | None    |

| Loc.  | Date       | Conc.  | Outlier |
|-------|------------|--------|---------|
| MW-27 | 4/18/2018  | 263000 | FALSE   |
|       | 10/9/2018  | 263000 | FALSE   |
|       | 4/13/2019  | 266000 | FALSE   |
|       | 10/1/2019  | 268000 | FALSE   |
|       | 4/9/2020   | 264000 | FALSE   |
|       | 10/1/2020  | 275000 | FALSE   |
|       | 4/14/2021  | 264000 | FALSE   |
|       | 10/13/2021 | 270000 | FALSE   |
|       | 4/20/2022  | 275000 | FALSE   |
|       | 9/28/2022  | 261000 | FALSE   |
|       | 4/19/2023  | 257000 | FALSE   |
|       | 8/24/2023  | 254000 | FALSE   |

## Shapiro-Wilks Test of Normality

Parameter: Sulfate

Location: MW-27

### Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 6 for 12 measurements

| i  | x(i)   | x(n-i+1) | x(n-1+1)-x(i) | a(n-i+1) | b(i)    |
|----|--------|----------|---------------|----------|---------|
| 1  | 254000 | 275000   | 21000         | 0.5475   | 11497.5 |
| 2  | 257000 | 275000   | 18000         | 0.3325   | 5985    |
| 3  | 261000 | 270000   | 9000          | 0.2347   | 2112.3  |
| 4  | 263000 | 268000   | 5000          | 0.1586   | 793     |
| 5  | 263000 | 266000   | 3000          | 0.0922   | 276.6   |
| 6  | 264000 | 264000   | 0             | 0.0303   | 0       |
| 7  | 264000 | 264000   | 0             |          |         |
| 8  | 266000 | 263000   | -3000         |          |         |
| 9  | 268000 | 263000   | -5000         |          |         |
| 10 | 270000 | 261000   | -9000         |          |         |
| 11 | 275000 | 257000   | -18000        |          |         |
| 12 | 275000 | 254000   | -21000        |          |         |

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Sum of b values = 20664.4

Sample Standard Deviation = 6367.53

W Statistic = 0.957438

5% Critical value of 0.859 is less than 0.957438

Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.957438

Data is normally distributed at 99% level of significance

**Mann-Kendall Trend Analysis**  
**Parameter: Sulfate**  
**Location: MW-27**  
**Original Data (Not Transformed)**  
**Non-Detects Replaced with Detection Limit**

95% Confidence Level

| <b>Xj</b> | <b>Xk</b> | <b>Xj - Xk</b> | <b>Positives</b> | <b>Negatives</b> |
|-----------|-----------|----------------|------------------|------------------|
| 263000    | 263000    | 0              | 0                | 0                |
| 266000    | 263000    | 3000           | 1                | 0                |
| 268000    | 263000    | 5000           | 2                | 0                |
| 264000    | 263000    | 1000           | 3                | 0                |
| 275000    | 263000    | 12000          | 4                | 0                |
| 264000    | 263000    | 1000           | 5                | 0                |
| 270000    | 263000    | 7000           | 6                | 0                |
| 275000    | 263000    | 12000          | 7                | 0                |
| 261000    | 263000    | -2000          | 7                | 1                |
| 257000    | 263000    | -6000          | 7                | 2                |
| 254000    | 263000    | -9000          | 7                | 3                |
|           |           |                |                  |                  |
| 266000    | 263000    | 3000           | 8                | 3                |
| 268000    | 263000    | 5000           | 9                | 3                |
| 264000    | 263000    | 1000           | 10               | 3                |
| 275000    | 263000    | 12000          | 11               | 3                |
| 264000    | 263000    | 1000           | 12               | 3                |
| 270000    | 263000    | 7000           | 13               | 3                |
| 275000    | 263000    | 12000          | 14               | 3                |
| 261000    | 263000    | -2000          | 14               | 4                |
| 257000    | 263000    | -6000          | 14               | 5                |
| 254000    | 263000    | -9000          | 14               | 6                |
|           |           |                |                  |                  |
| 268000    | 266000    | 2000           | 15               | 6                |
| 264000    | 266000    | -2000          | 15               | 7                |
| 275000    | 266000    | 9000           | 16               | 7                |
| 264000    | 266000    | -2000          | 16               | 8                |
| 270000    | 266000    | 4000           | 17               | 8                |
| 275000    | 266000    | 9000           | 18               | 8                |
| 261000    | 266000    | -5000          | 18               | 9                |
| 257000    | 266000    | -9000          | 18               | 10               |
| 254000    | 266000    | -12000         | 18               | 11               |
|           |           |                |                  |                  |
| 264000    | 268000    | -4000          | 18               | 12               |
| 275000    | 268000    | 7000           | 19               | 12               |
| 264000    | 268000    | -4000          | 19               | 13               |
| 270000    | 268000    | 2000           | 20               | 13               |
| 275000    | 268000    | 7000           | 21               | 13               |
| 261000    | 268000    | -7000          | 21               | 14               |
| 257000    | 268000    | -11000         | 21               | 15               |
| 254000    | 268000    | -14000         | 21               | 16               |
|           |           |                |                  |                  |
| 275000    | 264000    | 11000          | 22               | 16               |
| 264000    | 264000    | 0              | 22               | 16               |
| 270000    | 264000    | 6000           | 23               | 16               |
| 275000    | 264000    | 11000          | 24               | 16               |
| 261000    | 264000    | -3000          | 24               | 17               |

|        |        |        |    |    |
|--------|--------|--------|----|----|
| 257000 | 264000 | -7000  | 24 | 18 |
| 254000 | 264000 | -10000 | 24 | 19 |
| 264000 | 275000 | -11000 | 24 | 20 |
| 270000 | 275000 | -5000  | 24 | 21 |
| 275000 | 275000 | 0      | 24 | 21 |
| 261000 | 275000 | -14000 | 24 | 22 |
| 257000 | 275000 | -18000 | 24 | 23 |
| 254000 | 275000 | -21000 | 24 | 24 |
| 270000 | 264000 | 6000   | 25 | 24 |
| 275000 | 264000 | 11000  | 26 | 24 |
| 261000 | 264000 | -3000  | 26 | 25 |
| 257000 | 264000 | -7000  | 26 | 26 |
| 254000 | 264000 | -10000 | 26 | 27 |
| 275000 | 270000 | 5000   | 27 | 27 |
| 261000 | 270000 | -9000  | 27 | 28 |
| 257000 | 270000 | -13000 | 27 | 29 |
| 254000 | 270000 | -16000 | 27 | 30 |
| 261000 | 275000 | -14000 | 27 | 31 |
| 257000 | 275000 | -18000 | 27 | 32 |
| 254000 | 275000 | -21000 | 27 | 33 |
| 257000 | 261000 | -4000  | 27 | 34 |
| 254000 | 261000 | -7000  | 27 | 35 |
| 254000 | 257000 | -3000  | 27 | 36 |

S Statistic = 27 - 36 = -9

| Tied Group | Value  | Members |
|------------|--------|---------|
| 1          | 263000 | 2       |
| 2          | 264000 | 2       |
| 3          | 275000 | 2       |

| Time Period | Observations |
|-------------|--------------|
| 4/18/2018   | 1            |
| 10/9/2018   | 1            |
| 4/13/2019   | 1            |
| 10/1/2019   | 1            |
| 4/9/2020    | 1            |
| 10/1/2020   | 1            |
| 4/14/2021   | 1            |
| 10/13/2021  | 1            |
| 4/20/2022   | 1            |
| 9/28/2022   | 1            |
| 4/19/2023   | 1            |
| 8/24/2023   | 1            |

There are 0 time periods with multiple data

A = 54

B = 0

C = 0

D = 0

E = 6

F = 0

a = 3828

b = 11880

c = 264

Group Variance = 209.667

Z-Score = -0.552491

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|-0.552491| \leq 1.97737$  indicating no evidence of a trend

