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AmerenEnergy Medina Valley CoGen, LLC

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1940102569

2022 ANNUAL REPORT

FORMER HUTSONVILLE POWER STATION - ASH POND A

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2022 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A

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ACRONYMS AND ABBREVIATIONS

Ameren	AmerenEnergy Medina Valley Cogen, LLC
CCW	Coal Combustion Waste
Collection Trench	Groundwater Collection System
EPA	Environmental Protection Agency
GMZ	Groundwater Management Zone
Hanson	Hanson Professional Services, Inc.
HDPE	High Density Polyethylene
Hutsonville	Former Hutsonville Power Station
IAC	Illinois Administrative Code
ILCS	Illinois Compiled Statutes
mg/L	milligrams per liter
NRT	Natural Resource Technology, Inc.
TDS	Total Dissolved Solids

1. INTRODUCTION

1.1 Background

This report has been prepared for AmerenEnergy Medina Valley Cogen, LLC (Ameren) to summarize 2022 groundwater monitoring results for closed Ash Pond A at the former Hutsonville Power Station (Hutsonville). Ash Pond A, originally constructed with an 80-mil high-density polyethylene (HDPE) liner, received sluiced fly ash between 1986-2011, and is located near the southwest portion of the former power station (**Figure 1-1**).

Closure activities for the Hutsonville coal combustion waste (CCW) ponds, consisting of Ash Ponds A, B, C, and the Bottom Ash Sluice Pond, were completed in June 2016 in accordance with Ash Ponds Closure, Closure Plan, dated September 15, 2014 (Closure Plan) (Hanson Professional Services, Inc. [Hanson], Natural Resource Technology [NRT], 2014a), and the site-specific rule for closure of Ash Pond D, Part 840 of Title 35 of the Illinois Administrative Code (35 IAC 840), to the extent feasible. Closure activities for Ash Pond A included placement of ash transferred from Ash Ponds B, C and the Bottom Ash Sluice Pond and spoils from clean-up of the coal yard, and capping with a low permeability geosynthetic (40-mil HDPE) membrane covered with protective soil. Ash Ponds B, C, and the Bottom Ash Sluice Pond were clean-closed by relocating accumulated ash to Ash Pond A and re-grading the pond areas for proper drainage. The Ash Pond A Closure Completion Report (Ameren, 2017) was approved by the Illinois Environmental Protection Agency (EPA) in March 2017.

Ameren completed closure activities for Ash Pond D in 2013 in accordance with 35 IAC 840. These activities included placement of a 40-mil high density polyethylene (HDPE) geomembrane cap covered with a three-foot thick vegetative soil layer, construction of surface water control structures, and construction of a groundwater collection system (i.e., Collection Trench). Operation of the Collection Trench began in April 2015.

Since Ash Ponds B, C, and the Bottom Ash Sluice Pond were clean-closed, the Ash Ponds Closure, Groundwater Monitoring Plan, dated September 15, 2014 (Groundwater Monitoring Plan) (Hanson, NRT, 2014b) and associated annual reports are for Ash Pond A. The Groundwater Monitoring Plan was prepared in accordance with 35 IAC 840.114 and 35 IAC 840.116 and outlines groundwater monitoring and sampling procedures, establishes the parameters and methods to be used for analyzing the groundwater samples, and describes evaluation methods to assess post-closure groundwater quality and trends to demonstrate compliance with the applicable groundwater standards. The Groundwater Monitoring Program Schedule is provided in **Table 1-1**. Monitoring well locations, installation dates, construction information, and the groundwater zone they monitor are provided in **Table 1-2**. Field and laboratory parameters for evaluating groundwater quality are shown in **Table 1-3**.

The groundwater monitoring system for Ash Pond A (**Figure 1-2**), as defined by the Groundwater Monitoring Plan, originally consisted of two background monitoring wells, MW-10 and MW-10D, and ten downgradient compliance monitoring wells[1], MW-2R, MW-2D, MW-3, MW-3D, MW-4, MW-5, MW-12, MW-22S, and MW-22D. Background wells MW-10 and MW-10D were destroyed due to construction unrelated to Ameren operations after the first quarter 2016

[1] Note that in the 2017 Annual Report, well MW-9 was mistakenly listed as a compliance well. Well MW-9 is used for groundwater elevation, only.

monitoring period. No trace of the former background wells was found using a metal detector, probes, or digging. As a result, these wells were replaced with background monitoring wells MW-23S and MW-23D in November 2017. In addition, several other monitoring wells and piezometers located at Hutsonville are measured for groundwater level so that groundwater elevation contour maps can be created for the entire site.

In conjunction with Ameren's request for approval of the Closure Plan, Ameren submitted a request to establish a groundwater management zone (GMZ) pursuant to 35 IAC 620.250(a)(2), Ash Ponds Closure, Groundwater Management Zone Application, dated September 8, 2014 (GMZ Application) (Hanson, NRT, 2014c), which was approved along with the Closure Plan. The GMZ is a three-dimensional region containing groundwater being managed to mitigate impacts from a potential release of leachate from the facility. Impacts observed during groundwater monitoring conducted 2011-2014 included concentrations for dissolved boron, dissolved sulfate, dissolved manganese, and Total Dissolved Solids (TDS) higher than 35 ICA 620.410 Class I groundwater quality standards within the GMZ. The GMZ is shown on **Figure 1-2**.

Post-closure groundwater monitoring began in 2016. Annual reporting according to the Groundwater Monitoring Plan and the Ash Ponds Closure, Post-Closure Care Plan, dated September 8, 2014 (Post-Closure Care Plan) (Hanson, NRT, 2014d), began after the Closure Completion Report was approved by Illinois EPA in March 2017. This sixth annual report includes the following elements:

- A summary of groundwater monitoring data collected in 2021 and 2022 and used for annual trend and statistical analysis; data tables are included in **Appendix A**.
- Quarterly Site Inspection Forms, including observations and descriptions of any maintenance activities performed on the pond cap, embankment, and Collection Trench and discharge system (**Appendix B**).
- Annual trend and statistical analysis results per Section 7.2.1 of the Groundwater Monitoring Plan, including an assessment of any statistically significant increasing trends (**Appendix C**).

1.2 Groundwater Quality Overview – 2017 to 2022

1.2.1 Summary of Cover System Construction and Maintenance

Ash Pond A was originally constructed with an 80-mil HDPE liner, and closure activities for Ash Pond A included grading according to the Closure Plan and capping with a low-permeability geomembrane (40-mil HDPE) covered with protective soil.

Inspections of the cover system are performed on a quarterly schedule. Routine maintenance activities are performed at Ash Pond A as needed and as soon as practicable after issues are identified. These activities include recontouring the ground surface, repairing drainage channels, repairing and replacing channel lining material, revegetating areas, and removing woody vegetation. Maintenance activities can be found in more detail in the Post-Closure Care Plan.

1.2.2 Summary of 2017 to 2022 Groundwater Quality Data Review

Groundwater quality data collected since the approval of the Ash Pond A Closure Completion Report in 2017 were reviewed to assess the overall condition of the groundwater and the performance of the cover system. This review was performed independently from the compliance evaluations required by the Groundwater Monitoring Plan, which are focused on specific compliance criteria and proposed mitigation actions. This review is intended as a holistic view of groundwater quality over time since closure.

Dissolved boron was identified as the primary indicator constituent for coal ash leachate impacts to groundwater at Ash Pond A in the Closure Plan. As such, dissolved boron was selected for this groundwater quality data review. Dissolved boron concentrations since 2017 are presented in **Figures 1-3 through 1-7**. On the figures, the lines through the concentration data represent the best fit linear regressions for dissolved boron concentrations in each well. Best fit linear regression lines are included in the figures to provide a convenient means of evaluating general concentration patterns since closure. It should be noted that the regression lines are not equivalent to the statistical trends discussed in the groundwater compliance section of this report. Generally, dissolved boron concentrations in most compliance monitoring wells have been stable or decreasing since 2017 and are currently below the 35 IAC 620.410 Class I Groundwater Standard for the majority of the compliance groundwater monitoring wells, with the exceptions of MW-3D, MW-22S, and MW-22D.

Dissolved sulfate was also identified as an indicator constituent for coal ash at Ash Pond A in the Closure Plan; however, dissolved sulfate can have other anthropogenic sources for elevated concentrations in groundwater, and dissolved sulfate concentrations can decrease in groundwater under strongly reducing conditions. These caveats make dissolved sulfate a less reliable indicator for coal ash impacts than dissolved boron. Dissolved sulfate concentrations since 2017 are presented in **Figures 1-8 through 1-12**. Similar to dissolved boron, dissolved sulfate concentrations have been stable or decreasing since the closure completion.

In addition, since 2017, several decreasing trends for various analytical parameters were identified and are discussed in Section 3.3 and summarized on **Tables 3-1 and 3-2**.

1.2.3 Conclusion

The stable or decreasing dissolved boron and sulfate concentrations in the majority of compliance monitoring wells across the site is a strong indication that the cover system is functioning to improve overall groundwater quality beneath the pond. This observation is consistent with the results of groundwater modeling performed to simulate changes in groundwater quality resulting from pond closure. Modeling results suggested that dissolved boron concentrations would stabilize shortly after the closure plan is implemented in monitoring wells with low concentrations (wells MW-5 and MW-9), while other wells were predicted to take as long as 40 years to stabilize.

2. GROUNDWATER MONITORING PLAN COMPLIANCE

2.1 Applicable Groundwater Quality Standards

2.1.1 On-Site Groundwater Standards

A GMZ has been established around the maximum predicted area of on-site groundwater impacts associated with Ponds A, B, and C. As described in Section 5.1.1 of the Groundwater Monitoring Plan and pursuant to 35 IAC 840.16(a):

- Prior to the completion of the post-closure care period, the on-site applicable groundwater quality standards at Ash Pond A are the greater of either the actual groundwater monitoring result, or the Class I Potable Resource Groundwater standard set forth in 35 IAC 620.410.
- After completion of the post-closure care period, the on-site concentrations of contaminants from Ash Pond A as determined by groundwater monitoring, if those concentrations exceed the numeric standards for Class I Potable Resource Groundwater set forth in 35 IAC 620.410, are the applicable groundwater standards at Ash Pond A if the following criteria are addressed to the satisfaction of the IEPA:
  - To the extent practicable, the exceedance has been minimized and beneficial use, as appropriate for the class of groundwater, has been returned on site.
  - Any threat to public health or the environment on site has been minimized.
  - An institutional control prohibiting potable uses of groundwater is placed on Ash Pond A in accordance with the Uniform Environmental Covenants Act (765 Illinois Compiled Statutes (ILCS) 122) or an alternative instrument authorized for environmental uses under Illinois law and approved by the IEPA. Existing potable uses of groundwater may be preserved as long as such uses remain fit for human consumption in accordance with accepted water supply principles.

2.1.2 Off-Site Groundwater Standards

For off-site groundwater compliance, the groundwater quality standards are the Class I potable resource groundwater standards [35 IAC 620.410]. Although the established GMZ does not extend south of the former Hutsonville Power Station's property boundary, an agreement[2] exists between Ameren and the south property owner regarding shallow well drilling. This restriction covers the first 25 feet of the water table and lies within a 500-ft offset south of the southern property boundary of the former Hutsonville Power Station.

2.2 Demonstration of Compliance

Compliance will be based on attainment of groundwater quality that meets the numeric standards for Class I potable resource groundwater as set forth in 35 IAC 620.410. Groundwater quality that does not meet the Class I standard will be considered in compliance when no statistically significant increasing trend can be attributed to the ash ponds at the compliance GMZ boundary for four (4) consecutive years, which must be approved by the IEPA. Post-closure groundwater compliance monitoring will continue for a minimum of ten years from the IEPA's approval of the Closure Plan.

[2] Available at: http://www.ipcb.state.il.us/documents/dsweb/Get/Document-65177 as Chapter 9 of the Rulemaking Technical Support Documents.

2.2.1 Compliance Determination

As described in Section 7.2.1 of the Groundwater Monitoring Plan:

- GMZ compliance is demonstrated by performing an annual trend analysis for each monitoring well located at the down-gradient boundaries of the former Hutsonville Power Station (**Table 1-2**) for all constituents listed in **Table 1-3**. The analysis shall use Sen's Estimate of Slope and be performed on a minimum of four consecutive samples.
- If the results of the trend analysis show a positive slope at any compliance monitoring well located at the downgradient boundaries of the former Hutsonville Power Station, a Mann-Kendall test will be performed at 95 percent confidence to determine whether or not the increasing slope represents a statistically significant increasing trend. Ameren will investigate the cause of a statistically significant increasing trend as described below.
  - If the investigation attributes a statistically significant increasing trend to a superseding cause, Ameren will notify the IEPA in writing, stating the cause of the increasing trend and providing the rationale used in such a determination.
  - If there is no superseding cause and the statistically significant increasing trend continues to be observed over two or more consecutive years, a hydrogeologic investigation (and additional site investigation(s), if necessary) will be performed.

Based on the outcome of the investigation above, Ameren will take action to mitigate statistically significant increasing trends that are causing, threatening, or allowing exceedances of off-site groundwater quality standards. Such actions will be proposed as a modification to the post-closure care plan within 180 days after completion of the investigation activities described above.

3. DATA ANALYSIS

3.1 Groundwater Flow

Groundwater flow for 2022 is represented using groundwater elevation contour maps for each quarterly sampling event (**Figures 3-1 through 3-4**). Groundwater in the upper (shallow) migration zone generally flowed from west to east and northeast towards the Wabash River during 2022, which is consistent with past evaluations. The Collection Trench began operation in April 2015, and following startup, groundwater elevations have exhibited localized flow toward the trench with groundwater elevations generally lower near the trench (**Figure 3-5**). In the depictions of groundwater elevation contours, dashed lines have been used to infer the localized drawdown of groundwater levels resulting from trench operation, which is necessary with limited wells situated laterally along the length of the trench.

The horizontal hydraulic gradient in the upper migration zone beneath the northern extent of Ash Pond A ranged from 0.003 to 0.004 feet/feet during 2022. There was little variability in horizontal hydraulic gradient across Ash Pond A between sampling events. Horizontal hydraulic gradient was not calculated near the southern end of the pond due to the potential influence of the Collection Trench on groundwater flow.

Groundwater flow within the lower (deep alluvial) migration zone along the edge of the Wabash River valley was not contoured since all the deep alluvial monitoring wells are within a narrow zone between Ash Pond D and the Wabash River. Groundwater within the lower zone generally flows from southwest to northeast towards the Wabash River.

3.2 Review of Analytical Data (2021-2022)

Groundwater samples from the most recent eight monitoring events were collected on March 1, 2021; April 26, 2021; September 1, 2021; November 1, 2021; March 21, 2022; June 20, 2022; August 8, 2022; and October 24, 2022. All field and laboratory analytical results are tabulated in **Appendix A**. Sampling anomalies, such as wells that were dry, had water levels too low for sampling, or were not sampled during a sampling event for other reasons, are noted below:

- MW-3: Not sampled in the second and third quarter of 2021 and second, third and fourth quarter of 2022 due to insufficient water level.

Results of groundwater monitoring for constituents that exceeded the 35 IAC 620.410 Class I Groundwater Standard when the GMZ was established (boron, sulfate, manganese, and TDS) are discussed below:

- Dissolved boron has been identified as the primary indicator constituent for coal ash impacts to groundwater at Ash Pond A (see Section 1.2.2). In the 2021-2022 monitoring period, dissolved boron concentrations ranged from 0.1 to 3.1 milligrams per liter (mg/L) in shallow compliance monitoring wells. In deep monitoring wells, dissolved boron concentrations ranged from 0.05 to 6.9 mg/L (**Figures 3-6 and 3-7**). Dissolved boron concentrations were highest at MW-22S, MW-22D, and MW-3D in 2021 and 2022. As discussed in Sections 1.2.2-1.2.3, dissolved boron concentrations have been stable or decreasing in the majority of compliance monitoring wells across the site since closure. During the current monitoring period, dissolved boron concentrations continue to be stable, indicating the cover system is functioning to improve overall groundwater quality beneath the ponds.

- Dissolved sulfate has also been identified as an indicator for coal ash impacts to groundwater at Ash Pond A (see Section 1.2.2). In the 2021-2022 monitoring period, dissolved sulfate concentrations ranged from 1 to 3,800 mg/L in shallow compliance monitoring wells. In deep monitoring wells, dissolved sulfate concentrations ranged from 3.6 to 2,500 mg/L (**Figures 3-8 and 3-9**). Dissolved sulfate concentrations were highest at MW-22S, MW-22D, and MW-3D in 2021 and 2022, where dissolved boron concentrations were also highest.
- Box-whisker plots and timeseries plots illustrating concentrations for the most recent eight monitoring events (2021-2022) were also developed for dissolved manganese and TDS (**Figures 3-10 through 3-13**). Similar to the identified indicator parameters, these parameters showed generally stable trends during this reporting period.

3.3 Statistical Analyses

Analytical data were evaluated to identify short-term (compliance) data trends in the 2021-2022 dataset. Trends were evaluated according to the procedure outlined in the Groundwater Monitoring Plan.

3.3.1 Outlier Analysis

The Grubbs outlier test provides statistical evidence of potential outliers by whether identifying high or low observations that differ significantly from the other data. The results and test methodology are listed in **Appendix C1**. Outliers identified during the compliance period (2021-2022) by the Grubbs outlier test based on the date range of 1984-2022 were not eliminated from further statistical analysis due the lack of documentation indicating that they are not representative of actual field conditions. In addition, the identified outliers did not have any influence on the short-term compliance trends.

3.3.2 Sen’s Estimate of Slope

Sen’s estimate of slope is a non-parametric estimator of trend. It is the median of all slopes between all possible unique pairs of individual data points in the time period being analyzed. The slopes represent the rate of change of the measured parameter, with the y-axis being the parameter value and the x-axis being calendar time. The method is robust and fairly insensitive to the presence of a small fraction of outliers and non-detect data values. The test methodology is described in **Appendix C2**.

Data collected in 2021-2022 show 19 cases with positive slopes, 21 cases with negative slopes, and 210 cases with no slope (**Table 3-1**). Sen’s Estimate of Slope requires a minimum of four consecutive samples. Note that this analysis was not performed for MW-3 since only three samples were collected during 2021-2022.

3.3.3 Mann-Kendall Trend Analysis

The 19 cases of positive Sen’s slopes referenced above were tested using the Mann-Kendall test to determine if the positive slopes represented statistically significant increasing trends. The Mann-Kendall test is a non-parametric, one-tailed test to determine whether a dataset has a statistically significant trend (increasing or decreasing). The test methodology is described in **Appendix C2**. Increasing short-term (compliance) trends are identified in **Tables 3-1 and 3-2**.

The Mann-Kendall test did not detect any case of increasing trends in the 2021-2022 dataset.

3.4 Site Inspection

The Post-Closure Care Plan requires quarterly inspections for a minimum of 10 years until completion of the post-closure care period. Inspections are also required after storm events defined as a 25-year, 24-hour event, or 5.37 inches of precipitation. Discontinuation of the site inspections will occur after IEPA approval of the certified Post-Closure Care Report.

Site inspections include assessment of the condition and need for repair of final cover and vegetation, as wells as fencing, monitoring points, surface water control features, and the Collection Trench. For 2022, these inspections were performed on March 17, May 13, August 25, and November 22. The August 25, 2022 inspection indicated that Collection Trench pumps DS-1 and DS-2 had failed and needed replacement. These pumps were replaced on October 3, 2022. The other components of the closure system were in good condition. The inspection reports for 2022 are included in **Appendix B**.

4. EVALUATION OF COMPLIANCE

During the most recent eight monitoring events (2021-2022), none of the monitored parameters detected at concentrations above their respective 35 IAC 620.410 Class I Groundwater standards showed increasing short-term trends; as such, no further action is required at this time.

5. CONCLUSIONS

Cover system construction and maintenance, as well as stable or decreasing boron and sulfate concentrations in the majority of compliance monitoring wells across the site is a strong indication that the cover system is functioning to improve overall groundwater quality beneath the pond.

Statistical analyses of analytical results for groundwater samples collected during the 2021-2022 compliance period at the Hutsonville Ash Pond A did not show both concentrations above the 35 IAC 620.410 Class I Groundwater Standard and a short-term increasing trend for any parameter at any well; as such, no further action is required at this time. The concentrations of indicator parameters will continue to be monitored and evaluated in 2023.

6. REFERENCES

Ameren, 2017. *Closure Completion Report*. March 30, 2017.

Hanson Professional Services, Inc. (Hanson), Natural Resource Technology, Inc. (NRT), 2014a. *Ash Ponds Closure, Closure Plan – Hutsonville Power Station*. September 15, 2014.

Hanson Professional Services, Inc. (Hanson), Natural Resource Technology, Inc. (NRT), 2014b. *Ash Ponds Closure, Groundwater Monitoring Plan – Hutsonville Power Station.* September 15, 2014.

Hanson Professional Services, Inc. (Hanson), Natural Resource Technology, Inc. (NRT), 2014c. *Ash Ponds Closure, Groundwater Management Zone Application – Hutsonville Power Station*. September 8, 2014.

Hanson Professional Services, Inc. (Hanson), Natural Resource Technology, Inc. (NRT), 2014d. *Ash Ponds Closure, Post-Closure Care Plan – Hutsonville Power Station*. September 8, 2014.

TABLES

Table 1-1. Groundwater Monitoring Program Schedule
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Frequency	Duration	Sampling Quarter	Report Due Date
Quarterly	Begins: January 2016 Ends: After successful completion of the post-closure activities required and approval of the Illinois EPA.	January- March (1) April - June (2) July - September (3) October - December (4)	May 31 August 31 November 30 February 28

Table 1-2. Groundwater Monitoring System Wells
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Well	Installation Date	Surface Elevation[1] (ft, MSL[2])	TOC[1, 3] Elevation (ft, MSL[2])	Top of Screen Elevation[4] (ft, MSL[2])	Bottom of Screen Elevation[4] (ft, MSL[2])	Total Well Depth[5] (ft, BGS[2])	Objective	Position	Monitoring Zone[6]
Ash Pond A Groundwater Monitoring System Wells: Water Quality and Groundwater Elevations									
MW-2R	6/4/2012	453.0	455.37	446.0	435.3	17.8	Compliance	Downgradient	UZ - s&g
MW-2D	10/14/2015	452.9	455.42	435.1	430.4	23.1	Compliance	Downgradient	UZ - ss
MW-3	2/9/1984	453.7	454.84	447.7	442.7	11.0	Compliance	Downgradient	UZ - s&g
MW-3D	10/6/1998	453.57	455.01	433.6	428.6	25.0	Compliance	Downgradient	UZ - ss
MW-4	2/13/1984	454.0	456.76	449.4	441.9	12.1	Compliance	Downgradient	UZ - s&g, ss
MW-5	2/13/1984	452.1	454.67	447.3	434.3	17.8	Compliance	Downgradient	UZ - s&g, ss
MW-10[7]	10/7/1998	452.9	454.23	447.2	442.2	10.7	Background	Upgradient	UZ - si s&g, ss
MW-10D[7]	10/7/1998	452.9	454.65	436.6	431.6	21.3	Background	Upgradient	UZ - ss
MW-23S[7]	11/28/2017	453.4	456.03	444.2	438.9	14.5	Background	Upgradient	UZ - s si, si s, ss
MW-23D[7]	11/28/2017	453.5	455.90	434.0	428.7	24.8	Background	Upgradient	UZ - ss, sh
MW-12	10/8/1998	455.5	456.74	448.6	438.6	16.9	Compliance	Downgradient	UZ - s&g
MW-22S	10/14/2015	449.2	451.48	441.9	437.2	12.7	Compliance	Downgradient	UZ - si s&g, ss
MW-22D	10/14/2015	449.1	451.36	431.7	427.0	22.7	Compliance	Downgradient	UZ - si s&g, ss
Other Monitoring Wells and Piezometers: Groundwater Elevations									
MW-6	2/9/1984	438.7	443.17	433.9	427.5	11.2	- -	- -	UZ - s&g, ss
MW-7	2/8/1984	439.9	442.28	422.9	412.9	27.0	- -	- -	UZ - si s&g
MW-7D	10/5/1998	438.9	442.75	398.2	393.2	45.7	- -	- -	LZ - si s&g
MW-8	2/8/1984	440.0	443.65	422.9	417.9	22.1	- -	- -	UZ - si sand
MW-9	2/14/1984	451.7	454.38	443.5	433.5	18.2	- -	- -	UZ - s&g
MW-11R	10/3/2001	440.4	443.01	435.4	425.4	15.0	- -	- -	UZ - s&g
MW-14	10/3/2001	440.1	442.89	412.9	407.9	32.2	- -	- -	LZ - s&g
MW-115S	5/1/2004	438.7	440.88	408.4	403.4	35.3	- -	- -	LZ - s&g
MW-115D	5/1/2004	439.1	441.39	356.4	351.4	87.7	- -	- -	LZ - s&g
MW-121	10/2/2001	439.2	440.23	403.8	398.8	40.3	- -	- -	LZ - s&g

Notes:

[O: JJW 4/22/19; C:EDP 4/22/19]

1. Well survey data collected by Lamac Engineering November 30, 2017 to December 1, 2017.
2. BGS = below ground surface; MSL = mean sea level.
3. TOC = top of casing
4. Screen elevations presented in the table reflect values provided in boring logs or well construction forms and assume no changes to the screen elevations occurred after well installation.
5. The total well depth is assumed to be equal to the depth to the bottom of screen from ground surface when data is not available in boring logs or well construction forms.
6. UZ = Upper Zone, LZ = Lower Zone (deep alluvial aquifer); s = sand or sandy, s&g = sand and gravel, si = silt or silty, ss = sandstone, sh = shale
7. Background wells MW-10 and MW-10D were damaged and replaced with background wells MW-23D and MW-23S.

- - Not applicable. Wells listed are for development of groundwater elevation contour maps only.

Table 1-3. Groundwater Monitoring Program Parameters
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Field Parameters	STORET Code
pH[2]	00400
Specific Conductance[2]	00094
Temperature (Fahrenheit)	00011
Depth to Water (BMP)	72109
Elevation of GW Surface[2]	71993
Depth of Well (BGS)[2]	72008
Elevation of Measuring Point	72110
Laboratory Parameters[1]	**STORET Code**
Boron[2]	01020
Iron[2]	01046
Manganese[2]	01056
Sulfate[2]	00946
Total Dissolved Solids (TDS)[2]	70300
Antimony	01095
Arsenic	01000
Barium	01005
Beryllium	01010
Cadmium	01025
Chloride	00941
Chromium	01030
Cobalt	01035
Copper	01040
Cyanide	00720
Fluoride	00950
Lead	01049
Mercury	71890
Nickel	01065
Nitrate as N	00618
Selenium	01145
Silver	01075
Thallium	01057
Vanadiium	01085
Zinc	01090

[O: YD/SJC, C: YD/SJC]

Notes:
[1] Reported as dissolved (filtered) concentrations.
[2] Mandatory monitoring parameter per 35 IAC 840.114(a).

Table 3-1. Trend Analysis Results
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	MW-2R	MW-2D	MW-3	MW-3D	MW-4	MW-5	MW-12	MW-22D	MW-22S	MW-23D	MW-23S
Number of Samples	**8**	**8**	**3**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**
Antimony, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Arsenic, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Barium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Beryllium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Boron, dissolved	+	None	ID	-	None	None	None	-	None	None	None
Cadmium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Chloride, dissolved	None	+	ID	+	-	+	None	Decrease	-	-	-
Chromium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Cobalt, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Copper, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Cyanide, total	None	None	ID	None	None	None	None	None	None	None	None
Fluoride, dissolved	None	None	ID	-	None	None	None	None	None	None	None
Iron, dissolved	None	None	ID	None	None	None	None	+	-	None	None
Lead, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Manganese, dissolved	None	None	ID	+	None	None	None	+	-	None	None
Mercury, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Nickel, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Nitrate nitrogen, dissolved	-	None	ID	None	-	None	+	None	None	None	None
Selenium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Silver, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Sulfate, dissolved	+	+	ID	+	-	Decrease	Decrease	+	-	-	Decrease
Thallium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Total Dissolved Solids	+	+	ID	-	+	-	+	+	-	+	+
Vanadium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Zinc, dissolved	None	None	ID	None	None	None	None	None	None	None	None

Notes: [O: RSD 12/14/2022 , C: RAB 12/27/22]
- "+" indicates that the Sen's non-parametric estimate of the median slope is positive.
- "-" indicates that the Sen's non-parametric estimate of the median slope is negative.
- "Decrease" indicates a statistically significant decreasing trend
- "Increase" indicates a statistically significant increasing trend
- Mann Kendall Trend analysis done with non-detects at one half the reporting limit.
- The most recent eight sampling events were used for analysis; date range for this analysis is 1/1/2021-12/31/2022.
- Green shading indicates increasing trends as determined using the Mann-Kendall test at 95% confidence for constituents with maximum concentration lower than the Class I groundwater quality standard.
- Yellow shading indicates increasing trends as determined using the Mann-Kendall test at 95% confidence for constituents with maximum concentration higher than the Class I groundwater quality standard.
- ID indicated that there was insufficient data to perform Sen's Estimate of Slope.

Table 3-2. Summary of Trend Analyses
2022 Annual Report
Former Hutsonville Power Station - Ash Pond A

Time Period	Short-Term Increasing Trends	Long-Term Decreasing Concentration Patterns
2016-2017	8	17
2017-2018	9	
2018-2019	10	
2019-2020	3	
2020-2021	4	
2021-2022	0	

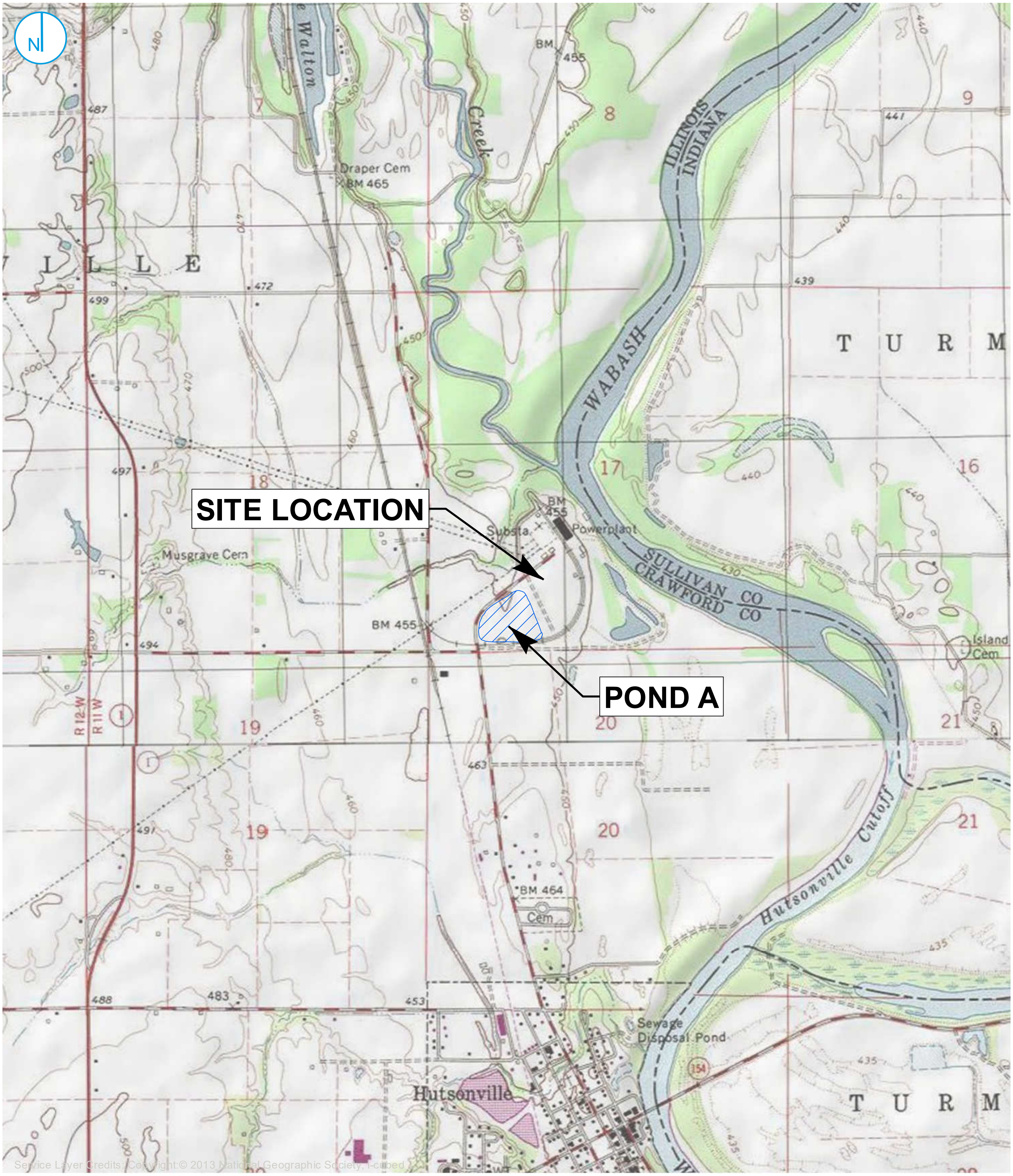
[O: RSD 12/21/22, C: RAB 12/27/22]

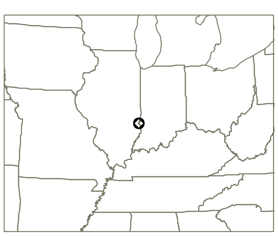
Notes:
Trends based on data collected during the specified periods.
The number of samples per well location for short-term trends are noted on Table 3-1.
Long-terms trends were calculated with data since completion of closure in March 2017.

FIGURES

Y:\Mapping\Projects\24\2420\MXDs\2020APA\Figure 1-1_Site Location Map Ash Pond D2.mxd

PROJECT: 72971 | DATED: 1/13/2021 | DESIGNER: galarmmc





KEY MAP

Map Scale: 1:1:24,000;
Map Center: 87°39'45"W 39°7'53"N

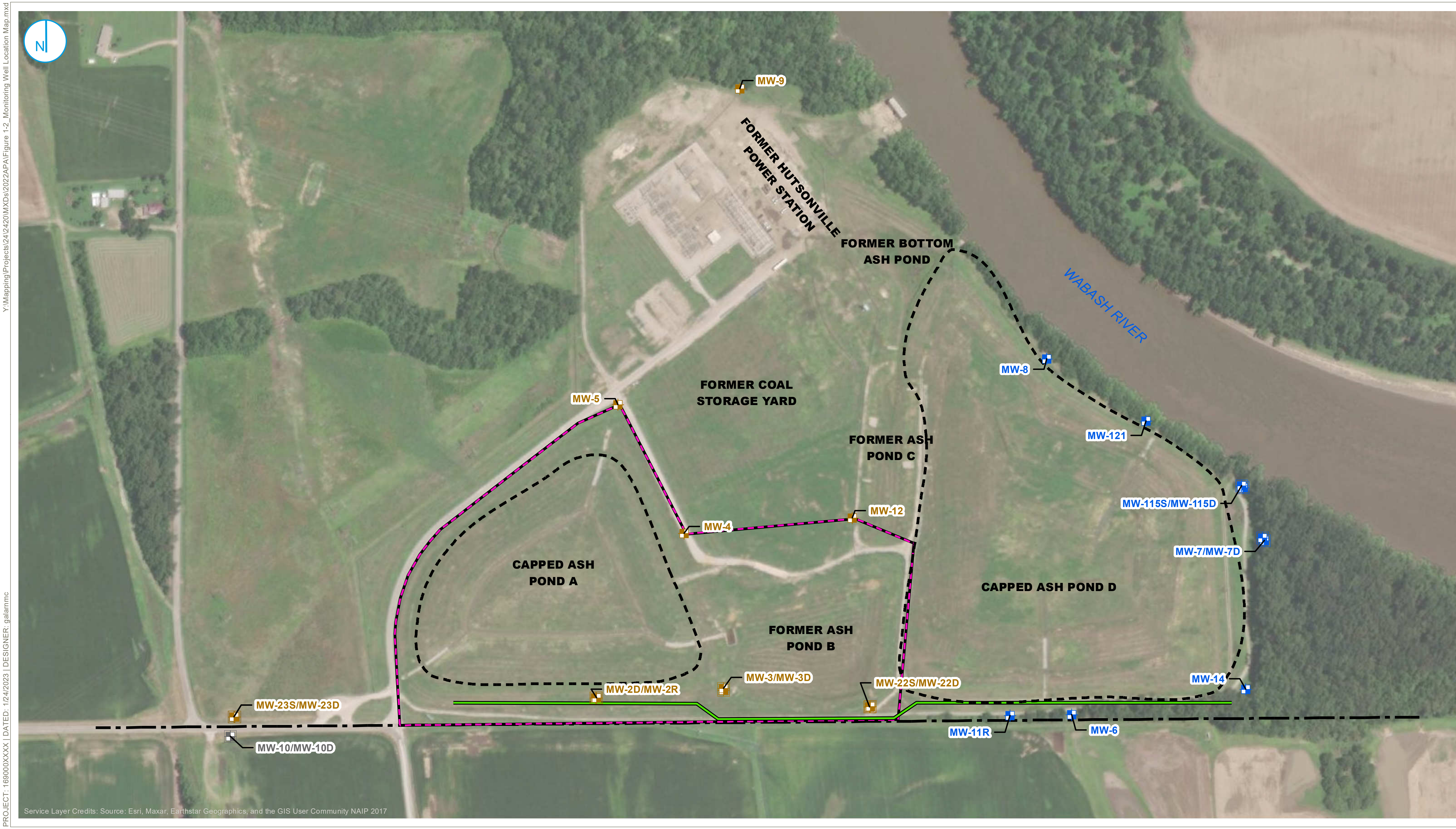
0 1,000 2,000 Feet

SITE LOCATION MAP

2022 ANNUAL REPORT
FORMER HUTSONVILLE
POWER STATION - ASH POND A
AMEREN ENERGY MEDINA VALLEY COGEN, LLC
HUTSONVILLE, IL

FIGURE 1-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC
A RAMBOLL COMPANY



ASH POND D MONITORING WELL LOCATION

NESTED ASH POND D MONITORING WELL LOCATION

ASH POND A MONITORING WELL LOCATION

NESTED ASH POND A MONITORING WELL LOCATION

ABANDONED NESTED MONITORING WELL LOCATION

PROPERTY LINE

APPROXIMATE BOUNDARY OF CAPPED ASH POND

GROUNDWATER COLLECTION TRENCH (BEGAN OPERATION APRIL 2015)

LIMITS OF GROUNDWATER MANAGEMENT ZONE

0 150 300 Feet

MONITORING WELL LOCATION MAP

2022 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A
AMEREN ENERGY MEDINA VALLEY COGEN, LLC
HUTSONVILLE, IL

FIGURE 1-2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC
A RAMBOLL COMPANY

RAMBOLL

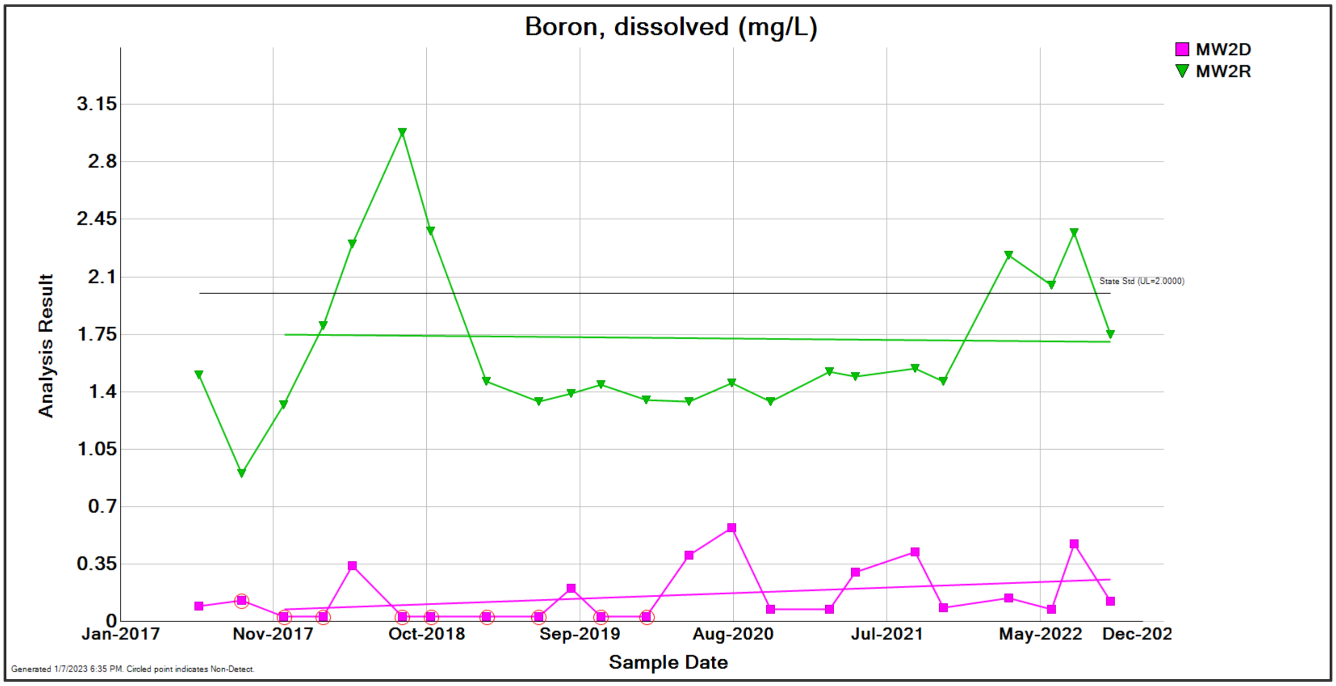


Figure 1-3. Boron concentrations since 2017 at compliance wells MW-2D and MW-2R. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

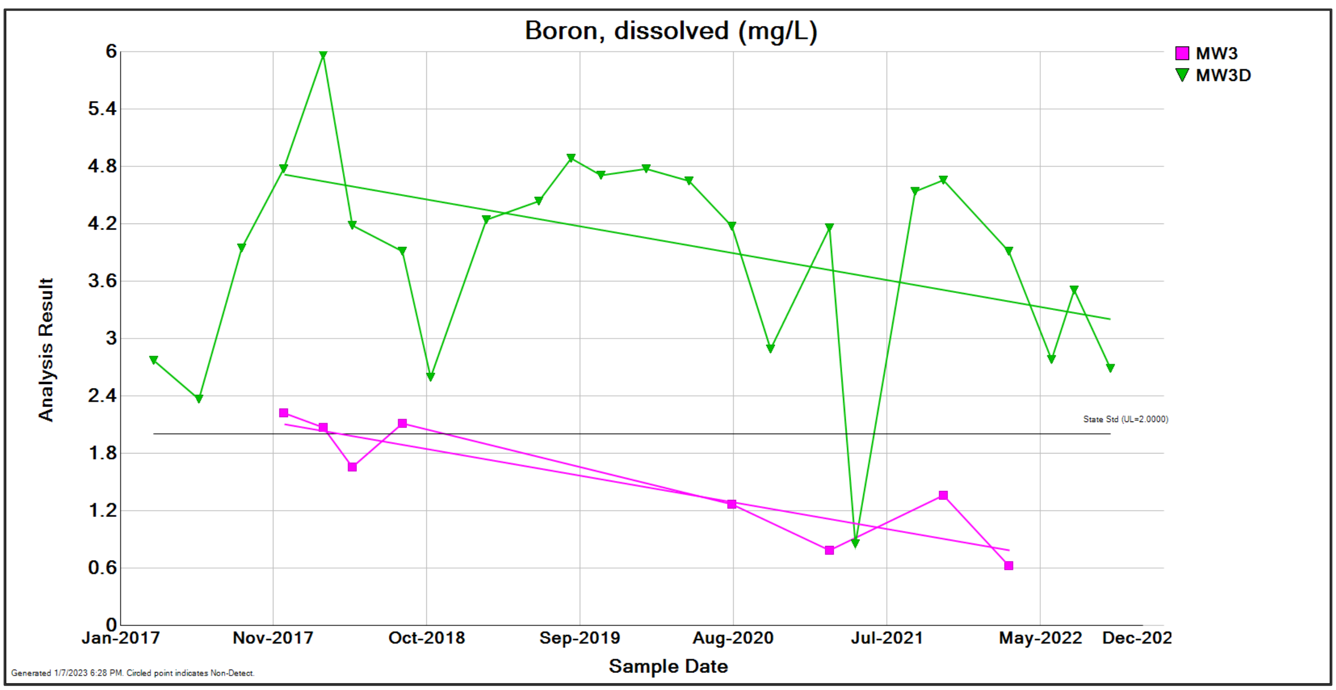


Figure 1-4. Boron concentrations since 2017 at compliance wells MW-3 and MW-3D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

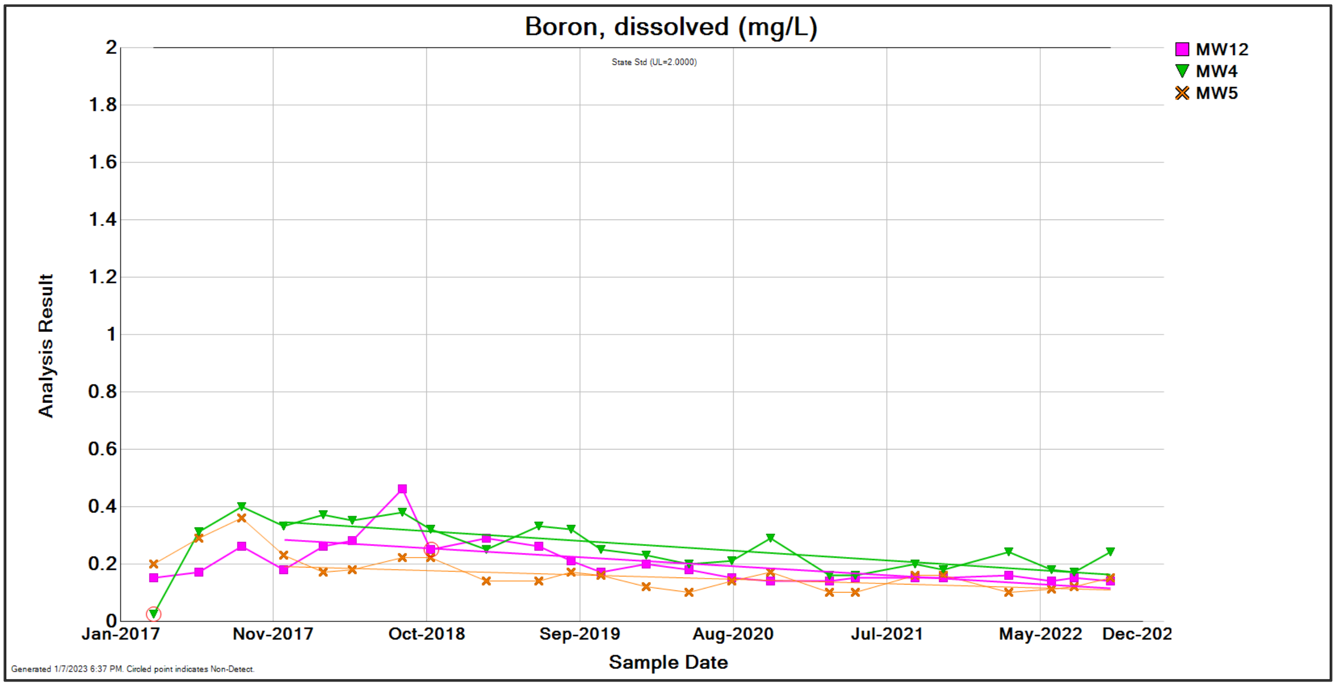


Figure 1-5. Boron concentrations since 2017 at compliance wells MW-4, MW-5, and MW-12. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

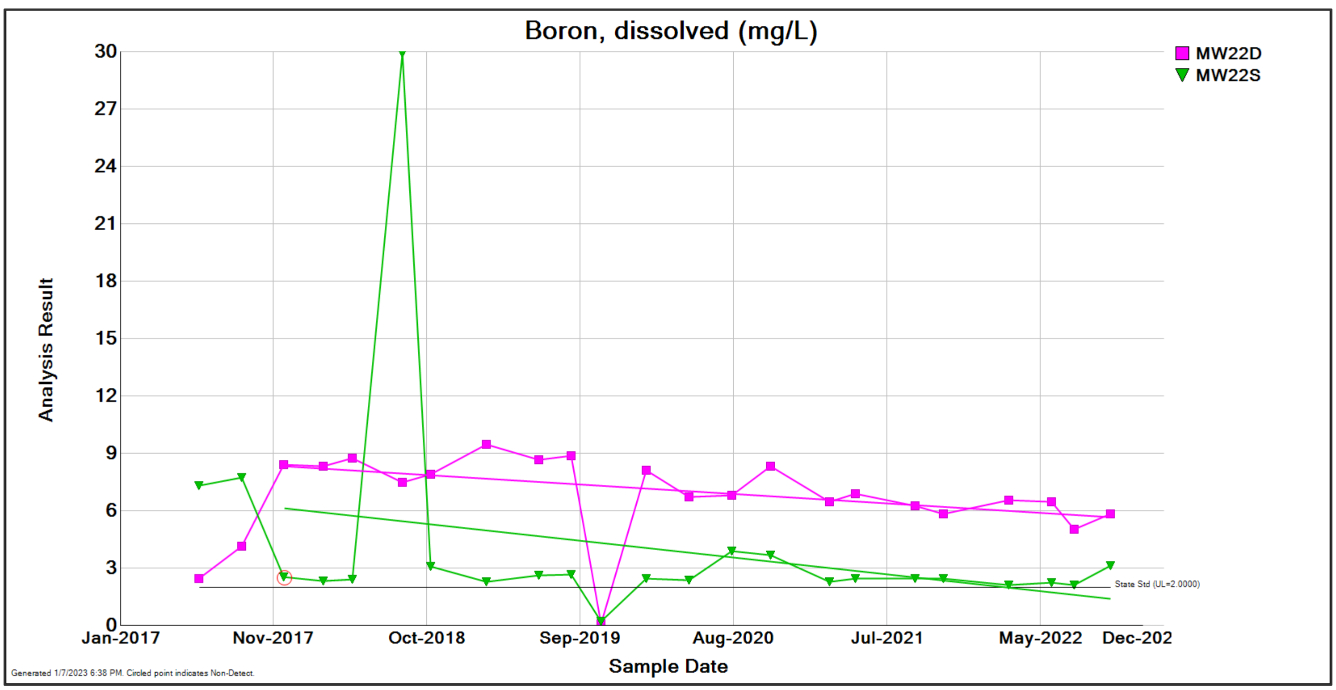


Figure 1-6. Boron concentrations since 2017 at compliance wells MW-22S and MW-22D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

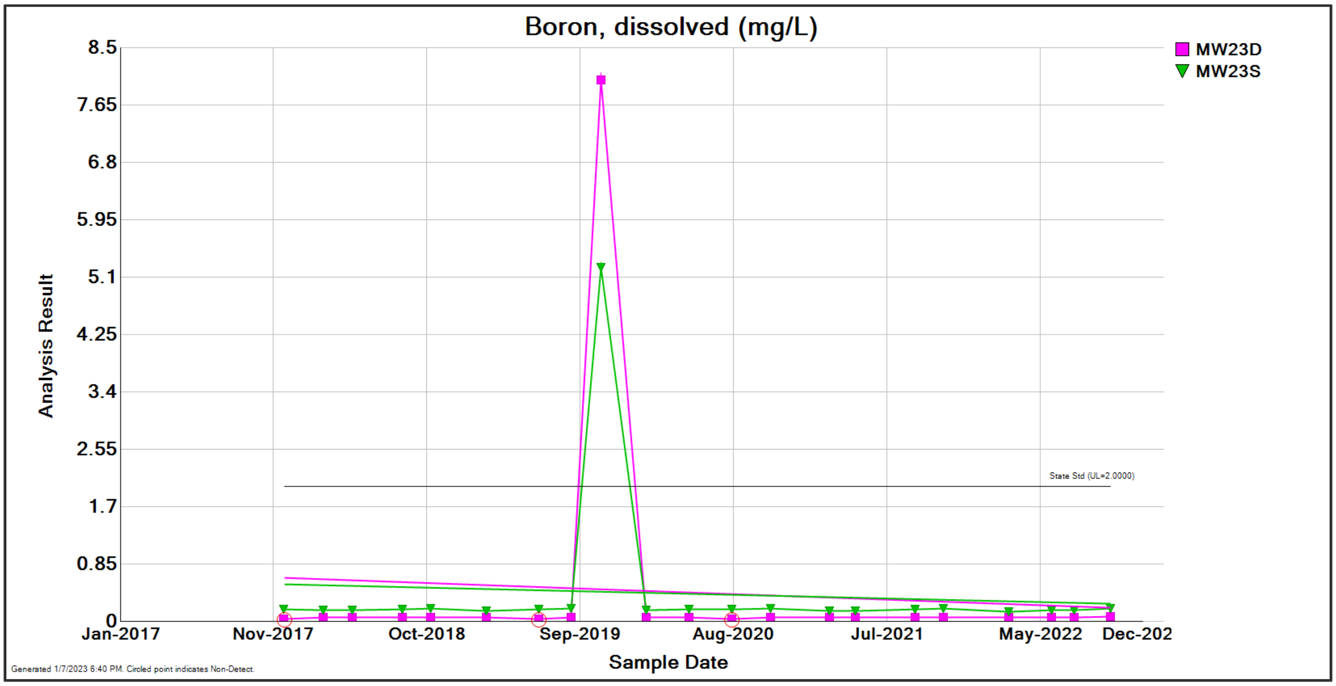


Figure 1-7. Boron concentrations since 2017 at compliance wells MW-23S and MW-23D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

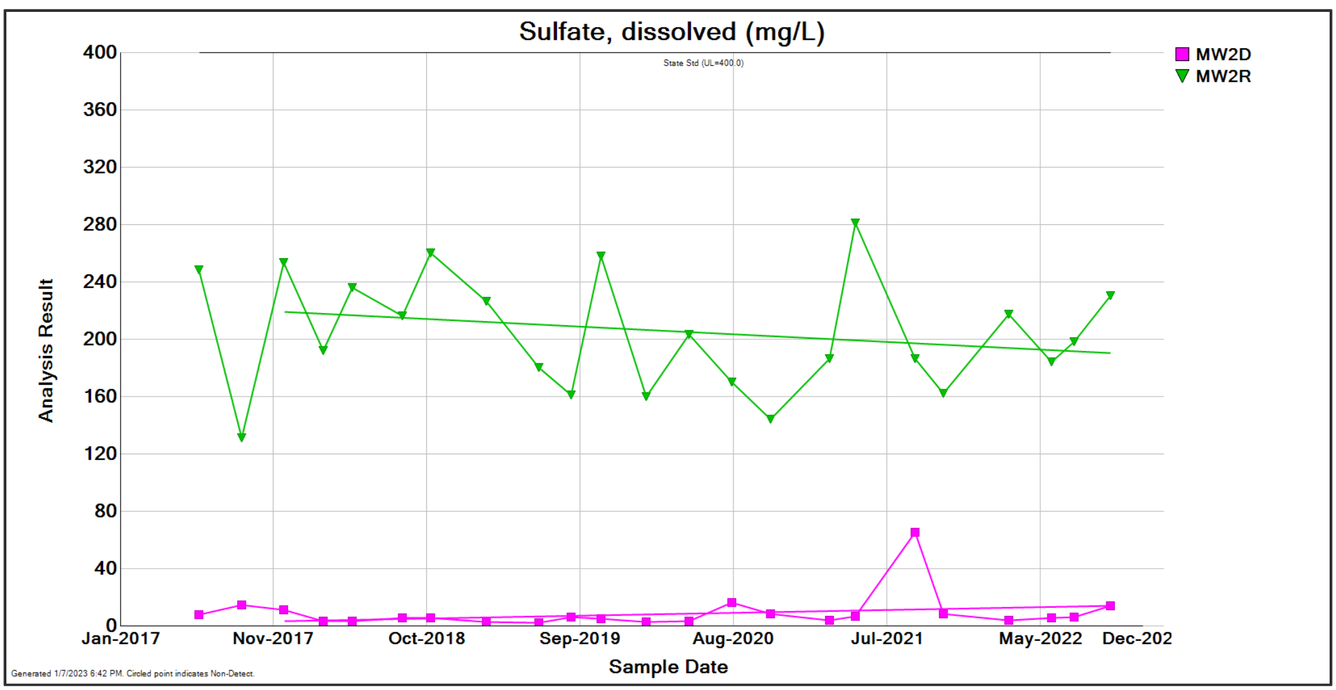


Figure 1-8. Sulfate concentrations since 2017 at compliance wells MW-2D and MW-2R. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

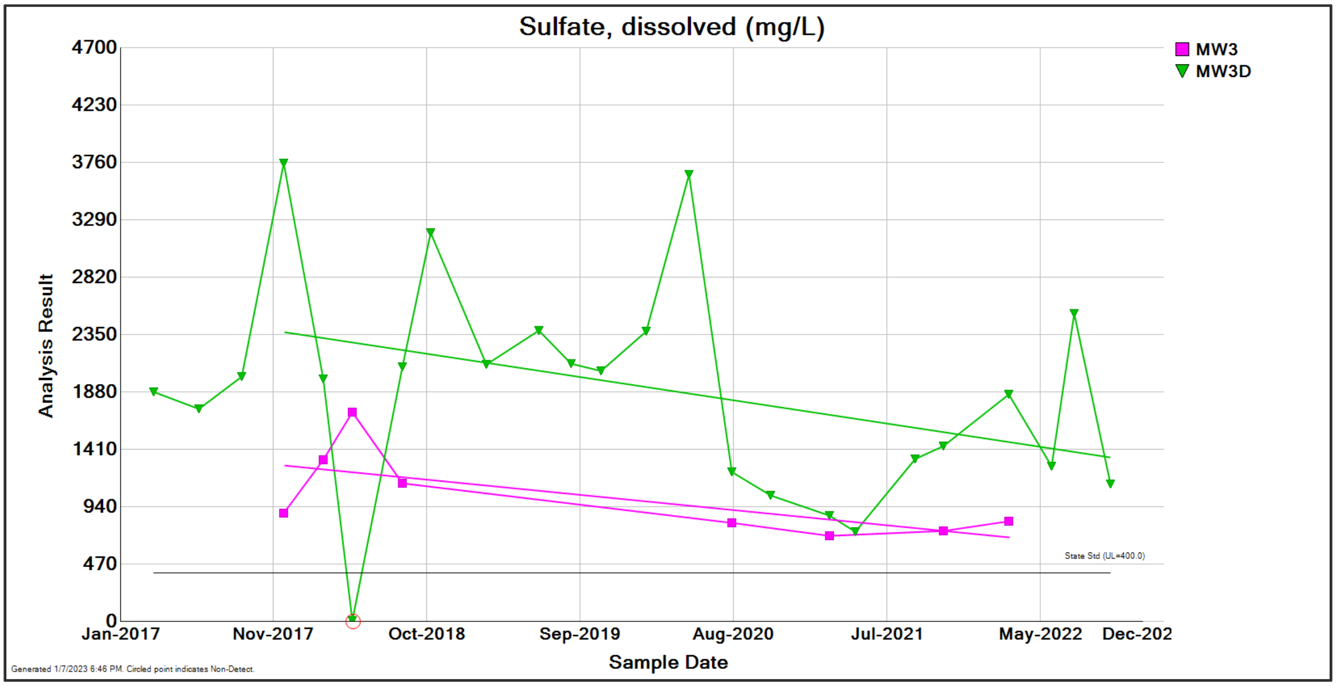


Figure 1-9. Sulfate concentrations since 2017 at compliance wells MW-3 and MW-3D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

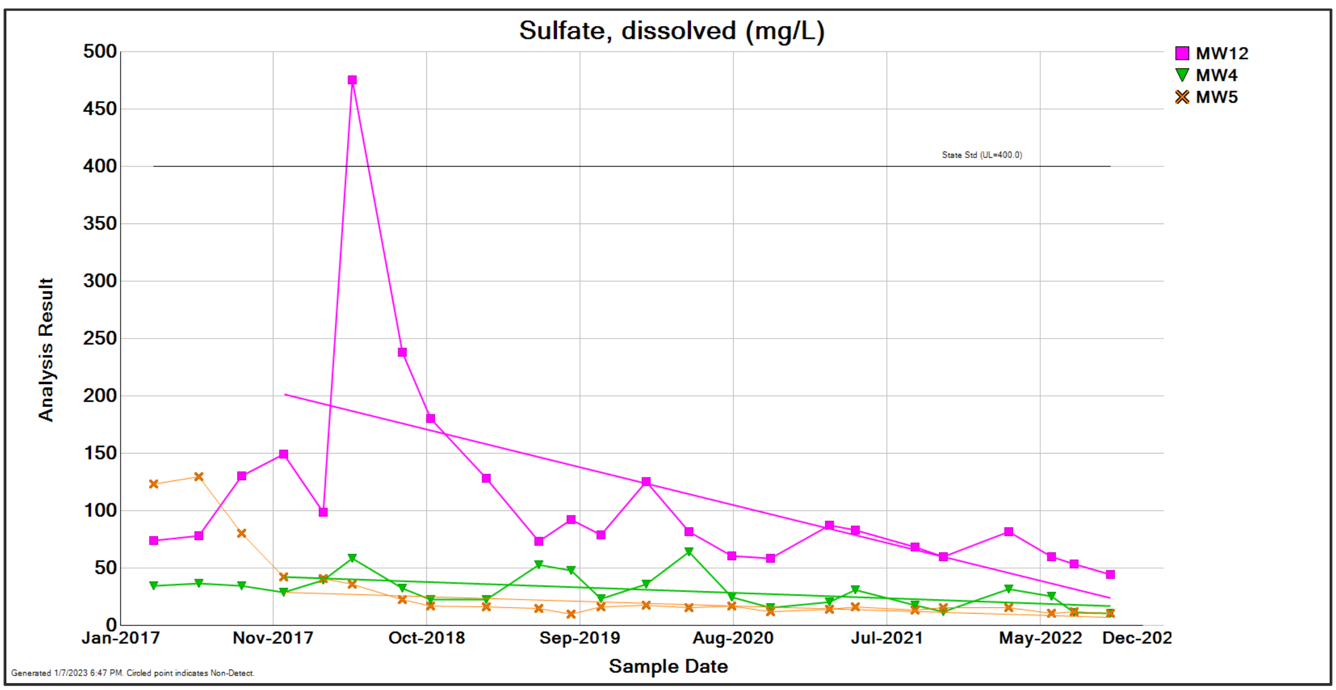


Figure 1-10. Sulfate concentrations since 2017 at compliance wells MW-4, MW-5, and MW-12. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

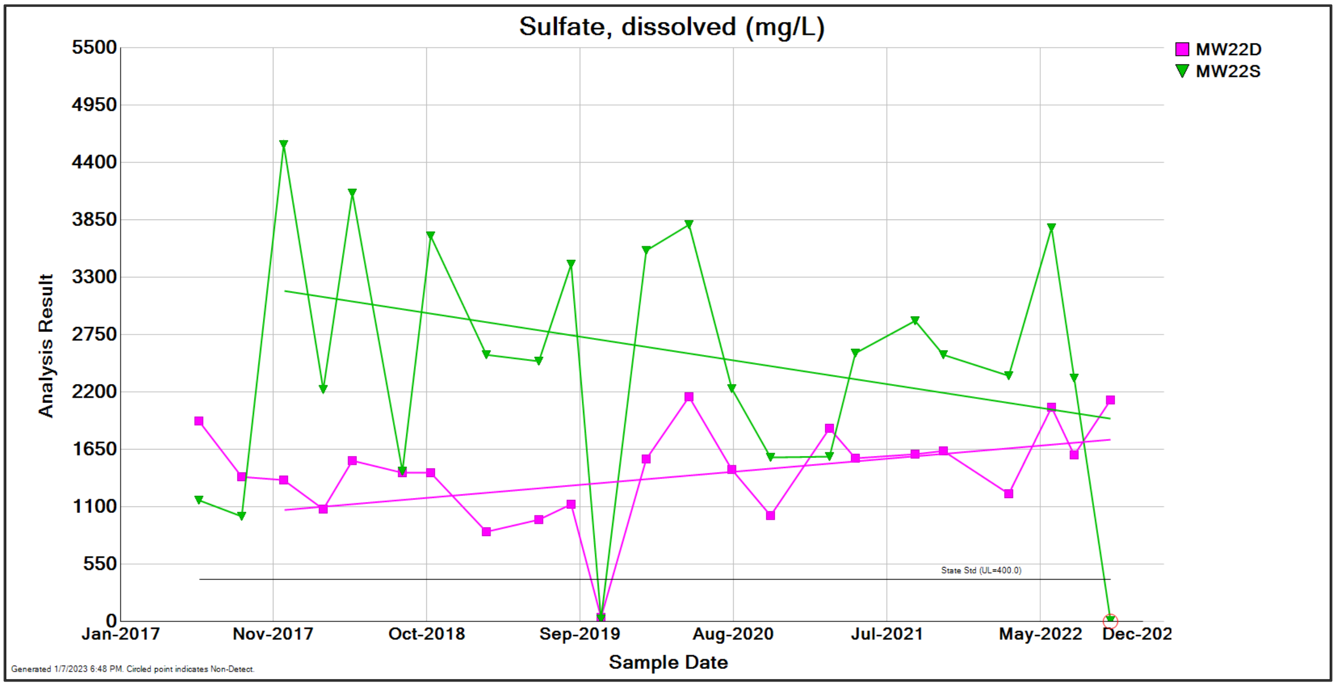


Figure 1-11. Sulfate concentrations since 2017 at compliance wells MW-22S and MW-22D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

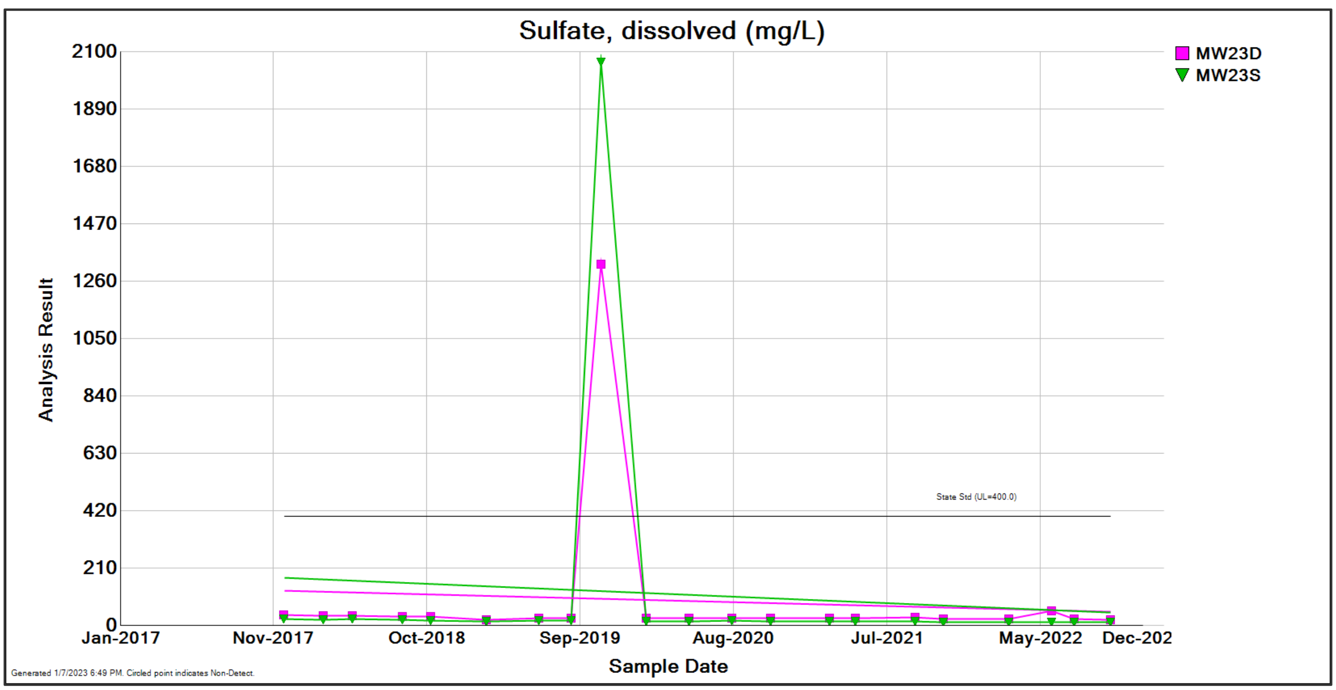
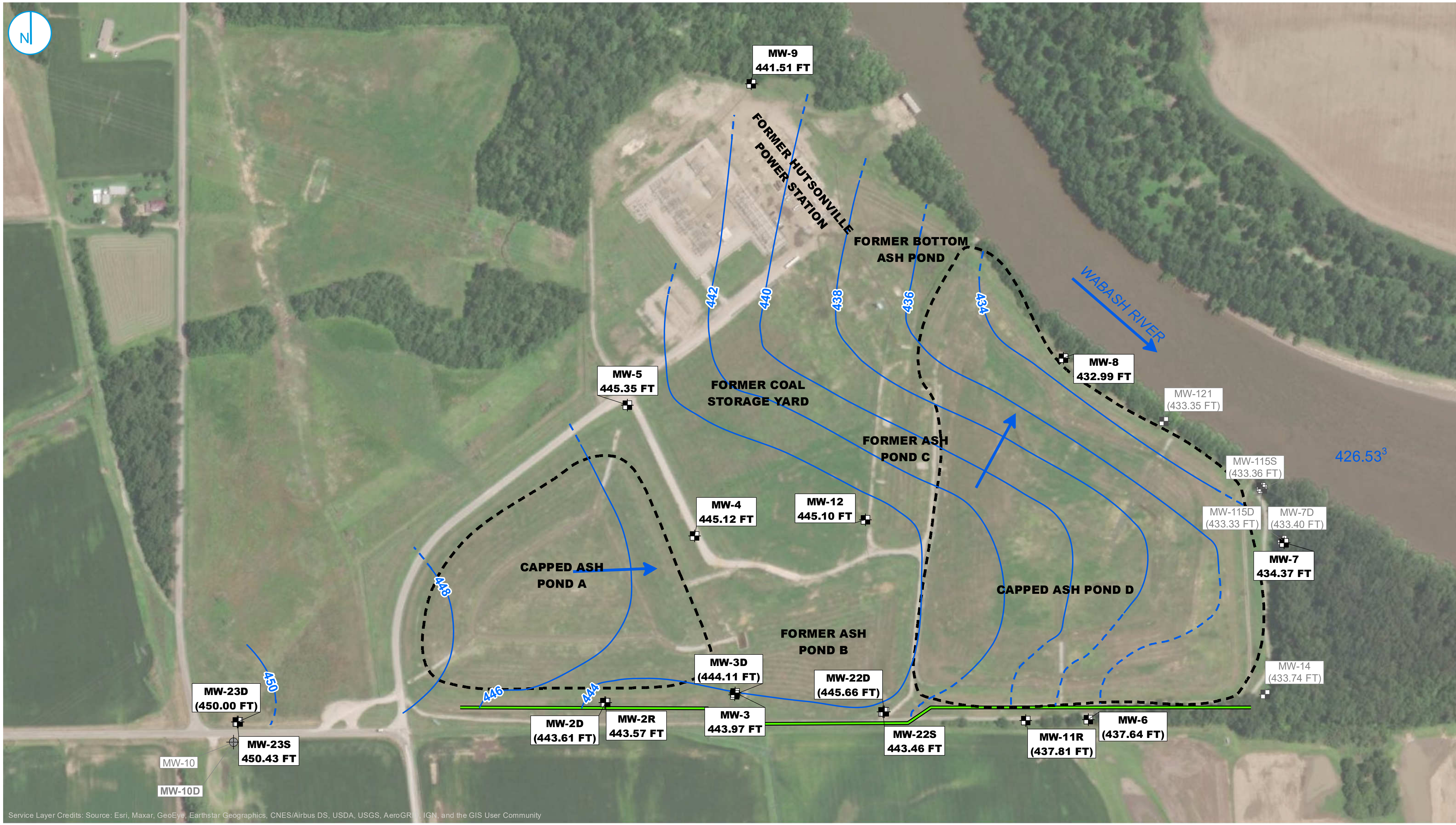


Figure 1-12. Sulfate concentrations since 2017 at compliance wells MW-23S and MW-23D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.



Y:\Mapping\Projects\24\2420\MXDs\2022APA\Figure 3-1_Q1_2022_GW_Elevation.mxd

PROJECT: 169000XXXX | DATED: 8/1/2022 | DESIGNER: galammc

UPPER MIGRATION ZONE MONITORING WELL
DEEP MIGRATION ZONE MONITORING WELL
ABANDONED MONITORING WELL LOCATION
PROPERTY LINE
GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
APPROXIMATE BOUNDARY OF CAPPED ASH POND
GROUNDWATER COLLECTION TRENCH (BEGAN OPERATION APRIL 2015)

0 150 300 Feet

Notes

1) GROUNDWATER AND RIVER ELEVATIONS REPORTED IN FEET NORTH AMERICAN VERTICAL DATUM OF 1988.
2) GROUNDWATER ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
3) WABASH RIVER ELEVATIONS AS REPORTED BY USGS FROM USGS 03342000 WABASH RIVER AT RIVERTON, IN LOCATED APPROXIMATELY 12.5 RIVER MILES DOWNSTREAM. RIVER ELEVATION REPORTED IN FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929 AND CONVERTED TO FEET NORTH AMERICAN VERTICAL DATUM OF 1988.

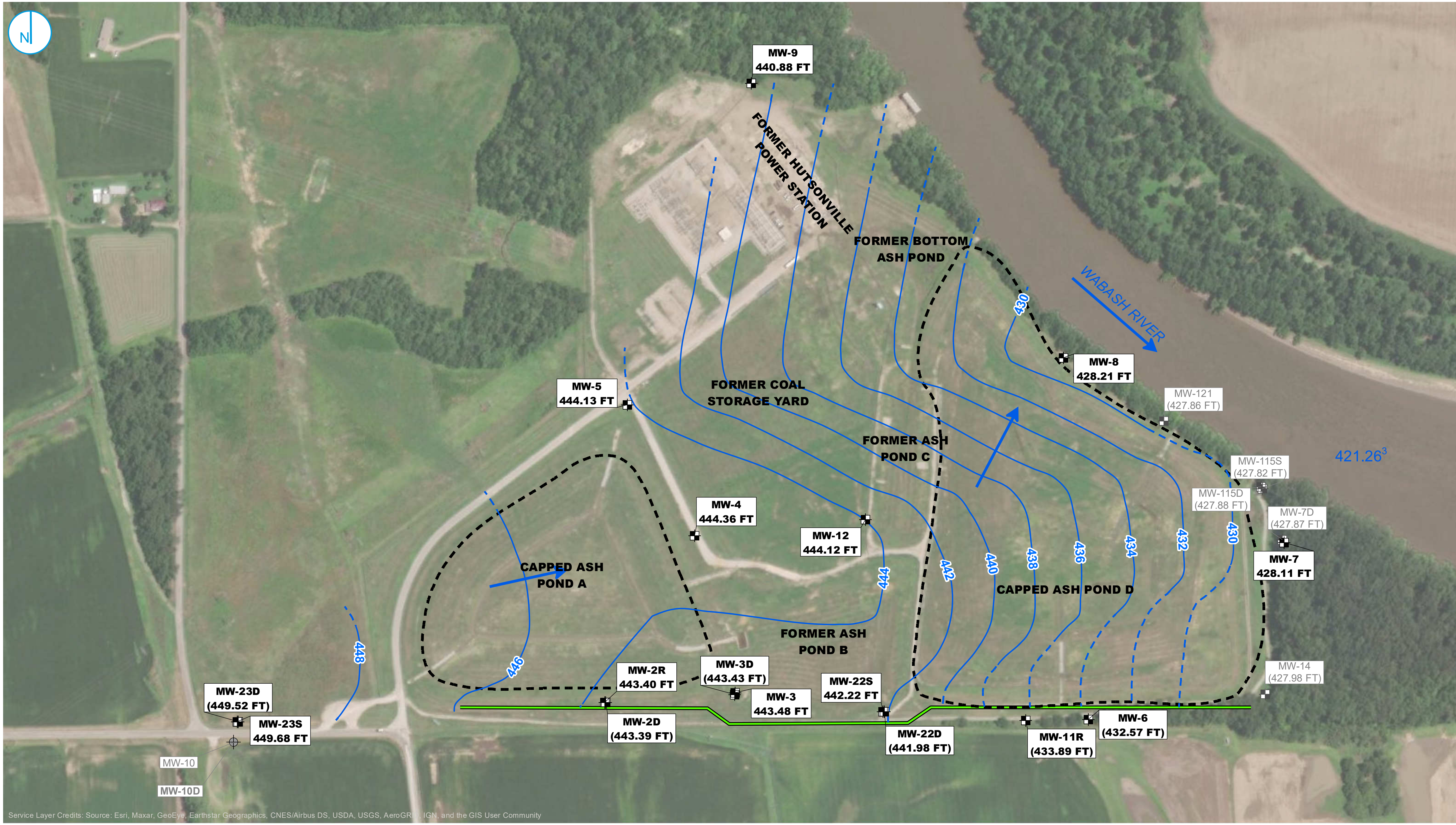
Q1 UPPER MIGRATION ZONE GROUNDWATER ELEVATION CONTOUR MAP
MARCH 21, 2022

2022 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A
AMEREN ENERGY MEDINA VALLEY COGEN, LLC
HUTSONVILLE, IL

FIGURE 3-1

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC
A RAMBOLL COMPANY

RAMBOLL



Y:\Mapping\Projects\24\2420\MXDs\2022APA\Figure 3-2_Q2_2022_GW_Elevation.mxd

PROJECT: 169000XXXX | DATED: 8/1/2022 | DESIGNER: galammc

UPPER MIGRATION ZONE MONITORING WELL
DEEP MIGRATION ZONE MONITORING WELL
ABANDONED MONITORING WELL LOCATION
PROPERTY LINE
GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
APPROXIMATE BOUNDARY OF CAPPED ASH POND
GROUNDWATER COLLECTION TRENCH (BEGAN OPERATION APRIL 2015)

0 150 300 Feet

Notes

1) GROUNDWATER AND RIVER ELEVATIONS REPORTED IN FEET NORTH AMERICAN VERTICAL DATUM OF 1988.
2) GROUNDWATER ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
3) WABASH RIVER ELEVATIONS AS REPORTED BY USGS FROM USGS 03342000 WABASH RIVER AT RIVERTON, IN LOCATED APPROXIMATELY 12.5 RIVER MILES DOWNSTREAM. RIVER ELEVATION REPORTED IN FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929 AND CONVERTED TO FEET NORTH AMERICAN VERTICAL DATUM OF 1988.

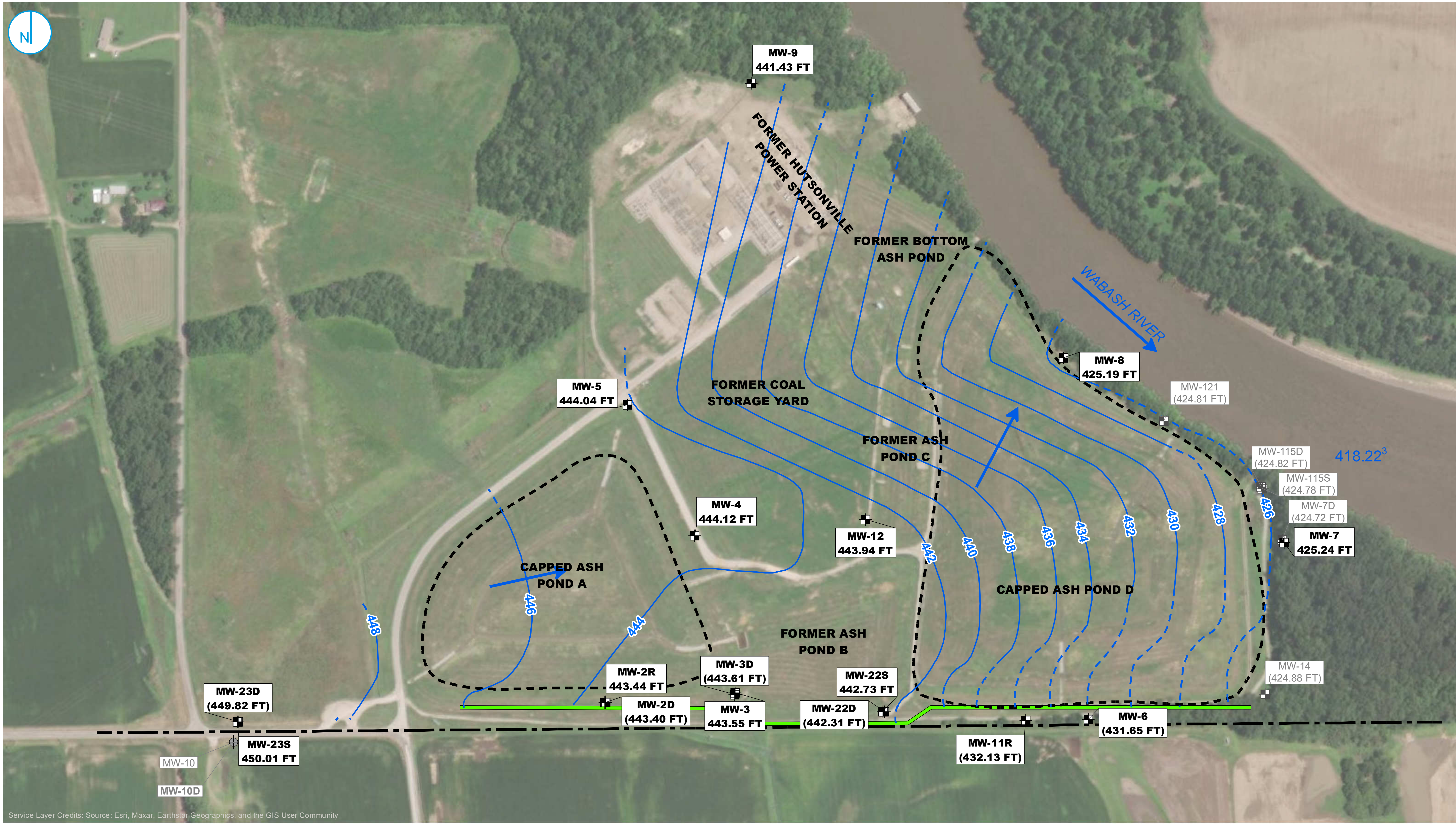
Q2 UPPER MIGRATION ZONE GROUNDWATER ELEVATION CONTOUR MAP
JUNE 20, 2022

2022 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A
AMEREN ENERGY MEDINA VALLEY COGEN, LLC
HUTSONVILLE, IL

FIGURE 3-2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC
A RAMBOLL COMPANY

RAMBOLL



Y:\Mapping\Projects\24\2420\MXDs\2022APA\Figure 3-3_Q3_2022_GW_Elevation.mxd

PROJECT: 169000XXXX | DATED: 1/19/2023 | DESIGNER: galarnmc

- UPPER MIGRATION ZONE MONITORING WELL
- DEEP MIGRATION ZONE MONITORING WELL
- ABANDONED MONITORING WELL LOCATION
- PROPERTY LINE
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE BOUNDARY OF CAPPED ASH POND
- GROUNDWATER COLLECTION TRENCH (BEGAN OPERATION APRIL 2015)

0 150 300 Feet

Notes

1) GROUNDWATER AND RIVER ELEVATIONS REPORTED IN FEET NORTH AMERICAN VERTICAL DATUM OF 1988.
2) GROUNDWATER ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
3) WABASH RIVER ELEVATIONS AS REPORTED BY USGS FROM USGS 03342000 WABASH RIVER AT RIVERTON, IN LOCATED APPROXIMATELY 12.5 RIVER MILES DOWNSTREAM. RIVER ELEVATION REPORTED IN FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929 AND CONVERTED TO FEET NORTH AMERICAN VERTICAL DATUM OF 1988.

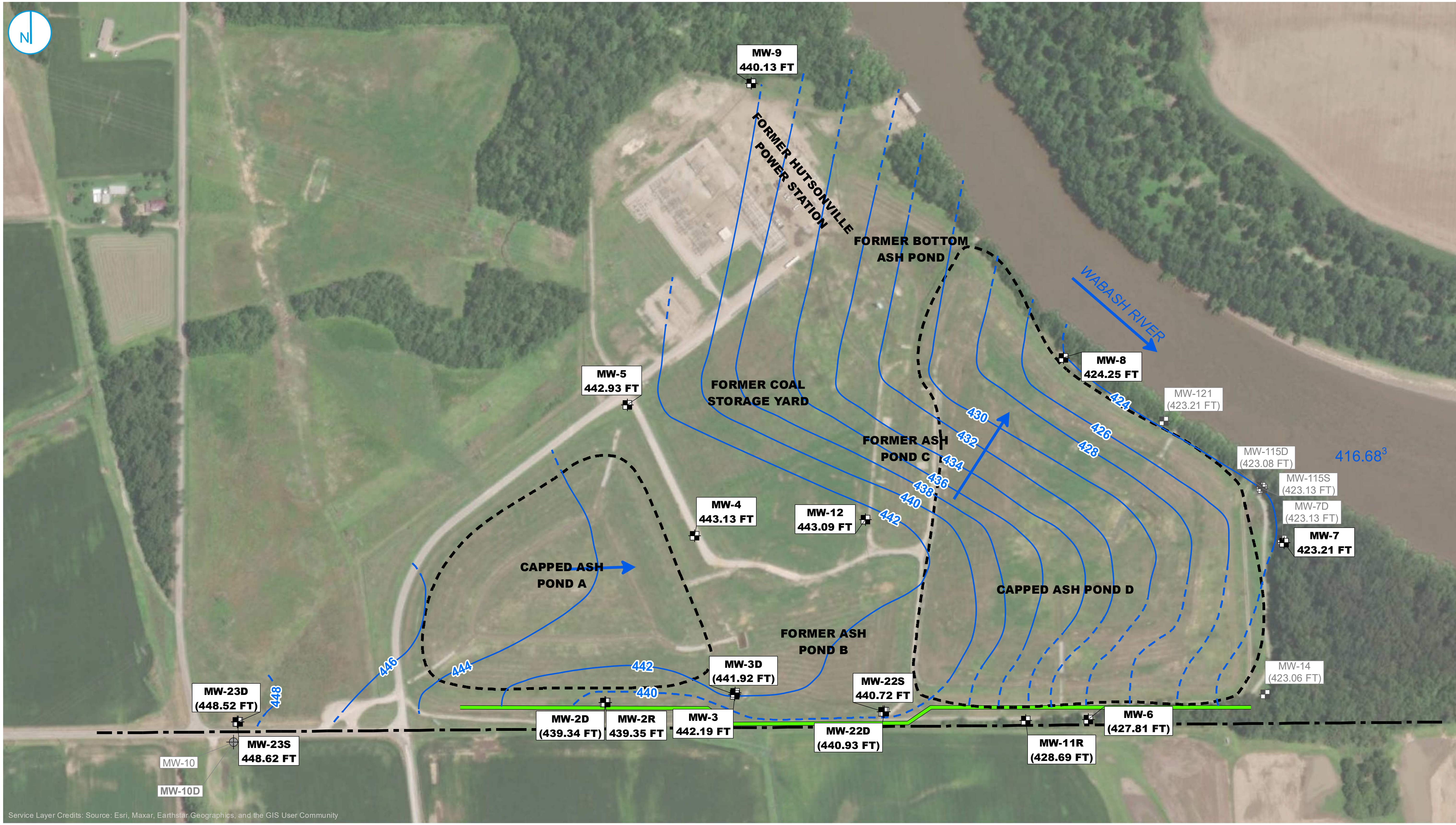
Q3 UPPER MIGRATION ZONE GROUNDWATER ELEVATION CONTOUR MAP
AUGUST 8, 2022

2022 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A
AMEREN ENERGY MEDINA VALLEY COGEN, LLC
HUTSONVILLE, IL

FIGURE 3-3

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC
A RAMBOLL COMPANY

RAMBOLL



Y:\Mapping\Projects\24\2420\MXDs\2022APA\Figure 3-4_Q4_2022_GW_Elevation.mxd

PROJECT: 169000XXXX | DATED: 1/19/2023 | DESIGNER: galarmc

- UPPER MIGRATION ZONE MONITORING WELL
- DEEP MIGRATION ZONE MONITORING WELL
- ABANDONED MONITORING WELL LOCATION
- PROPERTY LINE
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE BOUNDARY OF CAPPED ASH POND
- GROUNDWATER COLLECTION TRENCH (BEGAN OPERATION APRIL 2015)

0 150 300 Feet

Notes

1) GROUNDWATER AND RIVER ELEVATIONS REPORTED IN FEET NORTH AMERICAN VERTICAL DATUM OF 1988.
2) GROUNDWATER ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
3) WABASH RIVER ELEVATIONS AS REPORTED BY USGS FROM USGS 03342000 WABASH RIVER AT RIVERTON, IN LOCATED APPROXIMATELY 12.5 RIVER MILES DOWNSTREAM. RIVER ELEVATION REPORTED IN FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929 AND CONVERTED TO FEET NORTH AMERICAN VERTICAL DATUM OF 1988.

Q4 UPPER MIGRATION ZONE GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 24, 2022

2022 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A
AMEREN ENERGY MEDINA VALLEY COGEN, LLC
HUTSONVILLE, IL

FIGURE 3-4

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC
A RAMBOLL COMPANY

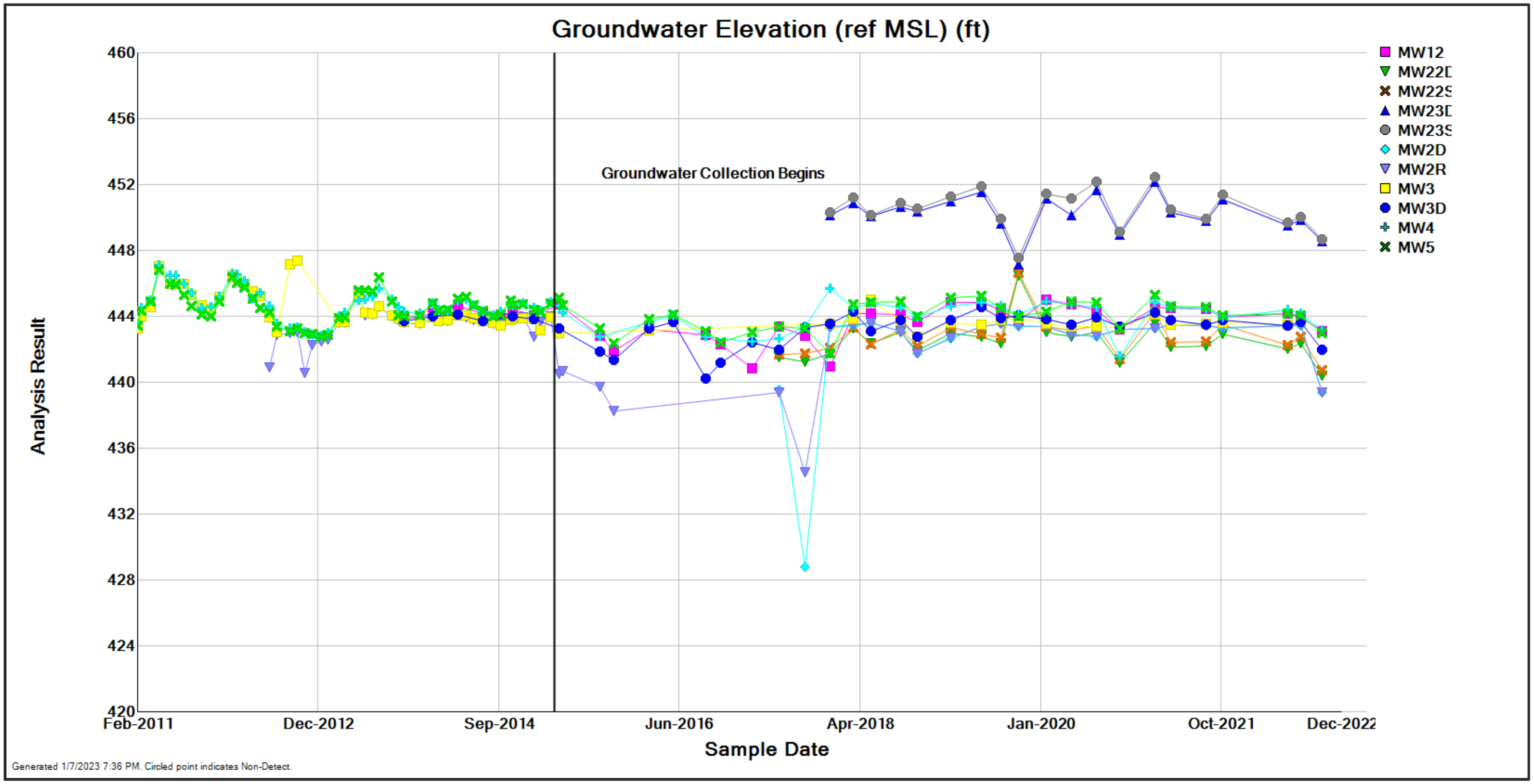


Figure 3-5. Groundwater elevations near groundwater collection trench.

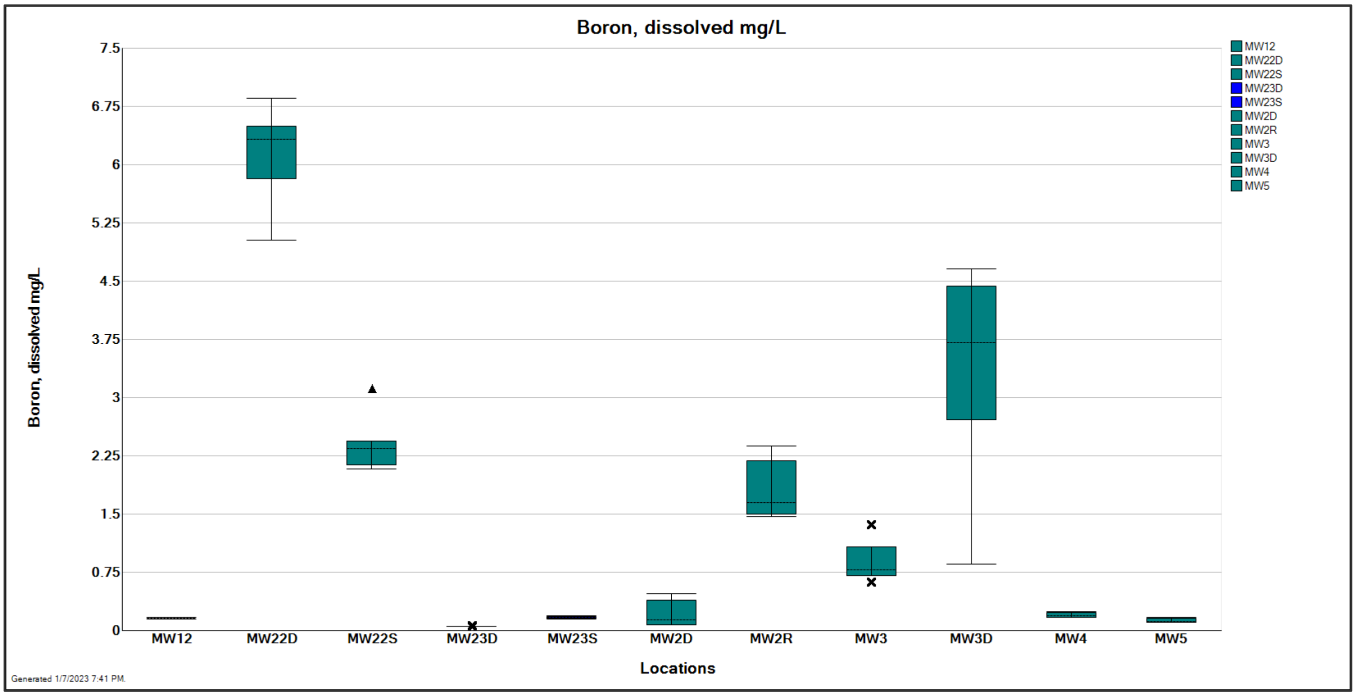


Figure 3-6. Box-whisker plot showing distribution of **boron** concentration by monitoring well for data collected in 2021 and 2022. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

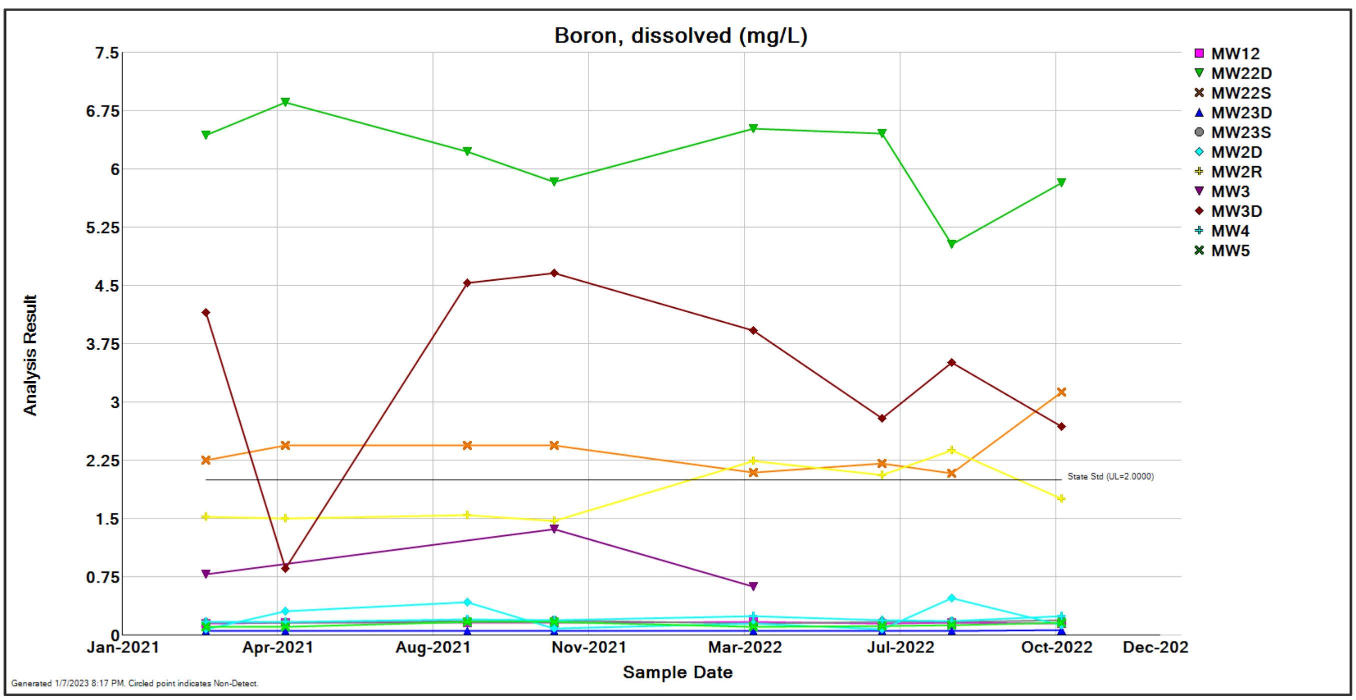


Figure 3-7. Boron concentrations during the reporting period (2021-2022) at all background and compliance wells. Note: Circled results indicate non-detects.

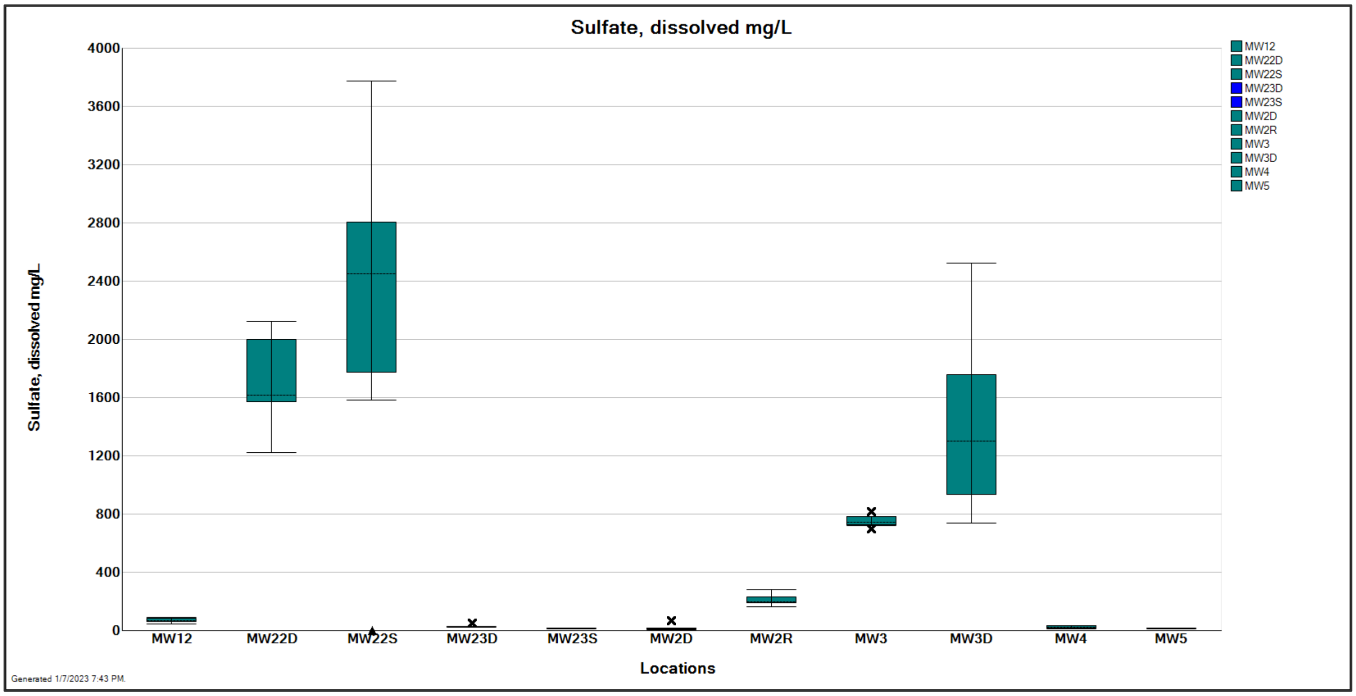


Figure 3-8. Box-whisker plot showing distribution of **sulfate** concentration by monitoring well for data collected in 2021 and 2022. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

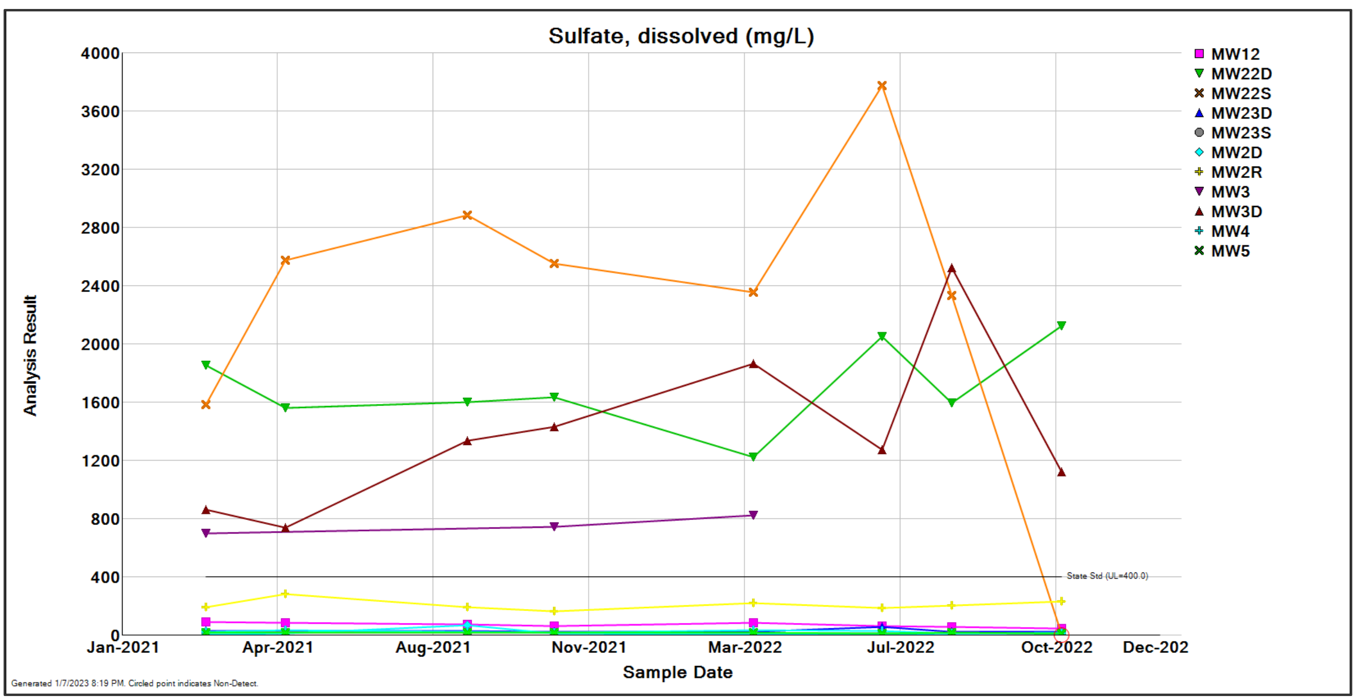


Figure 3-9. Sulfate concentrations during the reporting period (2021-2022) at all background and compliance wells.

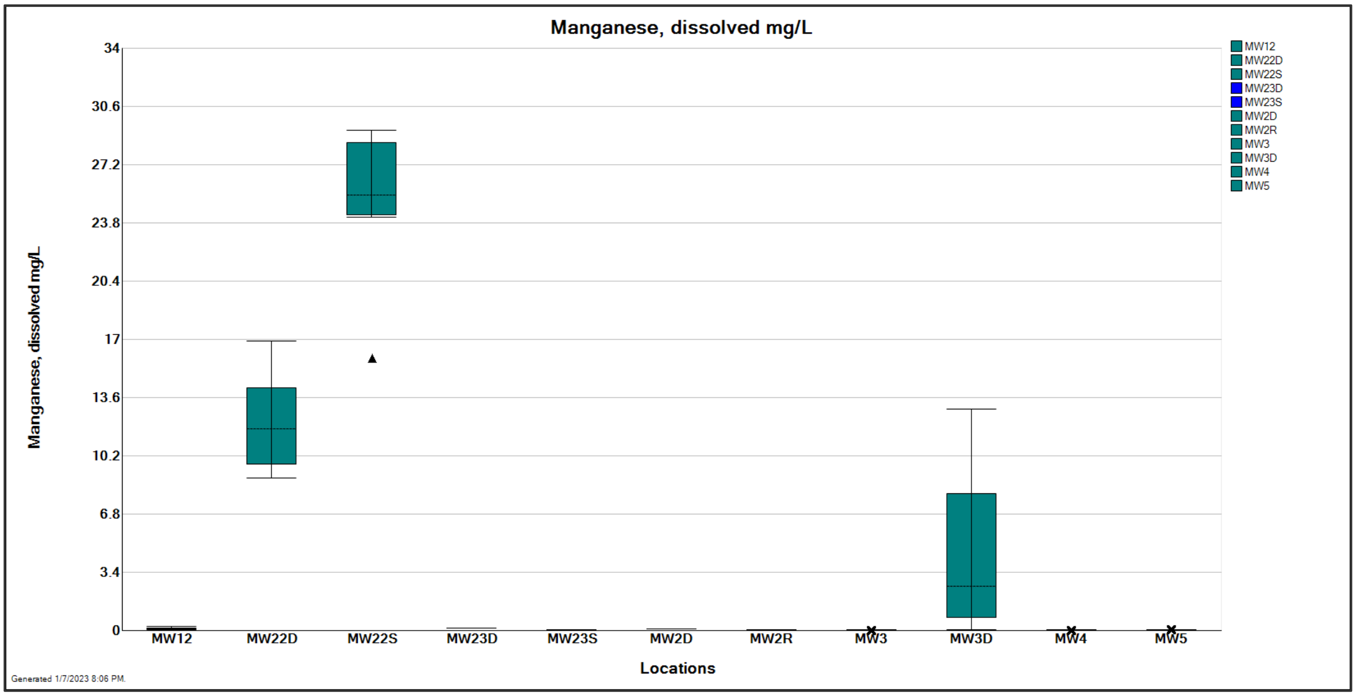


Figure 3-10A. Box-whisker plot showing distribution of **manganese** concentration by monitoring well for data collected in 2021 and 2022. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

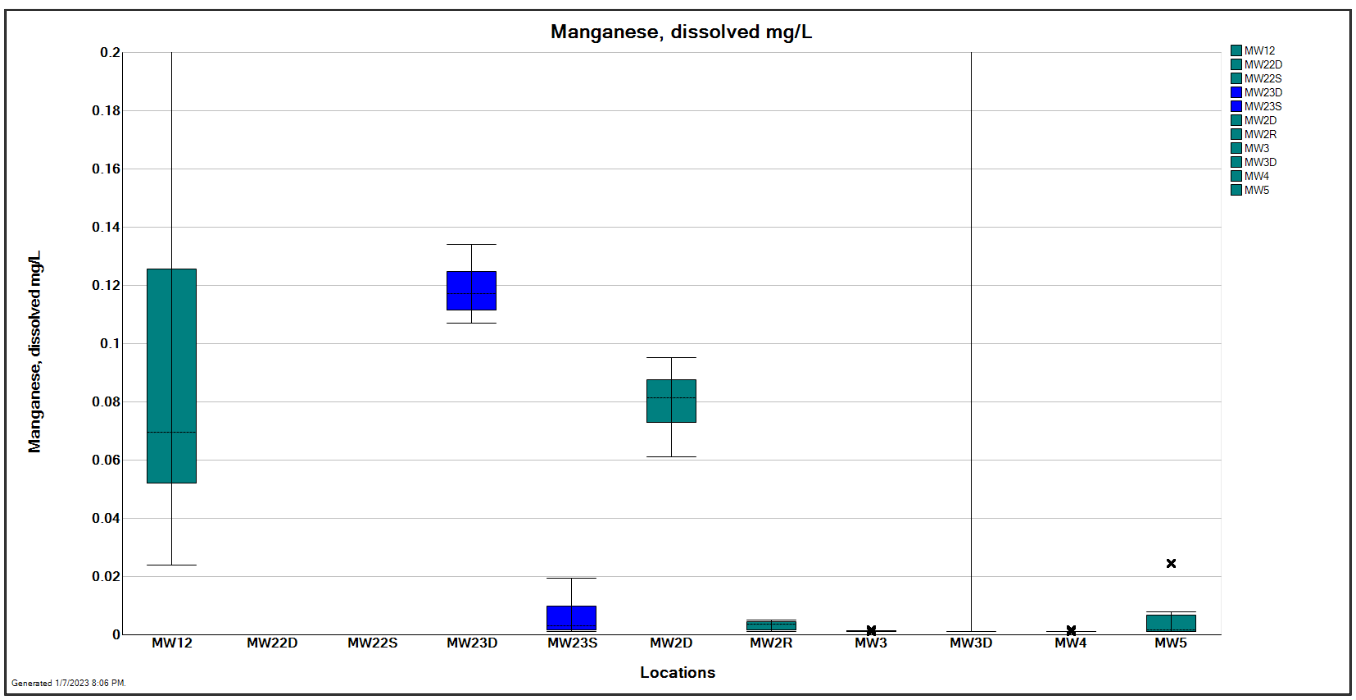


Figure 3-10B. Box-whisker plot showing distribution of **manganese** concentration by monitoring well for data collected in 2021 and 2022 (zoomed in). Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

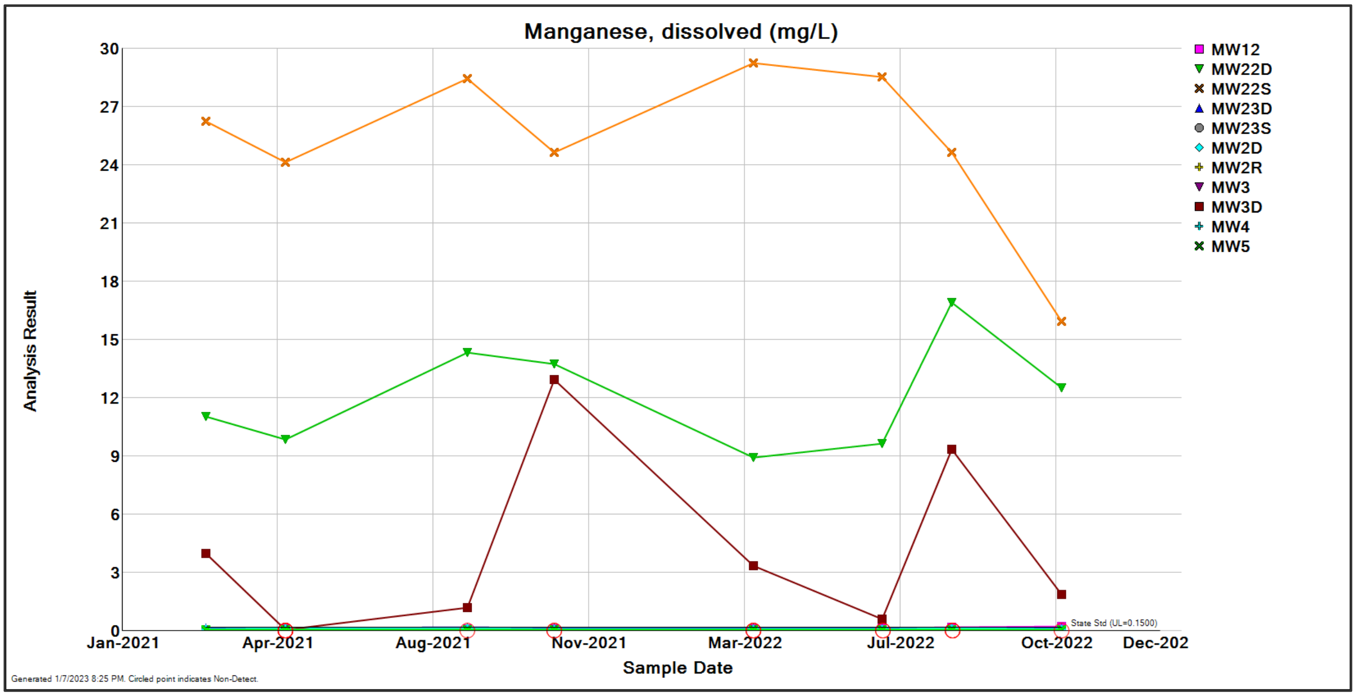


Figure 3-11A. Manganese concentrations during the reporting period (2021-2022) at all background and compliance wells. Note: Circled results indicate non-detects.

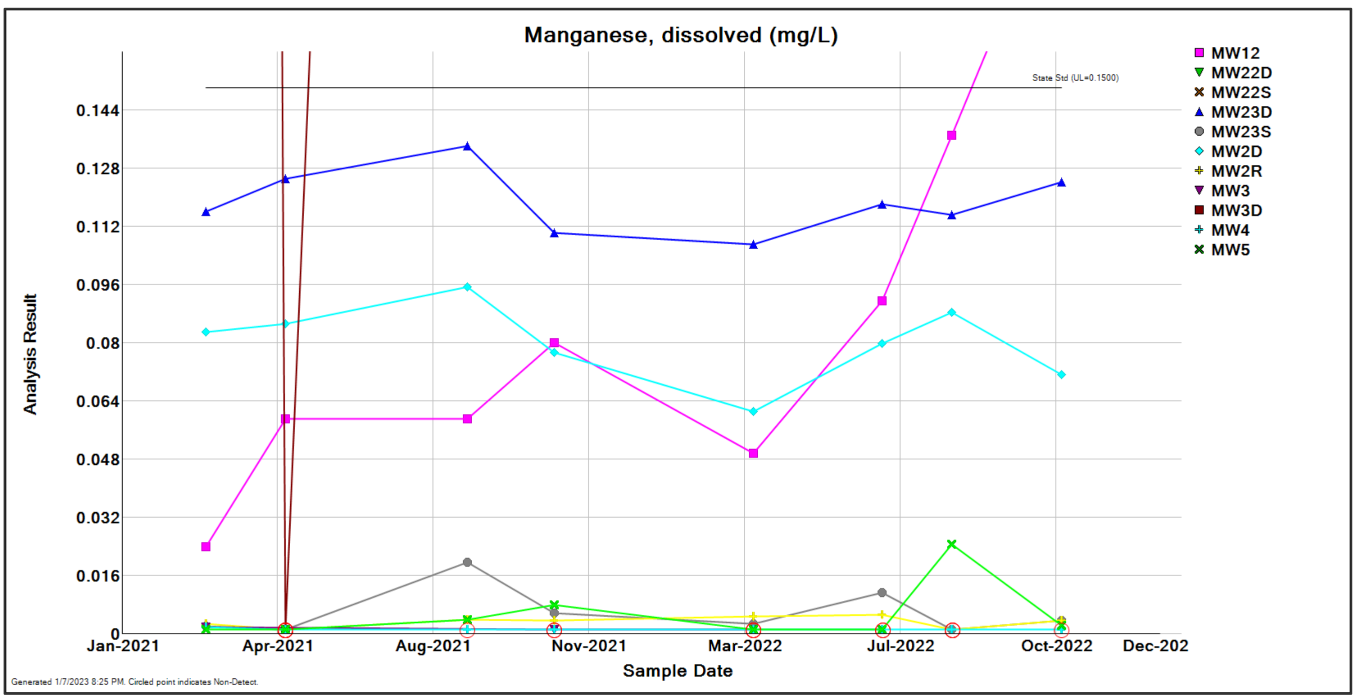


Figure 3-11B. Manganese concentrations during the reporting period (2021-2022) at all background and compliance wells. Zoomed in to show the Class I groundwater standard. Note: Circled results indicate non-detects.

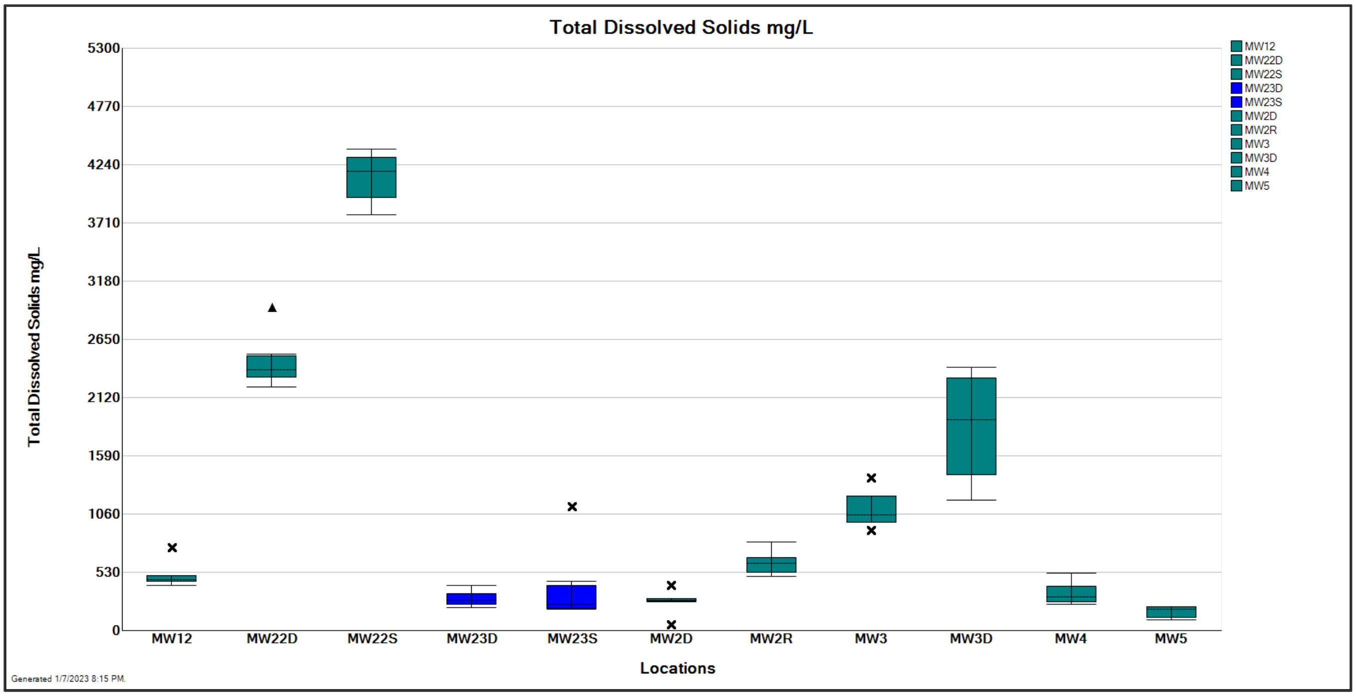


Figure 3-12. Box-whisker plot showing distribution of **total dissolved solids** concentration by monitoring well for data collected in 2021 and 2022. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

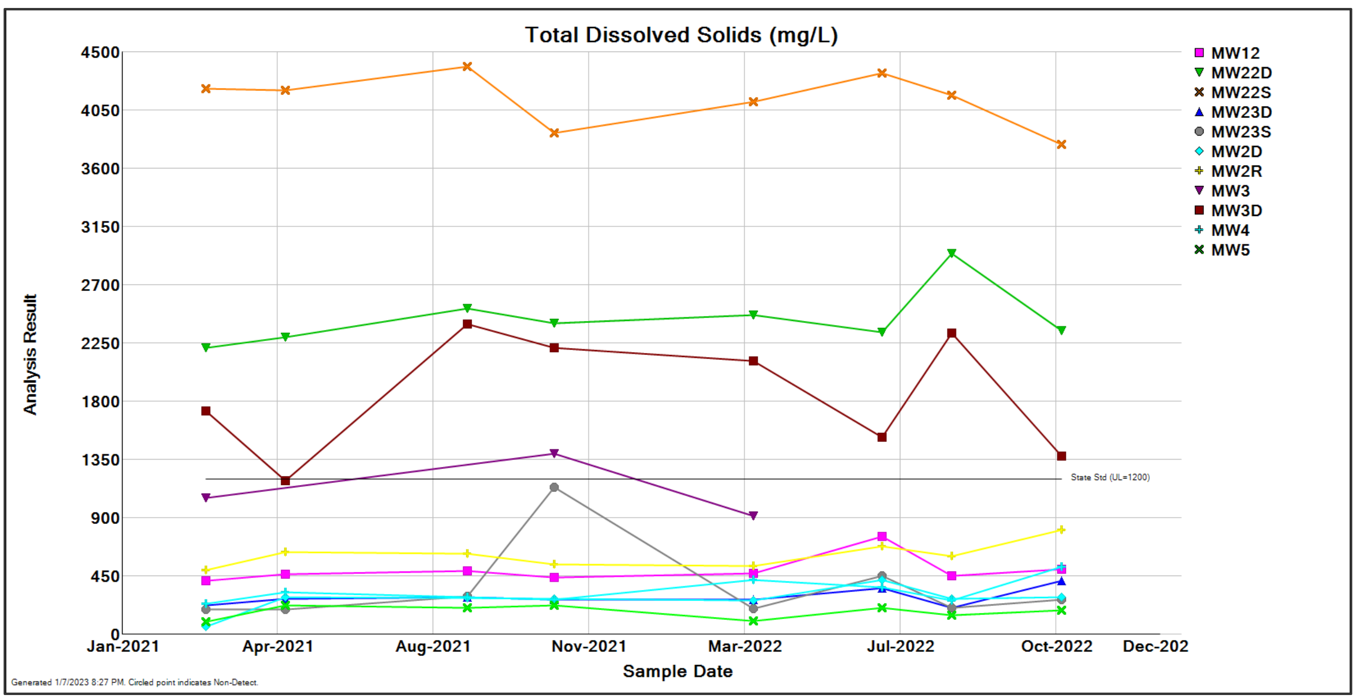


Figure 3-13. Total dissolved solids concentrations during the reporting period (2021-2022) at all background and compliance wells.

APPENDIX A
GROUNDWATER MONITORING RESULTS 2021-2022

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW2D

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0044	0.0067	0.0049	0.0075	0.0053	0.0096	0.0046	0.0075
B, diss, mg/L	0.0700	0.3000	0.4200	0.0800	0.1400	0.0700	0.4700	0.1200
Ba, diss, mg/L	0.053	0.092	0.097	0.061	0.067	0.059	0.069	0.071
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	13.7	11.8	13.1	12.1	11.6	19.5	12.8	14.0
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0003	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	0.2	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	0.109	0.133	0.664	0.393	0.140	0.416	0.180	0.317
GW Depth (TOC), ft	12.17	11.97	12.03	12.18	11.81	12.03	12.02	16.08
GW Elv, ft	443.25	443.45	443.39	443.24		443.39	443.40	439.34
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0829	0.0851	0.0951	0.0772	0.0609	0.0796	0.0882	0.0711
Ni, diss, mg/L	<0.0003	0.0008	0.0002	<0.0003	0.0002	0.0011	0.0002	0.0002
NO3, diss, mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.43	7.53	7.52	7.59	6.01	7.20	7.25	7.30
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0025	<0.0005	<0.0005	<0.0005	<0.0005
SO4, diss, mg/L	3.7	6.2	64.9	8.2	3.6	5.3	5.9	13.8
Spec. Cond. (field), micromho	551	514	530	537	498	875	517	476
TDS, mg/L	54	284	276	272	254	412	268	284
Temp (Fahrenheit), degrees F	56.5	60.1	66.0	60.8	60.1	64.2	72.0	66.6
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW2R

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
B, diss, mg/L	1.5200	1.4900	1.5400	1.4600	2.2300	2.0500	2.3700	1.7500
Ba, diss, mg/L	0.027	0.035	0.028	0.027	0.030	0.026	0.030	0.038
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	23.9	23.1	22.5	19.3	32.1	20.1	22.7	27.0
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	<0.010	0.036	0.292	0.155	0.092	<0.010	<0.010	<0.010
GW Depth (TOC), ft	12.12	11.90	11.98	12.10	11.80	11.97	11.93	16.02
GW Elv, ft	443.25	443.47	443.39	443.27		443.40	443.44	439.35
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0027	<0.0010	0.0037	0.0034	0.0047	0.0050	<0.0010	0.0036
Ni, diss, mg/L	0.0004	0.0003	0.0003	0.0006	0.0002	0.0005	0.0005	0.0004
NO3, diss, mg/L	1.150	1.290	0.747	0.892	0.598	0.687	0.581	1.890
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.30	7.41	7.22	7.42	8.92	8.51	7.22	7.18
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0043	0.0053	0.0040	0.0048	0.0030	0.0035	0.0028	0.0065
SO4, diss, mg/L	186.0	281.0	186.0	162.0	217.0	184.0	198.0	230.0
Spec. Cond. (field), micromho	941	927	867	856	878	768	876	965
TDS, mg/L	492	628	616	534	522	674	602	800
Temp (Fahrenheit), degrees F	54.9	59.1	66.2	62.6	60.2	64.2	72.7	67.6
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW3

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022
Ag, diss, mg/L	<0.0003			<0.0003	<0.0003	
As, diss, mg/L	<0.0003			<0.0003	<0.0003	
B, diss, mg/L	0.7800			1.3600	0.6200	
Ba, diss, mg/L	0.002			0.004	0.002	
Be, diss, mg/L	<0.0010			<0.0010	<0.0010	
Cd, diss, mg/L	<0.0003			<0.0003	<0.0003	
Cl, diss, mg/L	2.5			6.7	3.6	
CN, total, mg/L	<0.01			<0.01	<0.01	
Co, diss, mg/L	<0.001			<0.001	<0.001	
Cr, diss, mg/L	0.0003			0.0004	0.0004	
Cu, diss, mg/L	<0.0005			<0.0005	<0.0005	
F, diss, mg/L	0.3			0.3	0.2	
Fe, diss, mg/L	<0.010			0.143	0.096	
GW Depth (TOC), ft	10.75	11.39	11.33	11.25	10.87	11.36
GW Elv, ft	444.09	443.45	443.51	443.59		443.48
Hg, diss, mg/L	<0.0001			<0.0001	<0.0001	
Mn, diss, mg/L	0.0016			<0.0010	<0.0010	
Ni, diss, mg/L	0.0003			0.0002	0.0002	
NO3, diss, mg/L	0.497			0.884	0.662	
Pb, diss, mg/L	<0.001			<0.001	<0.001	
pH (field), STD	7.44			7.29	7.30	
Sb, diss, mg/L	<0.002			<0.002	<0.002	
Se, diss, mg/L	0.0040			0.0083	0.0026	
SO4, diss, mg/L	698.0			740.0	818.0	
Spec. Cond. (field), micromho	1760			1640	1300	
TDS, mg/L	1050			1390	908	
Temp (Fahrenheit), degrees F	51.6			62.4	56.0	
Tl, diss, mg/L	<0.0003			<0.0003	<0.0003	
V, diss, mg/L	<0.001			<0.001	<0.001	
Zn, diss, mg/L	0.02			0.03	0.02	

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW3D

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0042	<0.0003	0.0042	0.0112	0.0041	0.0011	0.0014	0.0013
B, diss, mg/L	4.1500	0.8500	4.5300	4.6500	3.9100	2.7800	3.5000	2.6800
Ba, diss, mg/L	0.009	0.003	<0.010	0.013	0.012	0.008	0.012	0.010
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	0.0057	<0.0003	0.0090	0.0080	0.0046	0.0014	0.0056	0.0024
Cl, diss, mg/L	7.3	0.7	10.9	10.7	21.8	4.8	7.9	8.5
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	0.154	<0.001	0.262	0.216	0.103	0.023	0.160	0.078
Cr, diss, mg/L	<0.0010	0.0003	<0.0010	<0.0010	0.0003	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	0.0012	0.0012	<0.0005	<0.0005	<0.0005	0.0010
F, diss, mg/L	0.4	0.3	0.8	1.0	0.6	0.3	0.3	<0.1
Fe, diss, mg/L	<0.100	0.044	1.480	4.790	0.100	<0.010	10.600	<0.010
GW Depth (TOC), ft	10.82	11.26	11.52	11.28	10.90	11.58	11.40	13.09
GW Elv, ft	444.19	443.75	443.49	443.73		443.43	443.61	441.92
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	3.9300	<0.0010	1.1700	12.9000	3.3100	0.5710	9.3300	1.8400
Ni, diss, mg/L	0.1800	0.0009	0.3150	0.2690	0.1420	0.0325	0.1720	0.0840
NO3, diss, mg/L	1.180	0.419	0.655	0.796	2.050	0.845	0.466	0.846
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	5.50	7.26	4.76	4.68	4.61	4.58	4.68	4.93
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0100	0.0035	<0.0500	<0.0005	<0.0025	0.0040	0.0012	<0.0050
SO4, diss, mg/L	861.0	734.0	1330.0	1430.0	1860.0	1270.0	2520.0	1120.0
Spec. Cond. (field), micromho	2130	1380	2490	2290	2520	1400	1920	1380
TDS, mg/L	1720	1180	2390	2210	2110	1520	2320	1370
Temp (Fahrenheit), degrees F	53.5	56.9	64.3	60.3	58.3	62.2	70.8	66.7
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	0.05	0.02	0.06	0.05	0.04	0.01	0.04	0.02

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW4

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
B, diss, mg/L	0.1600	0.1600	0.2000	0.1800	0.2400	0.1800	0.1700	0.2400
Ba, diss, mg/L	0.010	0.016	0.017	0.016	0.020	0.015	0.016	0.018
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	4.7	1.1	0.6	12.4	10.4	0.6	0.5	7.0
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	0.0004	0.0004	0.0004	0.0006	0.0005	0.0005	0.0005	0.0006
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	0.2	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	0.024	0.037	0.278	0.141	0.088	<0.010	<0.010	<0.010
GW Depth (TOC), ft	11.92	12.22	12.34	12.82	11.64	12.40	12.64	13.63
GW Elv, ft	444.84	444.54	444.42	443.94		444.36	444.12	443.13
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0016	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ni, diss, mg/L	0.0003	0.0010	<0.0003	<0.0003	0.0002	<0.0003	0.0003	0.0008
NO3, diss, mg/L	1.180	2.470	0.618	0.509	6.740	1.270	0.504	0.854
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.37	7.12	7.16	7.29	7.14	7.23	7.21	7.20
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0014	0.0021	0.0015	0.0011	0.0039	0.0021	0.0010	0.0016
SO4, diss, mg/L	20.3	30.6	17.6	11.5	31.1	25.1	10.9	10.3
Spec. Cond. (field), micromho	569	524	484	599	680	414	467	478
TDS, mg/L	232	320	284	264	418	358	254	518
Temp (Fahrenheit), degrees F	52.1	54.2	68.1	62.0	50.8	63.5	70.6	65.9
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW5

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
B, diss, mg/L	0.1000	0.1000	0.1600	0.1600	0.1000	0.1100	0.1200	0.1500
Ba, diss, mg/L	0.013	0.017	0.022	0.027	0.017	0.014	0.024	0.021
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	3.7	0.8	0.9	16.0	6.2	1.5	1.7	4.3
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	0.0004	0.0004	<0.0010	<0.0010	0.0004	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	<0.010	0.046	0.304	0.155	0.089	<0.010	<0.010	<0.010
GW Depth (TOC), ft	9.41	10.07	10.11	10.65	9.32	10.54	10.63	11.74
GW Elv, ft	445.26	444.60	444.56	444.02		444.13	444.04	442.93
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0010	<0.0010	0.0037	0.0077	<0.0010	<0.0010	0.0245	0.0022
Ni, diss, mg/L	0.0003	0.0009	0.0002	0.0002	<0.0003	0.0016	<0.0003	0.0004
NO3, diss, mg/L	0.485	0.336	0.338	0.600	0.878	0.263	0.507	0.539
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.06	6.87	6.58	6.77	6.93	6.71	6.59	6.80
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0014	0.0020	0.0014	0.0015	0.0013	0.0011	0.0011	<0.0005
SO4, diss, mg/L	13.5	15.5	12.8	14.9	14.8	10.5	11.6	9.9
Spec. Cond. (field), micromho	310	253	326	370	279	207	323	230
TDS, mg/L	94	216	200	216	100	202	140	182
Temp (Fahrenheit), degrees F	50.3	55.3	70.0	64.6	50.4	63.1	71.1	66.4
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW12

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
B, diss, mg/L	0.1400	0.1500	0.1500	0.1500	0.1600	0.1400	0.1500	0.1400
Ba, diss, mg/L	0.013	0.014	0.015	0.016	0.016	0.016	0.016	0.018
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	4.8	2.3	2.0	11.3	13.4	1.6	2.3	6.6
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0003	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	<0.010	0.036	0.317	0.142	0.084	<0.010	<0.010	0.031
GW Depth (TOC), ft	12.20	12.26	12.34	12.80	11.64	12.62	12.80	13.65
GW Elv, ft	444.54	444.48	444.40	443.94		444.12	443.94	443.09
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0238	0.0590	0.0590	0.0799	0.0495	0.0914	0.1370	0.2100
Ni, diss, mg/L	0.0004	0.0014	0.0003	0.0002	0.0005	0.0008	0.0009	0.0021
NO3, diss, mg/L	1.160	1.080	1.360	1.210	1.110	1.760	1.900	1.190
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.06	6.92	7.00	6.94	6.97	6.86	6.85	7.09
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0022	0.0017	0.0023	0.0021	0.0040	0.0017	0.0014	0.0012
SO4, diss, mg/L	87.3	82.6	68.1	59.3	81.2	59.5	53.5	43.7
Spec. Cond. (field), micromho	907	794	834	937	840	723	826	690
TDS, mg/L	406	458	484	434	466	754	446	500
Temp (Fahrenheit), degrees F	57.2	55.3	65.0	59.9	54.4	62.1	70.6	65.0
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW22D

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0021	0.0020	0.0020	0.0031	0.0029	0.0014	0.0018	0.0029
B, diss, mg/L	6.4300	6.8500	6.2200	5.8300	6.5100	6.4500	5.0200	5.8100
Ba, diss, mg/L	0.023	0.027	0.029	0.029	0.024	0.023	0.025	0.025
Be, diss, mg/L	0.0020	0.0023	0.0027	<0.0100	<0.0010	<0.0010	0.0030	0.0024
Cd, diss, mg/L	0.0016	0.0017	0.0019	0.0021	0.0017	0.0015	0.0022	0.0020
Cl, diss, mg/L	8.5	8.2	8.7	8.1	7.9	7.9	7.5	6.5
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	0.07	0.05	<0.01	<0.01
Co, diss, mg/L	0.074	0.079	0.113	0.109	0.077	0.080	0.106	0.112
Cr, diss, mg/L	<0.0010	0.0004	<0.0010	<0.0010	0.0004	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	0.0017	0.0024	0.0014	0.0014	0.0027	0.0027
F, diss, mg/L	0.5	0.5	0.8	0.6	0.6	0.4	0.7	0.6
Fe, diss, mg/L	127.000	99.000	144.000	158.000	112.000	108.000	222.000	153.000
GW Depth (TOC), ft	7.81	9.23	9.20	8.45	5.70	9.38	9.05	10.97
GW Elv, ft	443.55	442.13	442.16	442.91		441.98	442.31	440.39
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	11.0000	9.8200	14.3000	13.7000	8.8800	9.6100	16.9000	12.5000
Ni, diss, mg/L	0.0480	0.0491	0.0647	0.0671	0.0557	0.0552	0.0738	0.0700
NO3, diss, mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pb, diss, mg/L	0.006	0.011	0.010	0.016	0.011	0.006	0.011	0.007
pH (field), STD	5.14	5.16	5.05	4.84	5.03	4.94	4.99	5.22
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0100	<0.0050	<0.0050	<0.0050	<0.0025	<0.0005	<0.0050	<0.0050
SO4, diss, mg/L	1850.0	1560.0	1600.0	1630.0	1220.0	2050.0	1590.0	2120.0
Spec. Cond. (field), micromho	2620	2510	2630	2660	2580	1860	3030	2150
TDS, mg/L	2210	2290	2510	2400	2460	2330	2940	2340
Temp (Fahrenheit), degrees F	52.5	58.5	64.9	59.1	60.6	64.6	71.4	69.0
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	0.22	0.22	0.26	0.28	0.22	0.23	0.31	0.28

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW22S

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0005	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0074	0.0090	0.0061	0.0100	0.0089	0.0076	0.0042	0.0160
B, diss, mg/L	2.2400	2.4300	2.4300	2.4300	2.0900	2.2000	2.0800	3.1200
Ba, diss, mg/L	0.006	0.006	0.008	0.011	0.006	0.006	0.007	0.007
Be, diss, mg/L	0.0074	0.0092	0.0111	<0.0100	0.0093	0.0123	0.0100	<0.0100
Cd, diss, mg/L	0.0036	0.0048	0.0043	0.0041	0.0034	0.0042	0.0041	0.0067
Cl, diss, mg/L	10.9	8.0	8.9	10.6	14.6	6.9	7.0	6.3
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01
Co, diss, mg/L	0.114	0.117	0.123	0.122	0.133	0.144	0.119	0.117
Cr, diss, mg/L	0.0004	0.0006	0.0005	<0.0020	0.0006	0.0004	0.0005	0.0004
Cu, diss, mg/L	0.0122	0.0084	0.0114	0.0096	0.0075	0.0129	0.0119	0.0137
F, diss, mg/L	0.7	0.6	0.8	0.6	0.6	0.7	0.6	1.1
Fe, diss, mg/L	450.000	446.000	561.000	420.000	537.000	604.000	535.000	339.000
GW Depth (TOC), ft	7.24	9.06	9.01	8.04	8.02	9.26	8.75	10.76
GW Elv, ft	444.24	442.42	442.47	443.44		442.22	442.73	440.72
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	26.2000	24.1000	28.4000	24.6000	29.2000	28.5000	24.6000	15.9000
Ni, diss, mg/L	0.1190	0.1280	0.1450	0.1220	0.1240	0.1670	0.1450	0.1840
NO3, diss, mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pb, diss, mg/L	0.005	0.006	0.008	0.007	0.006	0.007	0.007	0.008
pH (field), STD	4.08	3.97	3.71	3.58	3.46	3.76	3.69	3.79
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0100	<0.0100	<0.0500	<0.0100	<0.0050	<0.0010	<0.0050	<0.0500
SO4, diss, mg/L	1580.0	2570.0	2880.0	2550.0	2350.0	3770.0	2330.0	<0.5
Spec. Cond. (field), micromho	4090	3730	3870	3550	3800	3020	3740	2890
TDS, mg/L	4210	4200	4380	3870	4110	4330	4160	3780
Temp (Fahrenheit), degrees F	52.3	57.2	69.5	61.8	57.7	67.5	73.0	70.6
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0005	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	0.003	<0.001	<0.002	<0.001	<0.005	<0.001	0.004
Zn, diss, mg/L	0.65	0.81	0.78	0.55	0.67	0.82	0.87	0.89

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW23D

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0012	0.0030	0.0025	0.0027	0.0012	0.0098	0.0023	0.0026
B, diss, mg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0600
Ba, diss, mg/L	0.043	0.049	0.048	0.042	0.051	0.045	0.048	0.047
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	4.9	4.1	4.7	4.6	4.2	3.7	4.1	7.1
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	0.06	0.05	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	0.0003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	0.076	0.248	0.557	0.445	0.123	<0.010	0.059	0.249
GW Depth (TOC), ft	3.78	5.62	6.14	4.85	5.90	6.38	6.08	7.38
GW Elv, ft	452.12	450.28	449.76	451.05		449.52	449.82	448.52
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.1160	0.1250	0.1340	0.1100	0.1070	0.1180	0.1150	0.1240
Ni, diss, mg/L	<0.0003	0.0002	0.0003	<0.0003	0.0002	0.0003	0.0016	0.0005
NO3, diss, mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.34	7.31	7.30	7.34	7.44	7.01	4.83	7.16
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
SO4, diss, mg/L	24.1	25.8	26.8	22.2	21.2	51.0	22.0	20.7
Spec. Cond. (field), micromho	524	492	506	482	495	430	465	442
TDS, mg/L	218	272	282	266	264	350	202	406
Temp (Fahrenheit), degrees F	52.3	58.2	64.5	60.0	58.9	63.1	82.5	67.5
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Hutsonville Ash Impoundment
Analysis Results by Date (column) and Parameter (row)

Date Range: 01/01/2021 to 12/31/2022
Well: MW23S

	3/1/2021	4/26/2021	9/1/2021	11/1/2021	3/21/2022	6/20/2022	8/8/2022	10/24/2022
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
B, diss, mg/L	0.1500	0.1500	0.1700	0.1800	0.1400	0.1600	0.1600	0.1800
Ba, diss, mg/L	0.034	0.042	0.040	0.037	0.039	0.032	0.040	0.037
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	3.5	1.6	1.9	4.2	9.3	1.3	1.9	1.2
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01
Co, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0003	<0.0010	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
F, diss, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	<0.010	0.036	0.285	0.056	0.105	<0.010	<0.010	<0.010
GW Depth (TOC), ft	3.58	5.59	6.12	4.68	5.60	6.35	6.02	7.41
GW Elv, ft	452.45	450.44	449.91	451.35		449.68	450.01	448.62
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0020	<0.0010	0.0194	0.0055	0.0025	0.0111	<0.0010	0.0035
Ni, diss, mg/L	0.0002	0.0003	0.0002	<0.0003	0.0002	0.0004	0.0005	0.0003
NO3, diss, mg/L	0.262	0.269	<0.100	0.248	<0.100	<0.100	<0.100	<0.100
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.06	6.81	6.79	6.98	6.99	6.76	6.87	6.96
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
SO4, diss, mg/L	13.2	14.5	13.4	11.5	10.7	9.5	11.6	9.2
Spec. Cond. (field), micromho	533	444	422	479	488	310	388	349
TDS, mg/L	188	190	288	1130	194	444	200	266
Temp (Fahrenheit), degrees F	51.7	57.9	66.9	61.2	55.5	63.0	69.5	69.5
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
V, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

APPENDIX B
SITE INSPECTION REPORTS

Hutsonville Power Station
Ash Pond A Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	03/17/2022
Inspector	MRK and LAM
Temperature	65 °F
Weather	Mostly Sunny

	Item	Condition Code *	Comments
Pond Cap	**Vent Pipes**	GC	Vent holes clear of pipes inspected, no weed overgrowth inside cement vent barriers.
	Drainage Berms	GC	No excessive standing water; no eroded or scoured drainage channels.
	Vegetation	GC	No vegetation overgrowth; no bare patches in excess of 100 sq. ft.
	Erosion on Cap	GC	No erosion or gullies 6 inches or deeper on cap.
	Liner	GC	No exposed liner; no visual indication of rips, tears, punctures, or other damage to liner.
	Water Control Features (berms, vegetated flumes, etc.)	GC	Small amount of dead vegetation in drainage channels but does not affect drainage.
	Other		
Embankment	**Vegetation**	GC	No overgrowth or bare patches on embankments
	Liner	GC	No exposure
	Erosion	GC	No erosion or gullies 6 inches or deeper on embankments or toe.
	Fencing	GC	Fending around site perimeter is secure.
	Drainage Channels (rip-rap, paved flumes, etc.)	GC	No overgrowth; rip-rap good condition.
	Other		
Groundwater Collection Trench and Discharge System	**Control Panels**	GC	Exterior of panels in good condition.
	Drainage Sumps / Manholes	GC	Lids are secure.
	Pumps	NI	Not in service.
	Groundwater Monitoring Wells	GC	Accessible; no excessive weed growth; no flooding.
	Flow Meter Totalizer	NI	Not in service.
	Diver-Mate Data Collector (data download)	NI	Not in service.
	Other		

Condition Codes

IM = Item needing Immediate Maintenance. Remediation should be completed within 1 month.
MM = Item needing Minor Maintenance and/or repairs within the year.
OB = Condition requires regular observation to ensure that the condition does not become worse.
GC = Good Condition. Working properly.
NE = No Evidence of a problem.
NI = Not Inspected. Reason should be stated in comment

Hutsonville Power Station – Ash Pond A

NE view

NW view

SW view

SE view

Outfall 003 drainage channel and embankment

South embankment

Hutsonville Power Station
Ash Pond A Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	05/13/2022
Inspector	LAM
Temperature	70 °F
Weather	Sunny

	Item	Condition Code *	Comments
Pond Cap	**Vent Pipes**	**GC**	Vent holes clear of pipes inspected, no weed overgrowth inside cement vent barriers.
	Drainage Berms	**GC**	No excessive standing water; no eroded or scoured drainage channels.
	Vegetation	**GC**	No excessive vegetation overgrowth; no bare patches in excess of 100 sq. ft. Mowing by Blankenship scheduled for June 16th.
	Erosion on Cap	**GC**	No erosion or gullies 6 inches or deeper on cap.
	Liner	**GC**	No exposed liner; no visual indication of rips, tears, punctures, or other damage to liner.
	Water Control Features (berms, vegetated flumes, etc.)	**GC**	Small amount of dead vegetation in drainage channels but does not affect drainage.
	Other		
Embankment	**Vegetation**	**GC**	No overgrowth or bare patches on embankments
	Liner	**GC**	No exposure
	Erosion	**GC**	No erosion or gullies 6 inches or deeper on embankments or toe.
	Fencing	**GC**	Fending around site perimeter is secure.
	Drainage Channels (rip-rap, paved flumes, etc.)	**GC**	No overgrowth; rip-rap good condition.
	Other		
Groundwater Collection Trench and Discharge System	**Control Panels**	**GC**	Exterior of panels in good condition.
	Drainage Sumps / Manholes	**GC**	Lids are secure.
	Pumps	**NI**	Not in service.
	Groundwater Monitoring Wells	**GC**	Accessible; no excessive weed growth; no flooding.
	Flow Meter Totalizer	**NI**	Not in service.
	Diver-Mate Data Collector (data download)	**NI**	Not in service.
	Other		

Condition Codes

IM = Item needing Immediate Maintenance. Remediation should be completed within 1 month.
MM = Item needing Minor Maintenance and/or repairs within the year.
OB = Condition requires regular observation to ensure that the condition does not become worse.
GC = Good Condition. Working properly.
NE = No Evidence of a problem.
NI = Not Inspected. Reason should be stated in comment

Hutsonville Power Station – Ash Pond A

East berm (facing N)

East berm and northeast letdown rip-rap (facing S)

North berm (facing SW)

West berm (facing S)

SW riprap (facing W)

Upper portion of SW riprap and CAP top (facing NE)

South berm (both facing E)

Cap Top (facing E)

Cap Top (facing NE)

Cap Top (facing SE)

Hutsonville Power Station
Ash Pond A Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	08/25/2022
Inspector	LAM
Temperature	82 °F
Weather	Sunny

	Item	Condition Code *	Comments
Pond Cap	**Vent Pipes**	**GC**	Vent holes clear of pipes inspected, no weed overgrowth inside cement vent barriers.
	Drainage Berms	**GC**	No excessive standing water; no eroded or scoured drainage channels.
	Vegetation	**GC**	No excessive vegetation overgrowth; no bare patches in excess of 100 sq. ft. Last mowing was 6/16/22. Mowing scheduled for week of 8/29/22.
	Erosion on Cap	**GC**	No erosion or gullies 6 inches or deeper on cap.
	Liner	**GC**	No exposed liner; no visual indication of rips, tears, punctures, or other damage to liner.
	Water Control Features (berms, vegetated flumes, etc.)	**GC**	Small amount of dead vegetation in drainage channels but does not affect drainage.
	Other		
Embankment	**Vegetation**	**GC**	No overgrowth or bare patches on embankments.
	Liner	**GC**	No exposure
	Erosion	**GC**	No erosion or gullies 6 inches or deeper on embankments or toe.
	Fencing	**GC**	Fending around site perimeter is secure.
	Drainage Channels (rip-rap, paved flumes, etc.)	**GC**	No overgrowth; rip-rap good condition.
	Other		
Groundwater Collection Trench and Discharge System	**Control Panels**	**GC**	Exterior of panels in good condition.
	Drainage Sumps / Manholes	**GC**	Lids are secure.
	Pumps	**IM**	Pumps DS-1 and DS-2 failed, Replacement scheduled for October 2022.
	Groundwater Monitoring Wells	**GC**	Accessible; no excessive weed growth; no flooding.
	Flow Meter Totalizer	**NI**	Not in service.
	Diver-Mate Data Collector (data download)	**NI**	Not in service.
	Other		

Condition Codes

IM = Item needing Immediate Maintenance. Remediation should be completed within 1 month.
MM = Item needing Minor Maintenance and/or repairs within the year.
OB = Condition requires regular observation to ensure that the condition does not become worse.
GC = Good Condition. Working properly.
NE = No Evidence of a problem.
NI = Not Inspected. Reason should be stated in comment

Hutsonville Power Station – Ash Pond A

North letdown (facing SW)

East embankment (facing S)

North embankment (facing SW)

North cap, lower tier (facing SW)

Southwest letdown (facing NE)

South embankment (both facing E)

South Embankment (facing W)

East Embankment (facing N)

Cap Top (facing NW)

Cap Top (facing SW)

Cap Top (facing S)

Hutsonville Power Station
Ash Pond A Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	11/22/2022
Inspector	LAM
Temperature	60 °F
Weather	Sunny

	Item	Condition Code *	Comments
Pond Cap	**Vent Pipes**	**GC**	Vent holes clear of pipes inspected, no weed overgrowth inside cement vent barriers.
	Drainage Berms	**GC**	No excessive standing water; no eroded or scoured drainage channels.
	Vegetation	**GC**	No excessive vegetation overgrowth; no bare patches in excess of 100 sq. ft. Last mowing was 8/29/22.
	Erosion on Cap	**GC**	No erosion or gullies 6 inches or deeper on cap.
	Liner	**GC**	No exposed liner; no visual indication of rips, tears, punctures, or other damage to liner.
	Water Control Features (berms, vegetated flumes, etc.)	**GC**	Small amount of dead vegetation in drainage channels but does not affect drainage.
	Other		
Embankment	**Vegetation**	**GC**	No overgrowth or bare patches on embankments.
	Liner	**GC**	No exposure
	Erosion	**GC**	No erosion or gullies 6 inches or deeper on embankments or toe.
	Fencing	**GC**	Fending around site perimeter is secure.
	Drainage Channels (rip-rap, paved flumes, etc.)	**GC**	No overgrowth; rip-rap good condition. Last herbicide application was 9/21/22.
	Other		
Groundwater Collection Trench and Discharge System	**Control Panels**	**GC**	Exterior of panels in good condition.
	Drainage Sumps / Manholes	**GC**	Lids are secure.
	Pumps	**GC**	Pumps replaced Oct 3, 2022.
	Groundwater Monitoring Wells	**GC**	Accessible; no excessive weed growth; no flooding.
	Flow Meter Totalizer	**GC**	Operational.
	Diver-Mate Data Collector (data download)	**GC**	Operational.
	Other		

Condition Codes

IM = Item needing Immediate Maintenance. Remediation should be completed within 1 month.
MM = Item needing Minor Maintenance and/or repairs within the year.
OB = Condition requires regular observation to ensure that the condition does not become worse.
GC = Good Condition. Working properly.
NE = No Evidence of a problem.
NI = Not Inspected. Reason should be stated in comment

Hutsonville Power Station – Ash Pond A

North letdown (facing SW)

East embankment (facing S)

North embankment (facing SW)

Southwest letdown (facing NE)

South embankment (both facing E)

Cap Top (facing N)

Cap Top (facing S)

Cap Top (facing E)

Cap Top (facing W)

APPENDIX C
STATISTICAL OUTPUT

APPENDIX C1
OUTLIER TEST

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Antimony, dissolved, mg/L
Location: MW12

Mean of all data: 0.00170
Standard Deviation of all data: 0.00174
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 4.77
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/18/2017	<0.0100	True		1

Antimony, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00200
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Antimony, dissolved, mg/L
Location: MW22S

Mean of all data: 0.00209
Standard Deviation of all data: 0.000417
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<0.00400	True		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Antimony, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00200
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Antimony, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00200
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Antimony, dissolved, mg/L
Location: MW2D

Mean of all data: 0.00200
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Antimony, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00217
Standard Deviation of all data: 0.00309
Largest Observation Concentration of all data: Xn = 0.0180
Test Statistic, high extreme of all data: Tn = 5.13
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0180	False		1

Antimony, dissolved, mg/L
Location: MW3

Mean of all data: 0.00186
Standard Deviation of all data: 0.00225
Largest Observation Concentration of all data: Xn = 0.00900
Test Statistic, high extreme of all data: Tn = 3.18
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00900	False		1

Antimony, dissolved, mg/L
Location: MW3D

Mean of all data: 0.00144
Standard Deviation of all data: 0.000894
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 0.625
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Antimony, dissolved, mg/L
Location: MW4

Mean of all data: 0.00156
Standard Deviation of all data: 0.00108
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.19
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00500	False		1

Antimony, dissolved, mg/L
Location: MW5

Mean of all data: 0.00142
Standard Deviation of all data: 0.000967
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 1.64
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Arsenic, dissolved, mg/L
Location: MW12

Mean of all data: 0.000192
Standard Deviation of all data: 0.000134
Largest Observation Concentration of all data: Xn = 0.000600
Test Statistic, high extreme of all data: Tn = 3.04
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2017	0.000600	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Arsenic, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00183
Standard Deviation of all data: 0.00150
Largest Observation Concentration of all data: Xn = 0.00650
Test Statistic, high extreme of all data: Tn = 3.11
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	0.00650	False		1

Arsenic, dissolved, mg/L
Location: MW22S

Mean of all data: 0.00644
Standard Deviation of all data: 0.00343
Largest Observation Concentration of all data: Xn = 0.0160
Test Statistic, high extreme of all data: Tn = 2.79
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/24/2022	0.0160	False		1

Arsenic, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00293
Standard Deviation of all data: 0.00181
Largest Observation Concentration of all data: Xn = 0.00980
Test Statistic, high extreme of all data: Tn = 3.80
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/20/2022	0.00980	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Arsenic, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000676
Standard Deviation of all data: 0.00195
Largest Observation Concentration of all data: Xn = 0.00920
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00920	False		1

Arsenic, dissolved, mg/L
Location: MW2D

Mean of all data: 0.00722
Standard Deviation of all data: 0.00250
Largest Observation Concentration of all data: Xn = 0.0138
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/17/2019	0.0138	False		1

Arsenic, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000353
Standard Deviation of all data: 0.000707
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 5.16
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/21/2014	0.00400	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Arsenic, dissolved, mg/L
Location: MW3

Mean of all data: 0.000214
Standard Deviation of all data: 0.000257
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 3.06
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00100	False		1

Arsenic, dissolved, mg/L
Location: MW3D

Mean of all data: 0.00151
Standard Deviation of all data: 0.00223
Largest Observation Concentration of all data: Xn = 0.0112
Test Statistic, high extreme of all data: Tn = 4.34
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	0.0112	False		1

Arsenic, dissolved, mg/L
Location: MW4

Mean of all data: 0.000271
Standard Deviation of all data: 0.000498
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 5.48
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/21/2014	0.00300	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Arsenic, dissolved, mg/L
Location: MW5

Mean of all data: 0.000228
Standard Deviation of all data: 0.000329
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 5.38
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/21/2014	0.00200	False		1

Barium, dissolved, mg/L
Location: MW12

Mean of all data: 0.0181
Standard Deviation of all data: 0.00379
Largest Observation Concentration of all data: Xn = 0.0260
Test Statistic, high extreme of all data: Tn = 2.09
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.0263
Standard Deviation of all data: 0.00789
Largest Observation Concentration of all data: Xn = 0.0490
Test Statistic, high extreme of all data: Tn = 2.88
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.0490	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L
Location: MW22S

Mean of all data: 0.0107
Standard Deviation of all data: 0.00914
Largest Observation Concentration of all data: Xn = 0.0420
Test Statistic, high extreme of all data: Tn = 3.42
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.0420	False		1

Barium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.0444
Standard Deviation of all data: 0.00610
Largest Observation Concentration of all data: Xn = 0.0560
Test Statistic, high extreme of all data: Tn = 1.90
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.0345
Standard Deviation of all data: 0.00855
Largest Observation Concentration of all data: Xn = 0.0490
Test Statistic, high extreme of all data: Tn = 1.70
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00900	False	-1	

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Barium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.0723
Standard Deviation of all data: 0.0140
Largest Observation Concentration of all data: Xn = 0.103
Test Statistic, high extreme of all data: Tn = 2.20
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.0341
Standard Deviation of all data: 0.00604
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW3

Mean of all data: 0.00743
Standard Deviation of all data: 0.00440
Largest Observation Concentration of all data: Xn = 0.0150
Test Statistic, high extreme of all data: Tn = 1.72
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Barium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.0131
Standard Deviation of all data: 0.00381
Largest Observation Concentration of all data: Xn = 0.0210
Test Statistic, high extreme of all data: Tn = 2.07
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW4

Mean of all data: 0.0193
Standard Deviation of all data: 0.00390
Largest Observation Concentration of all data: Xn = 0.0270
Test Statistic, high extreme of all data: Tn = 1.97
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW5

Mean of all data: 0.0297
Standard Deviation of all data: 0.0143
Largest Observation Concentration of all data: Xn = 0.0710
Test Statistic, high extreme of all data: Tn = 2.88
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/21/2016	0.0710	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Beryllium, dissolved, mg/L
Location: MW12

Mean of all data: 0.000970
Standard Deviation of all data: 0.00113
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.56
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<0.00500	True		1

Beryllium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00240
Standard Deviation of all data: 0.00234
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 3.25
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<0.0100	True		1

Beryllium, dissolved, mg/L
Location: MW22S

Mean of all data: 0.00751
Standard Deviation of all data: 0.00280
Largest Observation Concentration of all data: Xn = 0.0123
Test Statistic, high extreme of all data: Tn = 1.71
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Beryllium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00100
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00134
Standard Deviation of all data: 0.00157
Largest Observation Concentration of all data: Xn = 0.00820
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00820	False		1

Beryllium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.00117
Standard Deviation of all data: 0.000834
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<0.00500	True		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Beryllium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000767
Standard Deviation of all data: 0.000430
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.542
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L
Location: MW3

Mean of all data: 0.000571
Standard Deviation of all data: 0.000514
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.835
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000738
Standard Deviation of all data: 0.000519
Largest Observation Concentration of all data: Xn = 0.00210
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Beryllium, dissolved, mg/L
Location: MW4

Mean of all data: 0.000706
Standard Deviation of all data: 0.000462
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.636
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L
Location: MW5

Mean of all data: 0.000667
Standard Deviation of all data: 0.000478
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.697
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW12

Mean of all data: 0.182
Standard Deviation of all data: 0.0734
Largest Observation Concentration of all data: Xn = 0.460
Test Statistic, high extreme of all data: Tn = 3.79
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/28/2018	0.460	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Boron, dissolved, mg/L
Location: MW22D

Mean of all data: 6.67
Standard Deviation of all data: 2.19
Largest Observation Concentration of all data: Xn = 9.43
Test Statistic, high extreme of all data: Tn = 1.26
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.0500	False	-1	

Boron, dissolved, mg/L
Location: MW22S

Mean of all data: 4.09
Standard Deviation of all data: 5.85
Largest Observation Concentration of all data: Xn = 29.9
Test Statistic, high extreme of all data: Tn = 4.41
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/28/2018	29.9	False		1

Boron, dissolved, mg/L
Location: MW23D

Mean of all data: 0.426
Standard Deviation of all data: 1.74
Largest Observation Concentration of all data: Xn = 8.02
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	8.02	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Boron, dissolved, mg/L
Location: MW23S

Mean of all data: 0.409
Standard Deviation of all data: 1.11
Largest Observation Concentration of all data: Xn = 5.24
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	5.24	False		1

Boron, dissolved, mg/L
Location: MW2D

Mean of all data: 0.159
Standard Deviation of all data: 0.169
Largest Observation Concentration of all data: Xn = 0.570
Test Statistic, high extreme of all data: Tn = 2.43
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW2R

Mean of all data: 1.84
Standard Deviation of all data: 0.738
Largest Observation Concentration of all data: Xn = 3.55
Test Statistic, high extreme of all data: Tn = 2.31
T Critical of all data: Tcr = 3.03

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Boron, dissolved, mg/L
Location: MW3

Mean of all data: 3.03
Standard Deviation of all data: 1.95
Largest Observation Concentration of all data: Xn = 7.78
Test Statistic, high extreme of all data: Tn = 2.43
T Critical of all data: Tcr = 3.00

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW3D

Mean of all data: 3.48
Standard Deviation of all data: 1.16
Largest Observation Concentration of all data: Xn = 5.96
Test Statistic, high extreme of all data: Tn = 2.13
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW4

Mean of all data: 0.268
Standard Deviation of all data: 0.120
Largest Observation Concentration of all data: Xn = 0.831
Test Statistic, high extreme of all data: Tn = 4.69
T Critical of all data: Tcr = 3.13

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/11/2012	0.831	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Boron, dissolved, mg/L
Location: MW5

Mean of all data: 0.212
Standard Deviation of all data: 0.131
Largest Observation Concentration of all data: Xn = 0.710
Test Statistic, high extreme of all data: Tn = 3.80
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/06/2011	0.710	False		1

Cadmium, dissolved, mg/L
Location: MW12

Mean of all data: 0.000212
Standard Deviation of all data: 0.000218
Largest Observation Concentration of all data: Xn = 0.00125
Test Statistic, high extreme of all data: Tn = 4.77
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/18/2017	<0.00125	True		1

Cadmium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00176
Standard Deviation of all data: 0.000958
Largest Observation Concentration of all data: Xn = 0.00450
Test Statistic, high extreme of all data: Tn = 2.86
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/18/2017	0.00450	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cadmium, dissolved, mg/L
Location: MW22S

Mean of all data: 0.00351
Standard Deviation of all data: 0.00122
Largest Observation Concentration of all data: Xn = 0.00670
Test Statistic, high extreme of all data: Tn = 2.62
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	<0.000250	True	-1	

Cadmium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000314
Standard Deviation of all data: 0.000295
Largest Observation Concentration of all data: Xn = 0.00160
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00160	False		1

Cadmium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000481
Standard Deviation of all data: 0.00106
Largest Observation Concentration of all data: Xn = 0.00510
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00510	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cadmium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000192
Standard Deviation of all data: 0.000108
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.542
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW3

Mean of all data: 0.000143
Standard Deviation of all data: 0.000128
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.835
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Cadmium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.00294
Standard Deviation of all data: 0.00277
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 2.55
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW4

Mean of all data: 0.000176
Standard Deviation of all data: 0.000116
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.636
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW5

Mean of all data: 0.000167
Standard Deviation of all data: 0.000120
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.697
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Chloride, dissolved, mg/L
Location: MW12

Mean of all data: 4.50
Standard Deviation of all data: 3.12
Largest Observation Concentration of all data: Xn = 13.4
Test Statistic, high extreme of all data: Tn = 2.85
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	13.4	False		1

Chloride, dissolved, mg/L
Location: MW22D

Mean of all data: 8.01
Standard Deviation of all data: 1.48
Largest Observation Concentration of all data: Xn = 14.2
Test Statistic, high extreme of all data: Tn = 4.18
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	14.2	False		1

Chloride, dissolved, mg/L
Location: MW22S

Mean of all data: 8.77
Standard Deviation of all data: 3.82
Largest Observation Concentration of all data: Xn = 20.6
Test Statistic, high extreme of all data: Tn = 3.10
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	20.6	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Chloride, dissolved, mg/L
Location: MW23D

Mean of all data: 5.43
Standard Deviation of all data: 1.30
Largest Observation Concentration of all data: Xn = 9.70
Test Statistic, high extreme of all data: Tn = 3.28
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	9.70	False		1

Chloride, dissolved, mg/L
Location: MW23S

Mean of all data: 3.35
Standard Deviation of all data: 2.45
Largest Observation Concentration of all data: Xn = 10.1
Test Statistic, high extreme of all data: Tn = 2.75
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	10.1	False		1

Chloride, dissolved, mg/L
Location: MW2D

Mean of all data: 12.3
Standard Deviation of all data: 2.17
Largest Observation Concentration of all data: Xn = 19.5
Test Statistic, high extreme of all data: Tn = 3.32
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/20/2022	19.5	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Chloride, dissolved, mg/L
Location: MW2R

Mean of all data: 20.1
Standard Deviation of all data: 4.77
Largest Observation Concentration of all data: Xn = 32.1
Test Statistic, high extreme of all data: Tn = 2.51
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L
Location: MW3

Mean of all data: 6.60
Standard Deviation of all data: 6.14
Largest Observation Concentration of all data: Xn = 21.9
Test Statistic, high extreme of all data: Tn = 2.49
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/21/2014	21.9	False		1

Chloride, dissolved, mg/L
Location: MW3D

Mean of all data: 12.2
Standard Deviation of all data: 4.65
Largest Observation Concentration of all data: Xn = 21.8
Test Statistic, high extreme of all data: Tn = 2.07
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Chloride, dissolved, mg/L
Location: MW4

Mean of all data: 2.63
Standard Deviation of all data: 2.76
Largest Observation Concentration of all data: Xn = 12.4
Test Statistic, high extreme of all data: Tn = 3.54
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	12.4	False		1

Chloride, dissolved, mg/L
Location: MW5

Mean of all data: 3.64
Standard Deviation of all data: 3.14
Largest Observation Concentration of all data: Xn = 16.0
Test Statistic, high extreme of all data: Tn = 3.93
T Critical of all data: Tcr = 2.84

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	16.0	False		1

Chromium, dissolved, mg/L
Location: MW12

Mean of all data: 0.00102
Standard Deviation of all data: 0.00124
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 4.03
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/22/2014	0.00600	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Chromium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00124
Standard Deviation of all data: 0.00135
Largest Observation Concentration of all data: Xn = 0.00590
Test Statistic, high extreme of all data: Tn = 3.46
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	0.00590	False		1

Chromium, dissolved, mg/L
Location: MW22S

Mean of all data: 0.000887
Standard Deviation of all data: 0.000788
Largest Observation Concentration of all data: Xn = 0.00410
Test Statistic, high extreme of all data: Tn = 4.08
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	0.00410	False		1

Chromium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000967
Standard Deviation of all data: 0.000153
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.218
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/01/2021	0.000300	False	-1	

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Chromium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000933
Standard Deviation of all data: 0.000211
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.317
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	0.000300	False	-1	

Chromium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000970
Standard Deviation of all data: 0.000146
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.209
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	0.000300	False	-1	

Chromium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00132
Standard Deviation of all data: 0.00250
Largest Observation Concentration of all data: Xn = 0.0140
Test Statistic, high extreme of all data: Tn = 5.08
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0140	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L
Location: MW3

Mean of all data: 0.00211
Standard Deviation of all data: 0.00388
Largest Observation Concentration of all data: Xn = 0.0140
Test Statistic, high extreme of all data: Tn = 3.06
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0140	False		1

Chromium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000753
Standard Deviation of all data: 0.000601
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 3.74
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/19/2015	0.00300	False		1

Chromium, dissolved, mg/L
Location: MW4

Mean of all data: 0.00129
Standard Deviation of all data: 0.00264
Largest Observation Concentration of all data: Xn = 0.0140
Test Statistic, high extreme of all data: Tn = 4.82
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0140	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Chromium, dissolved, mg/L
Location: MW5

Mean of all data: 0.000783
Standard Deviation of all data: 0.00121
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 5.12
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00700	False		1

Cobalt, dissolved, mg/L
Location: MW12

Mean of all data: 0.000727
Standard Deviation of all data: 0.000452
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.603
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW22D

Mean of all data: 0.0843
Standard Deviation of all data: 0.0244
Largest Observation Concentration of all data: Xn = 0.113
Test Statistic, high extreme of all data: Tn = 1.18
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	<0.00100	True	-1	

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cobalt, dissolved, mg/L
Location: MW22S

Mean of all data: 0.110
Standard Deviation of all data: 0.0319
Largest Observation Concentration of all data: Xn = 0.180
Test Statistic, high extreme of all data: Tn = 2.19
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	<0.00100	True	-1	

Cobalt, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00652
Standard Deviation of all data: 0.0227
Largest Observation Concentration of all data: Xn = 0.105
Test Statistic, high extreme of all data: Tn = 4.34
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.105	False		1

Cobalt, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00529
Standard Deviation of all data: 0.0196
Largest Observation Concentration of all data: Xn = 0.0910
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.0910	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Cobalt, dissolved, mg/L
Location: MW2D

Mean of all data: 0.00100
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000767
Standard Deviation of all data: 0.000430
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.542
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW3

Mean of all data: 0.00121
Standard Deviation of all data: 0.00142
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 3.36
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/20/2015	0.00600	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cobalt, dissolved, mg/L
Location: MW3D

Mean of all data: 0.0969
Standard Deviation of all data: 0.0832
Largest Observation Concentration of all data: Xn = 0.332
Test Statistic, high extreme of all data: Tn = 2.83
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/12/2018	0.332	False		1

Cobalt, dissolved, mg/L
Location: MW4

Mean of all data: 0.000706
Standard Deviation of all data: 0.000462
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.636
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW5

Mean of all data: 0.000667
Standard Deviation of all data: 0.000478
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.697
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Copper, dissolved, mg/L
Location: MW12

Mean of all data: 0.000500
Standard Deviation of all data: 0.000395
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 3.79
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/20/2015	0.00200	False		1

Copper, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00247
Standard Deviation of all data: 0.00572
Largest Observation Concentration of all data: Xn = 0.0273
Test Statistic, high extreme of all data: Tn = 4.34
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	0.0273	False		1

Copper, dissolved, mg/L
Location: MW22S

Mean of all data: 0.00804
Standard Deviation of all data: 0.00408
Largest Observation Concentration of all data: Xn = 0.0137
Test Statistic, high extreme of all data: Tn = 1.39
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Copper, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000500
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000500
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Copper, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00113
Standard Deviation of all data: 0.00200
Largest Observation Concentration of all data: Xn = 0.00780
Test Statistic, high extreme of all data: Tn = 3.34
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00780	False		1

Copper, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000500
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000500
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Copper, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000583
Standard Deviation of all data: 0.000437
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 3.24
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00200	False		1

Copper, dissolved, mg/L
Location: MW3

Mean of all data: 0.00308
Standard Deviation of all data: 0.00468
Largest Observation Concentration of all data: Xn = 0.0170
Test Statistic, high extreme of all data: Tn = 2.97
T Critical of all data: Tcr = 2.50

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/28/1994	0.0170	False		1

Copper, dissolved, mg/L
Location: MW3D

Mean of all data: 0.00116
Standard Deviation of all data: 0.00230
Largest Observation Concentration of all data: Xn = 0.0130
Test Statistic, high extreme of all data: Tn = 5.14
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/07/2016	0.0130	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Copper, dissolved, mg/L
Location: MW4

Mean of all data: 0.00593
Standard Deviation of all data: 0.0315
Largest Observation Concentration of all data: Xn = 0.200
Test Statistic, high extreme of all data: Tn = 6.16
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/27/1991	0.200	False		1

Copper, dissolved, mg/L
Location: MW5

Mean of all data: 0.000638
Standard Deviation of all data: 0.00117
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 5.43
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/28/1994	0.00700	False		1

Cyanide, total, mg/L
Location: MW12

Mean of all data: 0.00864
Standard Deviation of all data: 0.0152
Largest Observation Concentration of all data: Xn = 0.0900
Test Statistic, high extreme of all data: Tn = 5.35
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	0.0900	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cyanide, total, mg/L
Location: MW22D

Mean of all data: 0.0148
Standard Deviation of all data: 0.0171
Largest Observation Concentration of all data: Xn = 0.0700
Test Statistic, high extreme of all data: Tn = 3.23
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	0.0700	False		1

Cyanide, total, mg/L
Location: MW22S

Mean of all data: 0.0107
Standard Deviation of all data: 0.0110
Largest Observation Concentration of all data: Xn = 0.0600
Test Statistic, high extreme of all data: Tn = 4.48
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	0.0600	False		1

Cyanide, total, mg/L
Location: MW23D

Mean of all data: 0.0131
Standard Deviation of all data: 0.0142
Largest Observation Concentration of all data: Xn = 0.0600
Test Statistic, high extreme of all data: Tn = 3.31
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	0.0600	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cyanide, total, mg/L
Location: MW23S

Mean of all data: 0.00976
Standard Deviation of all data: 0.00512
Largest Observation Concentration of all data: Xn = 0.0300
Test Statistic, high extreme of all data: Tn = 3.95
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/20/2022	0.0300	False		1

Cyanide, total, mg/L
Location: MW2D

Mean of all data: 0.00913
Standard Deviation of all data: 0.00325
Largest Observation Concentration of all data: Xn = 0.0200
Test Statistic, high extreme of all data: Tn = 3.34
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/28/2018	0.0200	False		1

Cyanide, total, mg/L
Location: MW2R

Mean of all data: 0.00717
Standard Deviation of all data: 0.00597
Largest Observation Concentration of all data: Xn = 0.0300
Test Statistic, high extreme of all data: Tn = 3.82
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/26/2020	0.0300	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cyanide, total, mg/L
Location: MW3

Mean of all data: 0.00429
Standard Deviation of all data: 0.00432
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.32
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW3D

Mean of all data: 0.00588
Standard Deviation of all data: 0.00435
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 0.947
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW4

Mean of all data: 0.00632
Standard Deviation of all data: 0.00449
Largest Observation Concentration of all data: Xn = 0.0150
Test Statistic, high extreme of all data: Tn = 1.93
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Cyanide, total, mg/L
Location: MW5

Mean of all data: 0.00794
Standard Deviation of all data: 0.0116
Largest Observation Concentration of all data: Xn = 0.0700
Test Statistic, high extreme of all data: Tn = 5.36
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/26/2016	0.0700	False		1

Fluoride, dissolved, mg/L
Location: MW12

Mean of all data: 0.111
Standard Deviation of all data: 0.0878
Largest Observation Concentration of all data: Xn = 0.454
Test Statistic, high extreme of all data: Tn = 3.91
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	0.454	False		1

Fluoride, dissolved, mg/L
Location: MW22D

Mean of all data: 0.425
Standard Deviation of all data: 0.239
Largest Observation Concentration of all data: Xn = 0.900
Test Statistic, high extreme of all data: Tn = 1.99
T Critical of all data: Tcr = 2.60

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Fluoride, dissolved, mg/L
Location: MW22S

Mean of all data: 0.608
Standard Deviation of all data: 0.219
Largest Observation Concentration of all data: Xn = 1.05
Test Statistic, high extreme of all data: Tn = 2.02
T Critical of all data: Tcr = 2.60

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW23D

Mean of all data: 0.135
Standard Deviation of all data: 0.118
Largest Observation Concentration of all data: Xn = 0.600
Test Statistic, high extreme of all data: Tn = 3.93
T Critical of all data: Tcr = 2.56

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.600	False		1

Fluoride, dissolved, mg/L
Location: MW23S

Mean of all data: 0.174
Standard Deviation of all data: 0.204
Largest Observation Concentration of all data: Xn = 0.900
Test Statistic, high extreme of all data: Tn = 3.56
T Critical of all data: Tcr = 2.56

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.900	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L
Location: MW2D

Mean of all data: 0.207
Standard Deviation of all data: 0.0833
Largest Observation Concentration of all data: Xn = 0.400
Test Statistic, high extreme of all data: Tn = 2.32
T Critical of all data: Tcr = 2.60

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW2R

Mean of all data: 0.799
Standard Deviation of all data: 3.85
Largest Observation Concentration of all data: Xn = 21.2
Test Statistic, high extreme of all data: Tn = 5.29
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	21.2	False		1

Fluoride, dissolved, mg/L
Location: MW3

Mean of all data: 0.252
Standard Deviation of all data: 0.253
Largest Observation Concentration of all data: Xn = 0.984
Test Statistic, high extreme of all data: Tn = 2.89
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/20/2015	0.984	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Fluoride, dissolved, mg/L
Location: MW3D

Mean of all data: 0.334
Standard Deviation of all data: 0.359
Largest Observation Concentration of all data: Xn = 1.30
Test Statistic, high extreme of all data: Tn = 2.69
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW4

Mean of all data: 0.211
Standard Deviation of all data: 0.107
Largest Observation Concentration of all data: Xn = 0.484
Test Statistic, high extreme of all data: Tn = 2.56
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW5

Mean of all data: 0.135
Standard Deviation of all data: 0.0901
Largest Observation Concentration of all data: Xn = 0.418
Test Statistic, high extreme of all data: Tn = 3.14
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	0.418	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Iron, dissolved, mg/L
Location: MW12

Mean of all data: 0.124
Standard Deviation of all data: 0.194
Largest Observation Concentration of all data: Xn = 0.710
Test Statistic, high extreme of all data: Tn = 3.02
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/19/2015	0.710	False		1

Iron, dissolved, mg/L
Location: MW22D

Mean of all data: 86.8
Standard Deviation of all data: 82.2
Largest Observation Concentration of all data: Xn = 354.
Test Statistic, high extreme of all data: Tn = 3.25
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	354.	False		1

Iron, dissolved, mg/L
Location: MW22S

Mean of all data: 350.
Standard Deviation of all data: 184.
Largest Observation Concentration of all data: Xn = 604.
Test Statistic, high extreme of all data: Tn = 1.38
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Iron, dissolved, mg/L
Location: MW23D

Mean of all data: 3.67
Standard Deviation of all data: 15.2
Largest Observation Concentration of all data: Xn = 70.0
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	70.0	False		1

Iron, dissolved, mg/L
Location: MW23S

Mean of all data: 9.77
Standard Deviation of all data: 44.5
Largest Observation Concentration of all data: Xn = 204.
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	204.	False		1

Iron, dissolved, mg/L
Location: MW2D

Mean of all data: 0.803
Standard Deviation of all data: 0.895
Largest Observation Concentration of all data: Xn = 3.56
Test Statistic, high extreme of all data: Tn = 3.08
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/17/2019	3.56	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Iron, dissolved, mg/L
Location: MW2R

Mean of all data: 0.135
Standard Deviation of all data: 0.169
Largest Observation Concentration of all data: Xn = 0.603
Test Statistic, high extreme of all data: Tn = 2.77
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/19/2015	0.603	False		1

Iron, dissolved, mg/L
Location: MW3

Mean of all data: 0.276
Standard Deviation of all data: 0.707
Largest Observation Concentration of all data: Xn = 2.89
Test Statistic, high extreme of all data: Tn = 3.70
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/19/2015	2.89	False		1

Iron, dissolved, mg/L
Location: MW3D

Mean of all data: 3.66
Standard Deviation of all data: 4.44
Largest Observation Concentration of all data: Xn = 15.0
Test Statistic, high extreme of all data: Tn = 2.55
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 — **LT Multiplier: x 0.50**
Confidence Level: 95% — **Number of Outliers: One Outlier**
Transform: None

Iron, dissolved, mg/L
Location: MW4

Mean of all data: 0.0902
Standard Deviation of all data: 0.149
Largest Observation Concentration of all data: Xn = 0.751
Test Statistic, high extreme of all data: Tn = 4.44
T Critical of all data: Tcr = 3.06

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/30/2012	0.751	False		1

Iron, dissolved, mg/L
Location: MW5

Mean of all data: 0.0748
Standard Deviation of all data: 0.138
Largest Observation Concentration of all data: Xn = 0.840
Test Statistic, high extreme of all data: Tn = 5.55
T Critical of all data: Tcr = 3.07

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/22/1991	0.840	False		1

Lead, dissolved, mg/L
Location: MW12

Mean of all data: 0.00112
Standard Deviation of all data: 0.00182
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 4.89
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.0100	True		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Lead, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00670
Standard Deviation of all data: 0.00411
Largest Observation Concentration of all data: Xn = 0.0160
Test Statistic, high extreme of all data: Tn = 2.27
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW22S

Mean of all data: 0.00578
Standard Deviation of all data: 0.00224
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.89
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00105
Standard Deviation of all data: 0.000218
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.00200	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None
LT Multiplier: x 0.50
Number of Outliers: One Outlier

Lead, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00171
Standard Deviation of all data: 0.00231
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 3.59
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.0100	True		1

Lead, dissolved, mg/L
Location: MW2D

Mean of all data: 0.00100
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000800
Standard Deviation of all data: 0.000407
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.492
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Lead, dissolved, mg/L
Location: MW3

Mean of all data: 0.000571
Standard Deviation of all data: 0.000514
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.835
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000706
Standard Deviation of all data: 0.000462
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.636
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW4

Mean of all data: 0.000706
Standard Deviation of all data: 0.000462
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.636
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Lead, dissolved, mg/L
Location: MW5

Mean of all data: 0.000667
Standard Deviation of all data: 0.000478
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.697
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L
Location: MW12

Mean of all data: 0.204
Standard Deviation of all data: 0.358
Largest Observation Concentration of all data: Xn = 1.66
Test Statistic, high extreme of all data: Tn = 4.07
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/28/2018	1.66	False		1

Manganese, dissolved, mg/L
Location: MW22D

Mean of all data: 8.88
Standard Deviation of all data: 4.58
Largest Observation Concentration of all data: Xn = 19.6
Test Statistic, high extreme of all data: Tn = 2.34
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Manganese, dissolved, mg/L
Location: MW22S

Mean of all data: 25.0
Standard Deviation of all data: 18.9
Largest Observation Concentration of all data: Xn = 106.
Test Statistic, high extreme of all data: Tn = 4.29
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	106.	False		1

Manganese, dissolved, mg/L
Location: MW23D

Mean of all data: 0.527
Standard Deviation of all data: 1.85
Largest Observation Concentration of all data: Xn = 8.60
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	8.60	False		1

Manganese, dissolved, mg/L
Location: MW23S

Mean of all data: 0.667
Standard Deviation of all data: 2.94
Largest Observation Concentration of all data: Xn = 13.5
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	13.5	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L
Location: MW2D

Mean of all data: 0.0739
Standard Deviation of all data: 0.0119
Largest Observation Concentration of all data: Xn = 0.0951
Test Statistic, high extreme of all data: Tn = 1.78
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00756
Standard Deviation of all data: 0.0122
Largest Observation Concentration of all data: Xn = 0.0534
Test Statistic, high extreme of all data: Tn = 3.77
T Critical of all data: Tcr = 3.03

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	0.0534	False		1

Manganese, dissolved, mg/L
Location: MW3

Mean of all data: 0.0693
Standard Deviation of all data: 0.130
Largest Observation Concentration of all data: Xn = 0.708
Test Statistic, high extreme of all data: Tn = 4.90
T Critical of all data: Tcr = 3.00

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/20/2015	0.708	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Manganese, dissolved, mg/L
Location: MW3D

Mean of all data: 10.9
Standard Deviation of all data: 9.37
Largest Observation Concentration of all data: Xn = 43.7
Test Statistic, high extreme of all data: Tn = 3.51
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2017	43.7	False		1

Manganese, dissolved, mg/L
Location: MW4

Mean of all data: 0.0307
Standard Deviation of all data: 0.153
Largest Observation Concentration of all data: Xn = 1.25
Test Statistic, high extreme of all data: Tn = 7.97
T Critical of all data: Tcr = 3.13

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/09/2012	1.25	False		1

Manganese, dissolved, mg/L
Location: MW5

Mean of all data: 0.00377
Standard Deviation of all data: 0.00725
Largest Observation Concentration of all data: Xn = 0.0380
Test Statistic, high extreme of all data: Tn = 4.72
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/27/2014	0.0380	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Mercury, dissolved, mg/L
Location: MW12

Mean of all data: 0.000112
Standard Deviation of all data: 0.000182
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 4.89
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.00100	True		1

Mercury, dissolved, mg/L
Location: MW22D

Mean of all data: 0.000100
Standard Deviation of all data: 0.00000000000219
Largest Observation Concentration of all data: Xn = 0.000100
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW22S

Mean of all data: 0.000143
Standard Deviation of all data: 0.000188
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 4.56
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.00100	True		1

Hutsonville Ash Impoundment

Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Mercury, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000100
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000100
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000143
Standard Deviation of all data: 0.000196
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.00100	True		1

Mercury, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000100
Standard Deviation of all data: 0.00000000000219
Largest Observation Concentration of all data: Xn = 0.000100
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Mercury, dissolved, mg/L
Location: MW2R

Mean of all data: 0.0000800
Standard Deviation of all data: 0.0000484
Largest Observation Concentration of all data: Xn = 0.000200
Test Statistic, high extreme of all data: Tn = 2.48
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW3

Mean of all data: 0.0000533
Standard Deviation of all data: 0.0000516
Largest Observation Concentration of all data: Xn = 0.000100
Test Statistic, high extreme of all data: Tn = 0.904
T Critical of all data: Tcr = 2.41

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW3D

Mean of all data: 0.0000735
Standard Deviation of all data: 0.0000511
Largest Observation Concentration of all data: Xn = 0.000200
Test Statistic, high extreme of all data: Tn = 2.47
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Mercury, dissolved, mg/L
Location: MW4

Mean of all data: 0.0000735
Standard Deviation of all data: 0.0000511
Largest Observation Concentration of all data: Xn = 0.000200
Test Statistic, high extreme of all data: Tn = 2.47
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW5

Mean of all data: 0.0000917
Standard Deviation of all data: 0.000146
Largest Observation Concentration of all data: Xn = 0.000900
Test Statistic, high extreme of all data: Tn = 5.53
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.000900	False		1

Nickel, dissolved, mg/L
Location: MW12

Mean of all data: 0.00222
Standard Deviation of all data: 0.00223
Largest Observation Concentration of all data: Xn = 0.00780
Test Statistic, high extreme of all data: Tn = 2.50
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Nickel, dissolved, mg/L
Location: MW22D

Mean of all data: 0.0504
Standard Deviation of all data: 0.0211
Largest Observation Concentration of all data: Xn = 0.105
Test Statistic, high extreme of all data: Tn = 2.58
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nickel, dissolved, mg/L
Location: MW22S

Mean of all data: 0.106
Standard Deviation of all data: 0.0385
Largest Observation Concentration of all data: Xn = 0.184
Test Statistic, high extreme of all data: Tn = 2.03
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.000300	False	-1	

Nickel, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00272
Standard Deviation of all data: 0.0101
Largest Observation Concentration of all data: Xn = 0.0465
Test Statistic, high extreme of all data: Tn = 4.35
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.0465	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Nickel, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00611
Standard Deviation of all data: 0.0259
Largest Observation Concentration of all data: Xn = 0.119
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.119	False		1

Nickel, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000315
Standard Deviation of all data: 0.000220
Largest Observation Concentration of all data: Xn = 0.00110
Test Statistic, high extreme of all data: Tn = 3.57
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/20/2022	0.00110	False		1

Nickel, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00135
Standard Deviation of all data: 0.00251
Largest Observation Concentration of all data: Xn = 0.0120
Test Statistic, high extreme of all data: Tn = 4.24
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/03/2014	0.0120	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Nickel, dissolved, mg/L
Location: MW3

Mean of all data: 0.00959
Standard Deviation of all data: 0.0116
Largest Observation Concentration of all data: Xn = 0.0300
Test Statistic, high extreme of all data: Tn = 1.76
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nickel, dissolved, mg/L
Location: MW3D

Mean of all data: 0.152
Standard Deviation of all data: 0.0902
Largest Observation Concentration of all data: Xn = 0.369
Test Statistic, high extreme of all data: Tn = 2.41
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nickel, dissolved, mg/L
Location: MW4

Mean of all data: 0.00201
Standard Deviation of all data: 0.00554
Largest Observation Concentration of all data: Xn = 0.0310
Test Statistic, high extreme of all data: Tn = 5.24
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/30/2012	0.0310	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Nickel, dissolved, mg/L
Location: MW5

Mean of all data: 0.00128
Standard Deviation of all data: 0.00188
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 3.57
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00800	False		1

Nitrate nitrogen, dissolved, mg/L
Location: MW12

Mean of all data: 1.42
Standard Deviation of all data: 0.598
Largest Observation Concentration of all data: Xn = 3.03
Test Statistic, high extreme of all data: Tn = 2.69
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nitrate nitrogen, dissolved, mg/L
Location: MW22D

Mean of all data: 0.117
Standard Deviation of all data: 0.0856
Largest Observation Concentration of all data: Xn = 0.450
Test Statistic, high extreme of all data: Tn = 3.89
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/12/2018	0.450	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Nitrate nitrogen, dissolved, mg/L
Location: MW22S

Mean of all data: 0.106
Standard Deviation of all data: 0.0674
Largest Observation Concentration of all data: Xn = 0.350
Test Statistic, high extreme of all data: Tn = 3.61
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/12/2018	0.350	False		1

Nitrate nitrogen, dissolved, mg/L
Location: MW23D

Mean of all data: 0.0833
Standard Deviation of all data: 0.0242
Largest Observation Concentration of all data: Xn = 0.100
Test Statistic, high extreme of all data: Tn = 0.690
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nitrate nitrogen, dissolved, mg/L
Location: MW23S

Mean of all data: 0.208
Standard Deviation of all data: 0.119
Largest Observation Concentration of all data: Xn = 0.450
Test Statistic, high extreme of all data: Tn = 2.03
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Nitrate nitrogen, dissolved, mg/L
Location: MW2D

Mean of all data: 0.0894
Standard Deviation of all data: 0.0360
Largest Observation Concentration of all data: Xn = 0.200
Test Statistic, high extreme of all data: Tn = 3.07
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/18/2017	0.200	False		1

Nitrate nitrogen, dissolved, mg/L
Location: MW2R

Mean of all data: 1.87
Standard Deviation of all data: 2.36
Largest Observation Concentration of all data: Xn = 12.7
Test Statistic, high extreme of all data: Tn = 4.58
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/18/2017	12.7	False		1

Nitrate nitrogen, dissolved, mg/L
Location: MW3

Mean of all data: 1.20
Standard Deviation of all data: 0.987
Largest Observation Concentration of all data: Xn = 3.88
Test Statistic, high extreme of all data: Tn = 2.72
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/07/2016	3.88	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Nitrate nitrogen, dissolved, mg/L
Location: MW3D

Mean of all data: 0.639
Standard Deviation of all data: 0.660
Largest Observation Concentration of all data: Xn = 2.56
Test Statistic, high extreme of all data: Tn = 2.91
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	2.56	False		1

Nitrate nitrogen, dissolved, mg/L
Location: MW4

Mean of all data: 1.51
Standard Deviation of all data: 1.79
Largest Observation Concentration of all data: Xn = 7.34
Test Statistic, high extreme of all data: Tn = 3.25
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/17/2019	7.34	False		1

Nitrate nitrogen, dissolved, mg/L
Location: MW5

Mean of all data: 1.21
Standard Deviation of all data: 1.29
Largest Observation Concentration of all data: Xn = 5.06
Test Statistic, high extreme of all data: Tn = 2.99
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	5.06	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

pH (field), STD
Location: MW12

Mean of all data: 6.96
Standard Deviation of all data: 0.32
Largest Observation Concentration of all data: Xn = 8.18
Test Statistic, high extreme of all data: Tn = 3.82
T Critical of all data: Tcr = 3.06

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/29/1999	8.18	False		1

pH (field), STD
Location: MW22D

Mean of all data: 5.22
Standard Deviation of all data: 0.60
Largest Observation Concentration of all data: Xn = 7.17
Test Statistic, high extreme of all data: Tn = 3.24
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	7.17	False		1

pH (field), STD
Location: MW22S

Mean of all data: 4.05
Standard Deviation of all data: 0.85
Largest Observation Concentration of all data: Xn = 6.99
Test Statistic, high extreme of all data: Tn = 3.47
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	6.99	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

pH (field), STD
Location: MW23D

Mean of all data: 7.10
Standard Deviation of all data: 0.70
Largest Observation Concentration of all data: Xn = 7.62
Test Statistic, high extreme of all data: Tn = 0.74
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/08/2022	4.83	False	-1	

pH (field), STD
Location: MW23S

Mean of all data: 6.81
Standard Deviation of all data: 0.72
Largest Observation Concentration of all data: Xn = 7.35
Test Statistic, high extreme of all data: Tn = 0.75
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	3.75	False	-1	

pH (field), STD
Location: MW2D

Mean of all data: 7.40
Standard Deviation of all data: 0.33
Largest Observation Concentration of all data: Xn = 7.68
Test Statistic, high extreme of all data: Tn = 0.85
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	6.01	False	-1	

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

pH (field), STD
Location: MW2R

Mean of all data: 7.40
Standard Deviation of all data: 0.29
Largest Observation Concentration of all data: Xn = 8.92
Test Statistic, high extreme of all data: Tn = 5.29
T Critical of all data: Tcr = 3.03

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/21/2022	8.92	False		1

pH (field), STD
Location: MW3

Mean of all data: 9.62
Standard Deviation of all data: 34.80
Largest Observation Concentration of all data: Xn = 440.00
Test Statistic, high extreme of all data: Tn = 12.37
T Critical of all data: Tcr = 3.54

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2010	440.00	False		1

pH (field), STD
Location: MW3D

Mean of all data: 6.04
Standard Deviation of all data: 0.57
Largest Observation Concentration of all data: Xn = 7.50
Test Statistic, high extreme of all data: Tn = 2.55
T Critical of all data: Tcr = 3.08

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

pH (field), STD
Location: MW4

Mean of all data: 9.09
Standard Deviation of all data: 24.38
Largest Observation Concentration of all data: Xn = 320.00
Test Statistic, high extreme of all data: Tn = 12.75
T Critical of all data: Tcr = 3.55

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/17/2010	320.00	False		1

pH (field), STD
Location: MW5

Mean of all data: 7.78
Standard Deviation of all data: 10.23
Largest Observation Concentration of all data: Xn = 150.00
Test Statistic, high extreme of all data: Tn = 13.90
T Critical of all data: Tcr = 3.56

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/17/2010	150.00	False		1

Selenium, dissolved, mg/L
Location: MW12

Mean of all data: 0.00257
Standard Deviation of all data: 0.00199
Largest Observation Concentration of all data: Xn = 0.0112
Test Statistic, high extreme of all data: Tn = 4.34
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/12/2018	0.0112	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Selenium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00733
Standard Deviation of all data: 0.0105
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 4.07
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	<0.0500	True		1

Selenium, dissolved, mg/L
Location: MW22S

Mean of all data: 0.0138
Standard Deviation of all data: 0.0159
Largest Observation Concentration of all data: Xn = 0.0504
Test Statistic, high extreme of all data: Tn = 2.31
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000714
Standard Deviation of all data: 0.000982
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	<0.00500	True		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Selenium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000714
Standard Deviation of all data: 0.000982
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	<0.00500	True		1

Selenium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000587
Standard Deviation of all data: 0.000417
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<0.00250	True		1

Selenium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00516
Standard Deviation of all data: 0.00323
Largest Observation Concentration of all data: Xn = 0.0156
Test Statistic, high extreme of all data: Tn = 3.23
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	0.0156	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Selenium, dissolved, mg/L
Location: MW3

Mean of all data: 0.0119
Standard Deviation of all data: 0.00875
Largest Observation Concentration of all data: Xn = 0.0365
Test Statistic, high extreme of all data: Tn = 2.81
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/07/2016	0.0365	False		1

Selenium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.00551
Standard Deviation of all data: 0.0116
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 3.85
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/01/2021	<0.0500	True		1

Selenium, dissolved, mg/L
Location: MW4

Mean of all data: 0.00247
Standard Deviation of all data: 0.00204
Largest Observation Concentration of all data: Xn = 0.00970
Test Statistic, high extreme of all data: Tn = 3.55
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	0.00970	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Selenium, dissolved, mg/L
Location: MW5

Mean of all data: 0.00186
Standard Deviation of all data: 0.00134
Largest Observation Concentration of all data: Xn = 0.00480
Test Statistic, high extreme of all data: Tn = 2.19
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L
Location: MW12

Mean of all data: 0.000212
Standard Deviation of all data: 0.000218
Largest Observation Concentration of all data: Xn = 0.00125
Test Statistic, high extreme of all data: Tn = 4.77
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/18/2017	<0.00125	True		1

Silver, dissolved, mg/L
Location: MW22D

Mean of all data: 0.000348
Standard Deviation of all data: 0.000469
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/03/2020	<0.00250	True		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 | **LT Multiplier: x 0.50**
Confidence Level: 95% | **Number of Outliers: One Outlier**
Transform: None

Silver, dissolved, mg/L
Location: MW22S

Mean of all data: 0.000261
Standard Deviation of all data: 0.0000521
Largest Observation Concentration of all data: Xn = 0.000500
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<0.000500	True		1

Silver, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Silver, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000558
Standard Deviation of all data: 0.00135
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 4.02
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/19/2015	0.00600	False		1

Silver, dissolved, mg/L
Location: MW3

Mean of all data: 0.000271
Standard Deviation of all data: 0.000456
Largest Observation Concentration of all data: Xn = 0.00180
Test Statistic, high extreme of all data: Tn = 3.35
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/19/2015	0.00180	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Silver, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000176
Standard Deviation of all data: 0.000116
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.636
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L
Location: MW4

Mean of all data: 0.000187
Standard Deviation of all data: 0.000136
Largest Observation Concentration of all data: Xn = 0.000600
Test Statistic, high extreme of all data: Tn = 3.04
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	0.000600	False		1

Silver, dissolved, mg/L
Location: MW5

Mean of all data: 0.000174
Standard Deviation of all data: 0.000131
Largest Observation Concentration of all data: Xn = 0.000500
Test Statistic, high extreme of all data: Tn = 2.49
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Specific Conductance @ 25C (field), micromhos/cm
Location: MW12

Mean of all data: 836
Standard Deviation of all data: 436
Largest Observation Concentration of all data: Xn = 3090
Test Statistic, high extreme of all data: Tn = 5
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/18/2017	3090	False		1

Specific Conductance @ 25C (field), micromhos/cm
Location: MW22D

Mean of all data: 2020
Standard Deviation of all data: 600
Largest Observation Concentration of all data: Xn = 3030
Test Statistic, high extreme of all data: Tn = 2
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Specific Conductance @ 25C (field), micromhos/cm
Location: MW22S

Mean of all data: 2999
Standard Deviation of all data: 858
Largest Observation Concentration of all data: Xn = 4090
Test Statistic, high extreme of all data: Tn = 1
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	396	False	-1	

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Specific Conductance @ 25C (field), micromhos/cm
Location: MW23D

Mean of all data: 543
Standard Deviation of all data: 379
Largest Observation Concentration of all data: Xn = 2180
Test Statistic, high extreme of all data: Tn = 4
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	2180	False		1

Specific Conductance @ 25C (field), micromhos/cm
Location: MW23S

Mean of all data: 499
Standard Deviation of all data: 538
Largest Observation Concentration of all data: Xn = 2800
Test Statistic, high extreme of all data: Tn = 4
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	2800	False		1

Specific Conductance @ 25C (field), micromhos/cm
Location: MW2D

Mean of all data: 506
Standard Deviation of all data: 95
Largest Observation Concentration of all data: Xn = 875
Test Statistic, high extreme of all data: Tn = 4
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/20/2022	875	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Specific Conductance @ 25C (field), micromhos/cm
Location: MW2R

Mean of all data: 839
Standard Deviation of all data: 119
Largest Observation Concentration of all data: Xn = 1120
Test Statistic, high extreme of all data: Tn = 2
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Specific Conductance @ 25C (field), micromhos/cm
Location: MW3

Mean of all data: 2262
Standard Deviation of all data: 851
Largest Observation Concentration of all data: Xn = 3990
Test Statistic, high extreme of all data: Tn = 2
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Specific Conductance @ 25C (field), micromhos/cm
Location: MW3D

Mean of all data: 2206
Standard Deviation of all data: 794
Largest Observation Concentration of all data: Xn = 3230
Test Statistic, high extreme of all data: Tn = 1
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Specific Conductance @ 25C (field), micromhos/cm
Location: MW4

Mean of all data: 692
Standard Deviation of all data: 227
Largest Observation Concentration of all data: Xn = 1570
Test Statistic, high extreme of all data: Tn = 4
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/09/1987	1570	False		1

Specific Conductance @ 25C (field), micromhos/cm
Location: MW5

Mean of all data: 436
Standard Deviation of all data: 155
Largest Observation Concentration of all data: Xn = 925
Test Statistic, high extreme of all data: Tn = 3
T Critical of all data: Tcr = 3

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW12

Mean of all data: 99.2
Standard Deviation of all data: 78.4
Largest Observation Concentration of all data: Xn = 475.
Test Statistic, high extreme of all data: Tn = 4.79
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	475.	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Sulfate, dissolved, mg/L
Location: MW22D

Mean of all data: 1430.
Standard Deviation of all data: 471.
Largest Observation Concentration of all data: Xn = 2150.
Test Statistic, high extreme of all data: Tn = 1.53
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	31.1	False	-1	

Sulfate, dissolved, mg/L
Location: MW22S

Mean of all data: 2430.
Standard Deviation of all data: 1230.
Largest Observation Concentration of all data: Xn = 4570.
Test Statistic, high extreme of all data: Tn = 1.75
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW23D

Mean of all data: 89.1
Standard Deviation of all data: 282.
Largest Observation Concentration of all data: Xn = 1320.
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	1320.	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None
LT Multiplier: x 0.50
Number of Outliers: One Outlier

Sulfate, dissolved, mg/L
Location: MW23S

Mean of all data: 112.
Standard Deviation of all data: 446.
Largest Observation Concentration of all data: Xn = 2060.
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	2060.	False		1

Sulfate, dissolved, mg/L
Location: MW2D

Mean of all data: 8.93
Standard Deviation of all data: 12.8
Largest Observation Concentration of all data: Xn = 64.9
Test Statistic, high extreme of all data: Tn = 4.37
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/01/2021	64.9	False		1

Sulfate, dissolved, mg/L
Location: MW2R

Mean of all data: 185.
Standard Deviation of all data: 57.5
Largest Observation Concentration of all data: Xn = 312.
Test Statistic, high extreme of all data: Tn = 2.21
T Critical of all data: Tcr = 3.03

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Sulfate, dissolved, mg/L
Location: MW3

Mean of all data: 951.
Standard Deviation of all data: 458.
Largest Observation Concentration of all data: Xn = 1930.
Test Statistic, high extreme of all data: Tn = 2.13
T Critical of all data: Tcr = 3.00

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW3D

Mean of all data: 1840.
Standard Deviation of all data: 761.
Largest Observation Concentration of all data: Xn = 3750.
Test Statistic, high extreme of all data: Tn = 2.51
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW4

Mean of all data: 55.4
Standard Deviation of all data: 47.2
Largest Observation Concentration of all data: Xn = 288.
Test Statistic, high extreme of all data: Tn = 4.92
T Critical of all data: Tcr = 3.13

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/11/2012	288.	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Sulfate, dissolved, mg/L
Location: MW5

Mean of all data: 45.5
Standard Deviation of all data: 36.1
Largest Observation Concentration of all data: Xn = 180.
Test Statistic, high extreme of all data: Tn = 3.73
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2011	180.	False		1

Thallium, dissolved, mg/L
Location: MW12

Mean of all data: 0.000280
Standard Deviation of all data: 0.000454
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.89
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.00250	True		1

Thallium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Thallium, dissolved, mg/L
Location: MW22S

Mean of all data: 0.000359
Standard Deviation of all data: 0.000470
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.56
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.00250	True		1

Thallium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Thallium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000357
Standard Deviation of all data: 0.000491
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/26/2019	<0.00250	True		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Thallium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.000250
Standard Deviation of all data: 0.0
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.0
T Critical of all data: Tcr = 0.0

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Thallium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000258
Standard Deviation of all data: 0.000344
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 5.06
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.00200	False		1

Thallium, dissolved, mg/L
Location: MW3

Mean of all data: 0.000300
Standard Deviation of all data: 0.000359
Largest Observation Concentration of all data: Xn = 0.00120
Test Statistic, high extreme of all data: Tn = 2.50
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/07/2016	0.00120	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Thallium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000244
Standard Deviation of all data: 0.000256
Largest Observation Concentration of all data: Xn = 0.00130
Test Statistic, high extreme of all data: Tn = 4.12
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/26/2016	0.00130	False		1

Thallium, dissolved, mg/L
Location: MW4

Mean of all data: 0.000194
Standard Deviation of all data: 0.000132
Largest Observation Concentration of all data: Xn = 0.000600
Test Statistic, high extreme of all data: Tn = 3.06
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/26/2016	0.000600	False		1

Thallium, dissolved, mg/L
Location: MW5

Mean of all data: 0.000167
Standard Deviation of all data: 0.000120
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.697
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Total Dissolved Solids, mg/L
Location: MW12

Mean of all data: 532.
Standard Deviation of all data: 126.
Largest Observation Concentration of all data: Xn = 933.
Test Statistic, high extreme of all data: Tn = 3.17
T Critical of all data: Tcr = 3.03

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	933.	False		1

Total Dissolved Solids, mg/L
Location: MW22D

Mean of all data: 2000.
Standard Deviation of all data: 676.
Largest Observation Concentration of all data: Xn = 3650.
Test Statistic, high extreme of all data: Tn = 2.44
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	126.	False	-1	

Total Dissolved Solids, mg/L
Location: MW22S

Mean of all data: 3450.
Standard Deviation of all data: 1010.
Largest Observation Concentration of all data: Xn = 4380.
Test Statistic, high extreme of all data: Tn = 0.928
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	164.	False	-1	

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Total Dissolved Solids, mg/L
Location: MW23D

Mean of all data: 338.
Standard Deviation of all data: 336.
Largest Observation Concentration of all data: Xn = 1790.
Test Statistic, high extreme of all data: Tn = 4.32
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	1790.	False		1

Total Dissolved Solids, mg/L
Location: MW23S

Mean of all data: 395.
Standard Deviation of all data: 588.
Largest Observation Concentration of all data: Xn = 2800.
Test Statistic, high extreme of all data: Tn = 4.09
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	2800.	False		1

Total Dissolved Solids, mg/L
Location: MW2D

Mean of all data: 223.
Standard Deviation of all data: 104.
Largest Observation Concentration of all data: Xn = 412.
Test Statistic, high extreme of all data: Tn = 1.82
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Total Dissolved Solids, mg/L
Location: MW2R

Mean of all data: 526.
Standard Deviation of all data: 153.
Largest Observation Concentration of all data: Xn = 1010.
Test Statistic, high extreme of all data: Tn = 3.17
T Critical of all data: Tcr = 3.03

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/12/2012	1010.	False		1

Total Dissolved Solids, mg/L
Location: MW3

Mean of all data: 2350.
Standard Deviation of all data: 677.
Largest Observation Concentration of all data: Xn = 4000.
Test Statistic, high extreme of all data: Tn = 2.43
T Critical of all data: Tcr = 3.54

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Dissolved Solids, mg/L
Location: MW3D

Mean of all data: 2580.
Standard Deviation of all data: 414.
Largest Observation Concentration of all data: Xn = 3140.
Test Statistic, high extreme of all data: Tn = 1.36
T Critical of all data: Tcr = 3.04

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/26/2021	1180.	False	-1	

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Total Dissolved Solids, mg/L
Location: MW4

Mean of all data: 459.
Standard Deviation of all data: 223.
Largest Observation Concentration of all data: Xn = 1780.
Test Statistic, high extreme of all data: Tn = 5.93
T Critical of all data: Tcr = 3.55

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/09/1987	1780.	False		1

Total Dissolved Solids, mg/L
Location: MW5

Mean of all data: 315.
Standard Deviation of all data: 181.
Largest Observation Concentration of all data: Xn = 1010.
Test Statistic, high extreme of all data: Tn = 3.83
T Critical of all data: Tcr = 3.56

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/11/2014	1010.	False		1

Zinc, dissolved, mg/L
Location: MW12

Mean of all data: 0.00513
Standard Deviation of all data: 0.00369
Largest Observation Concentration of all data: Xn = 0.0170
Test Statistic, high extreme of all data: Tn = 3.21
T Critical of all data: Tcr = 2.79

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/07/2016	0.0170	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Zinc, dissolved, mg/L
Location: MW22D

Mean of all data: 0.199
Standard Deviation of all data: 0.101
Largest Observation Concentration of all data: Xn = 0.500
Test Statistic, high extreme of all data: Tn = 2.98
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	0.500	False		1

Zinc, dissolved, mg/L
Location: MW22S

Mean of all data: 0.547
Standard Deviation of all data: 0.224
Largest Observation Concentration of all data: Xn = 0.890
Test Statistic, high extreme of all data: Tn = 1.53
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Zinc, dissolved, mg/L
Location: MW23D

Mean of all data: 0.0138
Standard Deviation of all data: 0.0404
Largest Observation Concentration of all data: Xn = 0.190
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.190	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022 **LT Multiplier: x 0.50**
Confidence Level: 95% **Number of Outliers: One Outlier**
Transform: None

Zinc, dissolved, mg/L
Location: MW23S

Mean of all data: 0.0333
Standard Deviation of all data: 0.130
Largest Observation Concentration of all data: Xn = 0.600
Test Statistic, high extreme of all data: Tn = 4.36
T Critical of all data: Tcr = 2.58

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	0.600	False		1

Zinc, dissolved, mg/L
Location: MW2D

Mean of all data: 0.00522
Standard Deviation of all data: 0.00104
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 2.62

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/26/2020	0.0100	False		1

Zinc, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00716
Standard Deviation of all data: 0.00673
Largest Observation Concentration of all data: Xn = 0.0280
Test Statistic, high extreme of all data: Tn = 3.10
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0280	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment

Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L
Location: MW3

Mean of all data: 0.0704
Standard Deviation of all data: 0.0503
Largest Observation Concentration of all data: Xn = 0.172
Test Statistic, high extreme of all data: Tn = 2.02
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Zinc, dissolved, mg/L
Location: MW3D

Mean of all data: 0.0260
Standard Deviation of all data: 0.0201
Largest Observation Concentration of all data: Xn = 0.0900
Test Statistic, high extreme of all data: Tn = 3.19
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/12/2018	0.0900	False		1

Zinc, dissolved, mg/L
Location: MW4

Mean of all data: 0.00582
Standard Deviation of all data: 0.00664
Largest Observation Concentration of all data: Xn = 0.0390
Test Statistic, high extreme of all data: Tn = 4.99
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0390	False		1

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 10/24/2022
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Zinc, dissolved, mg/L

Location: MW5

Mean of all data: 0.00579
Standard Deviation of all data: 0.00592
Largest Observation Concentration of all data: Xn = 0.0330
Test Statistic, high extreme of all data: Tn = 4.60
T Critical of all data: Tcr = 2.82

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/21/2014	0.0330	False		1

Based on Grubbs one-sided outlier test

APPENDIX C2
TEST DESCRIPTIONS

MANAGES

Groundwater Data Management and Evaluation Software

Software Manual Product ID #1012581

Software Manual, February 2010

EPRI Project Manager
K. Ladwig

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10
STATISTICAL ANALYSIS

Stand-Alone Statistical Tests

Statistical Evaluation Report

The Statistical Evaluation Report is comprised of a series of subreports as described below.

User Selections:

- One location.
- Sample date range for data selection.
- Interval length: the length of the averaging period in months (1,2,3,4, or 6).
- One parameter.
- Non-detect processing: multiplier between 0 and 1.
- One-sided confidence $(1-\alpha)$ level – 0.90, 0.95 or 0.99.
- Limit type: used in the statistical overview to determine exceedances.

Mann-Kendall Trend and Seasonal Analysis Tests

The Mann-Kendall test for trend is insensitive to the presence or absence of seasonality. The test is non-parametric and does not assume any type of data distribution. Nonetheless, two forms of the test are provided in MANAGES, one ignoring data seasonality even if it is present, and one considering data seasonality. In the test, the null hypothesis, H_0, is that the Sen trend is zero, and the alternate hypothesis, H_a, is that the trend is non-zero.

In general, the Mann-Kendall test considering seasonality indicates a larger range for allowable Sen estimate of trend when seasonality is actually present than the range indicated by the test performed ignoring seasonality.

In the Mann-Kendall Trend Analysis, available in under the Statistical Evaluation Report and in the Statistical Procedure for Detection Monitoring, and Mann-Kendall Seasonal Analysis, found under the Statistical Evaluation Report, MANAGES first calculates the Sen slope and the upper and lower confidence limits of the Sen slope, and then determines whether the Sen slope is statistically significant. Slope is statistically significant if it is non-zero.

<table>
<tr><td colspan="2">Mann-Kendall Test for Sen Slope Significance – a two-sided, non-parametric method for data sets as small as 10, unless there are many tied (e.g., equal, NDs are treated as tieds) values (Gilbert, 1987; p. 208)</td></tr>
<tr><td>Indicator Function

$\text{sgn}(x_{ij} - x_{jk})$</td><td>$= 1 \text{ if } (x_{ij} - x_{jk}) > 0$

$= 0 \text{ if } (x_{ij} - x_{jk}) = 0$

$= -1 \text{ if } (x_{ij} - x_{jk}) < 0$

where $x_{i1}, x_{i2}, ..., x_{in}$ are the time ordered data (n_i is total of data in the i-th season).</td></tr>
<tr><td>Mann-Kendall Statistic, S_i</td><td>$= \sum_{k=1}^{n_i-1} \sum_{j=k+1}^{n_i} \text{sgn}(x_{ij} - x_{jk})$</td></tr>
<tr><td>Variance of S_i $VAR(S_i)$</td><td>$VAR(S_i) =$
$\frac{1}{18}\left\{n_i(n_i - 1)(2n_i + 5) - \sum_{p=1}^{g_i} t_{ip}(t_{ip} - 1)(2t_{ip} + 5) - \sum_{q=1}^{h_i} u_{iq}(u_{iq} - 1)(2u_{iq} + 5)\right\}$

$+ \frac{\sum_{p=1}^{g_i} t_{ip}(t_{ip} - 1)(t_{ip} - 2) \sum_{q=1}^{h_i} u_{iq}(u_{iq} - 1)(u_{iq} - 2)}{9n_i(n_i - 1)(n_i - 2)}$

$+ \frac{\sum_{p=1}^{g_i} t_{ip}(t_{ip} - 1) \sum_{q=1}^{h_i} u_{iq}(u_{iq} - 1)}{2n_i(n_i - 1)}.$

The variable g_i is the number of tied groups (equal-valued) data in the i-th season, t_{ip} is the number of tied data in the p-th group for the i-th season, h_i is the number of sampling times (or time periods) in the i-th season that contain multiple data, u_{iq} is the number of multiple data in the q-th time period in the i-th season, and n_i is the number of data values in the i-th season.</td></tr>
</table>

Test Statistic, Z	If $S' = \sum_{i=1}^{K} S_i$, where K is the number of seasons, then the test statistic Z is computed as: $$Z = \begin{cases} \dfrac{S'-1}{[VAR(S')]^{1/2}} & \text{iff } S' > 0 \\ 0 & \text{iff } S' = 0 \\ \dfrac{S'+1}{[VAR(S')]^{1/2}} & \text{iff } S' < 0 \end{cases}$$ Where "iff" is an acroym meaning: if-and-only-if. A positive Z value means an upward trend and a negative Z value means a negative trend.
Hypothesis Test: H_0 = no trend H_a = trend present This is a two-sided test at the α significance level.	Accept the null hypothesis H_0 of no trend if $\lvert Z \rvert \le Z_{1-\alpha/2}$ Reject the null hypothesis H_0 if $\lvert Z \rvert > Z_{1-\alpha/2}$ where $Z_{1-\alpha/2}$ is obtained from Table A1 in Gilbert (1987; p. 254).

Kruskal-Wallis Analysis (Test for Seasonality)

To perform the Kruskal-Wallis test for data seasonality, data points are first segmented according to season (Gilbert, 1987). The null hypothesis, H_0, is that all seasons have the same mean value. The alternative hypothesis, H_a ,is that at least one season has a mean larger or smaller than the mean of at least one other season. Montgomery et al. (1987) provide additional information on groundwater data seasonality. This is a two-sided, non-parametric test.

In MANAGES, the Kruskal-Wallis Test for Seasonality is found under Data Review // Non-Parametric Methods // Kruskal-Wallis Analysis. It determines whether the seasonal means for the specified parameter at the specified location are statistically the same.

	or $Z_i \geq SCL$.

Outlier Tests

Outlier tests are useful in detecting inconsistencies of measurement within a data set. An outlier is defined as an observation that appears to deviate markedly from other values of a sample set. There are many possible reasons for the presence of an outlier, including 1) the presence of a true but extreme value from a single population, resulting from random variability inherent in the data; 2) an improper identification of the underlying distribution describing the population from which the sample set comes from; 3) the occurrence of some unknown event(s) such as a spill, creating a mixture of two or more populations; 4) a gross deviation from prescribed sampling procedures or laboratory analysis; 5) a transcription error in the data value or data unit of measurement.

USEPA (1989; p. 8-11) states that the purpose of a test for outliers is to determine whether or not there is statistical evidence that an observation that appears extreme does not fit the distribution of the rest of the data. If an observation is identified as an outlier, then steps need to be taken to determine whether it is the result of an error or a valid extreme observation. If a true error, such as in transcription, dilution, or analytical procedure, can be identified, then the suspect value should be replaced with its corrected value. If the source of the error can be determined but no correction is possible, then the observation is deleted and the reason for deletion is reported along with any statistical analysis. If no source of error can be documented, then it must be assumed that the observation is a true but extreme value of the data set. If this is the case, the outlier observation(s) must not be altered or excluded from any statistical analysis. Identification of an observation as an outlier but with no error documented could be used to suggest resampling to confirm the value (USEPA, 1989; p. 8-13).

The outlier tests provided in MANAGES are based on either the single outlier test of Grubbs (1969), which is used by USEPA (1989; pp. 8-10 to 8-13) or the single outlier test of Dixon (1951, 1953), which is used by USEPA (2000; pp. 4-24) and by ASTM (1998). The outlier tests assume the data come from a normal distribution. Only one outlier, either an extreme low or an extreme high, can be detected during a single analysis of a data set. Additional outliers can be detected by temporarily removing a previously detected outlier from a data set and then repeating the test on the remaining, reduced, data set. During each pass of the outlier test, the sample mean, standard deviation, and sample size used in the test statistics are computed using only the data remaining in the set. The process can be continued until there is either an insufficient amount of data remaining (a minimum of 3 values) or when no additional outliers are found. When using MANAGES, the user will be asked how many outliers are to be checked and it will then automatically perform all of the recursive calls and data reductions with the Grubbs or Dixon routine. When done, a report can be generated that will show each outlier marked with a flag indicating the sequential order in which the outliers were identified.

Critical values used in the one-sided Grubbs test are taken directly from those in Grubbs and Beck (1972) for sample sizes smaller than 147 observations. Critical values for sample sizes larger than 147 were generated numerically using a Monte Carlo routine, where each sampling event was simulated 100,000 times. Sample sizes ranging from 148 to 5,000 where used and then their resultant test statistic T_n curve fitted at specific significance levels. By this method, it was possible to match Grubbs results to at least four significant digits for corresponding tabulated values.

Critical values used in the one-sided Dixon outlier test are taken directly from tables given in Dixon (1951), Dixon (1953; page 89), and USEPA (2000; p. A-5, Table A-3). The critical values were then curve fitted for every sample size between 3 and 25 as a function of the significance level. By this method, it was possible to match Dixon's results to at least four significant digits for corresponding tabulated values. Note that the Dixon test assumes the data are either normally or lognormally distributed. Hence, sample sizes can only range between 3 and 25, inclusive. Dixon never developed an outlier test for sample sizes larger than 25.

User Selections:

- One or up to 100 locations: a separate test is performed for each location.
- One or up to 100 parameters: a separate test is performed for each parameter.
- Evaluation date range.
- Confidence $(1-\alpha)$ level: 0.90, 0.95 or 0.99.
- Non-detect processing: multiplier between 0 and 1.
- Data transformation option: none and log (base e).
- Number of outliers: one, two, first 5%, first 10%. Selecting any option other than one causes MANAGES to rerun the test, with outliers from prior tests removed, until either no outliers are detected or the specified number of outliers are detected.

Technical Details

<table>
<tr><td colspan="2">Grubbs Outlier Test – The Grubbs outlier test determines whether there is statistical evidence that an observation does not fit the remaining data (USEPA, 1989; p. 8-11). This significance test looks at either the highest or the lowest observation in normal samples.</td></tr>
<tr><td>The number of observations taken during a specified scoping period; n</td><td>n</td></tr>
</table>

Mean of the observed data during the scoping period; $\overline{X}$	$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$ where X_i is the i-th observation.
Standard deviation of observed data; S_x.	$S_x = \sqrt{\frac{1}{(n-1)}\sum_{i=1}^{n}(X_i - \overline{X})^2}$
Test statistics: T_l & T_n	Sort the data into ascending order, then compute the statistics $T_l = (\overline{X} - X_l)/S_x$ $T_n = (X_n - \overline{X})/S_x$ where X_l is the smallest value of the n observations and X_n is the largest value of the n observations.
One-sided test with a (1-α) confidence level that there is a single extreme outlier within the n observations.	Grubbs single, one-sided test of either an extreme low outlier : X_l *is an outlier if* $T_l \geq T_{cr(1-\alpha,n)}$ or an extreme high outlier: X_n *is an outlier if* $T_n \geq T_{cr(1-\alpha,n)}$. The function $T_{cr(1-\alpha,n)}$ is the critical value, given in Grubbs and Beck (1972; Table 1) and USEPA (1989; p. B-11, Table 8) . Note that the critical value assumes that the mean and standard deviation are computed from the sample being tested.

Dixon Outlier Test – The Dixon outlier test determines whether there is statistical evidence that an extreme observation does not fit the remaining data (USEPA, 2000; p. 4-24 and ASTM D6312, 1998). This significance test looks at both the highest and the

lowest observations in a sample data set. However, the routine will only perform the outlier tests if several conditions are first satisfied. For example, the Dixon outlier algorithm checks the distribution of the sample data for both normality and lognormality using the Shapiro-Wilk W-test. The outlier routine will not proceed with a data set if the W-test fails. In addition, the Dixon outlier test is limited to a minimum of 3 and a maximum sample size n of 25 data values.	
The number of observations taken during a specified scoping period; n	Number of observations, n, where $3 \le n \le 25$.
Sorting the sample data	Sort the data into ascending order, with the minimum data value $X_{(1)}$ first and the maximum data value $X_{(n)}$ last. Use the natural log of the data values if data are lognormally distributed, i.e., $X_{(j)} = Ln[X_{(j)}]$.
Goodness-of fit tests	After temporarily excluding either the minimum or maximum value of the data set, the Shapiro-Wilk's W-test is used to determine if the remaining $n-1$ values are normally or lognormally distributed. If not, the Dixon outlier test can't be used.
Test statistic, T_s, for the minimum data value	Compute the T_s test statistic for $X_{(1)}$ as an outlier: $T_s = \frac{X_{(2)} - X_{(1)}}{X_{(n)} - X_{(1)}} \quad for \quad 3 \le n \le 7$ $T_s = \frac{X_{(2)} - X_{(1)}}{X_{(n-1)} - X_{(1)}} \quad for \quad 8 \le n \le 10$ $T_s = \frac{X_{(3)} - X_{(1)}}{X_{(n-1)} - X_{(1)}} \quad for \quad 11 \le n \le 13$ $T_s = \frac{X_{(3)} - X_{(1)}}{X_{(n-2)} - X_{(1)}} \quad for \quad 14 \le n \le 25.$
Test statistic, T_s, for the maximum data value	Compute the T_s test statistic for $X_{(n)}$ as an outlier:

	$T_s = \frac{X_{(n)} - X_{(n-1)}}{X_{(n)} - X_{(1)}}$ *for* $3 \le n \le 7$ $T_s = \frac{X_{(n)} - X_{(n-1)}}{X_{(n)} - X_{(2)}}$ *for* $8 \le n \le 10$ $T_s = \frac{X_{(n)} - X_{(n-2)}}{X_{(n)} - X_{(2)}}$ *for* $11 \le n \le 13$ $T_s = \frac{X_{(n)} - X_{(n-2)}}{X_{(n)} - X_{(3)}}$ *for* $14 \le n \le 25.$
Critical value T_c	USEPA (2000; p. A-5, Table A-3) lists the critical values of the Dixon test as a function of sample size for a one-sided extreme value test at the significance levels α of 0.1, 0.05, and 0.01.
One-sided test with a (1-α) confidence level that there is a single extreme outlier within the n observations.	Dixon's single, one-sided test for statistical evidence of either an extreme low-valued outlier: $X_{(1)}$ *is an outlier if* $T_s \ge T_c$ or an extreme high-valued outlier: $X_{(n)}$ *is an outlier if* $T_s \ge T_c$. The function T_c is the critical value, given in Dixon (1953; page 89) and USEPA (2000; p. A-5, Table A-3). Note that the critical value assumes that the data are either normally or lognormally distributed.

Other Statistical Calculations Used in MANAGES

Sen Estimate of Slope

The Sen estimate of slope is the median of all slopes between all possible unique pairs of individual data points in the time period being analyzed (Gilbert, 1987). The slopes represent the rate of change of the measured parameter, with the y-axis being the parameter value and the x-axis being calendar days. Sen's estimate of slope is a non-parametric estimator of trend. The method is robust, and fairly insensitive to the presence of a small fraction of outliers and non-detect data values. In contrast, linear regression and other least squares estimators of slope are significantly more sensitive, and more likely to give erroneous slope indications, even when only a few outlier values are present.

When data averaging is not activated, the Sen slope is calculated using individual data points and actual sampling dates. When data averaging is activated, multiple data points within each specified season period are reduced to one data point by arithmetic averaging over each of the season periods. These averaged values are then assigned to the day that corresponds to the middle of that season's period.

The approximate lower and upper confidence limits for the Sen slope can also be calculated using normal theory (Gilbert, 1987). It should be noted that confidence limits for the Sen slope are not necessarily symmetrical about the estimated slope since ranked values of slope are used in the calculation.

MANAGES calculates Sen slope in the Sen Slope Overlay Graph, Statistical Summary reports and in the two Mann-Kendall tests performed under the Statistical Evaluation Report.

Sen's Estimate of Slope – two-sided, non-parametric method that calculates the trend of a single data series. It is less sensitive to outliers and non-detect values than linear regression (Gilbert, 1987; p. 217).	
Slope, Q	$= \frac{x_{i'} - x_i}{i' - i}$ where $X_{i'}$ and x_i are data values at times *i'* and *i*, respectively, and where $i' > i$. Typically, i' and i are expressed in units of either days for trend analysis or years for seasonal analysis.
N′	Number of unique data point pairs that can be made for the observations in the data set, for $i' > i$. For n monitoring events, N′ is given as: N′ = n(n-1)/2

Sen's Slope Estimate	Sen's slope estimator = median slope $= Q_{[(N'+1)/2]}$ if N' is odd $= \frac{1}{2}(Q_{[N'/2]} + Q_{[(N'+2)/2]})$ if N' is even where the Q values have first been ranked from smallest to largest.
$Z_{1-\alpha/2}$	Statistic for the cumulative normal distribution (Gilbert, 1987; p. 254) for the two-sided, α significance level.
Variance estimate of the Mann-Kendall S Statistic, VAR(S)	VAR(S) $= \frac{1}{18}\left[n(n-1)(2n+5) - \sum_{p=1}^{g} t_p(t_p-1)(2t_p+5)\right]$ where g is the number of tied groups, t_p is the number of data in the pth group, and n is the number of data values.
C_α	$= Z_{1-\alpha/2}\sqrt{VAR(S)}$
Sen's Slope , a two-sided test at the α significance level	$M_1 = \frac{(N'-C_\alpha)}{2}$ $M_2 = \frac{(N'+C_\alpha)}{2}$ Lower limit of confidence interval is the M_1-th largest slope, and upper limit of confidence interval is the (M_2+1)-th largest of the N′ ordered slope estimates.

Coefficient of Skewness for Normality

The coefficient of skewness is another measure for data normality (Gilbert, 1987). MANAGES provides the value of the coefficient of skewness in the Statistical Evalueation Report, Statistical Overview. Additional information on data normality is given by Montgomery, et al. (1987).