Intended for
AmerenEnergy Medina Valley CoGen, LLC

Date
January 25, 2022

Project No.
1940100701

2021 ANNUAL REPORT

FORMER HUTSONVILLE POWER STATION - ASH POND A

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FORMER HUTSONVILLE POWER STATION - ASH POND A

Project name	**Former Hutsonville Power Station - Ash Pond A**
Project no.	**1940100701**
Recipient	**AmerenEnergy Medina Valley CoGen, LLC**
Document type	**2021 Annual Report**
Revision	**0**
Version	**FINAL**
Date	**January 25, 2022**
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ACRONYMS AND ABBREVIATIONS

Ameren	AmerenEnergy Medina Valley Cogen, LLC
CCW	Coal Combustion Waste
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) for the former Hutsonville Power Station (Hutsonville). Ameren completed closure activities for Ash Pond D in 2013 in accordance with the site-specific closure requirements of 35 Illinois Administrative Code (IAC) 840. Closure activities for Ash Pond D included placement of a 40-mil high density polyethylene (HDPE) 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. Ash Pond B, Ash Pond 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. Ash Pond A, originally constructed with an 80 mil HDPE liner, was in service between 1986-2011 to receive sluiced fly ash and provide subsequent treatment. Closure activities for Ash Pond A included placement of ash transferred from the other ash ponds and spoils from clean-up of the coal yard, grading according to the Ash Ponds Closure, Closure Plan, dated September 15, 2014 (Closure Plan) (Hanson Professional Services, Inc. [Hanson], Natural Resource Technology [NRT], 2014a), and capping with a low permeability geosynthetic (40-mil HDPE) membrane covered with protective soil. Closure activities for the coal combustion waste (CCW) ponds consisting of Ash Pond A, Ash Pond B, Ash Pond C, and the Bottom Ash Sluice Pond were completed in June 2016 in accordance with the Closure Plan (Hanson, NRT, 2014a), and the site-specific Ash Pond D rule 35 IAC 840 to the extent feasible. The Ash Pond A Closure Completion Report (Ameren, 2017) was approved by the Illinois Environmental Protection Agency (EPA) in March 2017. Since Ash Pond B, Ash Pond 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.

Groundwater has been monitored at the site since 1984. The groundwater monitoring system for Ash Pond A, as defined by the Groundwater Monitoring Plan (Hanson, NRT, 2014b), 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 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. Ash Pond A is located near the southwest portion of the former Hutsonville Power Station, as shown on Figure 1-1, with the sampled monitoring wells shown on Figure 1-2.

In conjunction with Ameren's request for approval of the Closure Plan (Hanson, NRT, 2014a), 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 (Hanson, NRT, 2014a). The GMZ is a three-dimensional region containing

[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.

groundwater being managed to mitigate impacts from a potential release of leachate from the facility. Observed impacts during 2011-2014 included concentrations for boron, sulfate, manganese, and Total Dissolved Solids (TDS) higher than Class I groundwater quality standards within the GMZ. The GMZ is shown on Figure 1-2.

The Groundwater Monitoring Plan (Hanson, NRT, 2014b), in accordance with 35 IAC 840.114 and 35 IAC 840.116, 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.

Post-closure groundwater monitoring began in 2016. Annual reporting according to the Groundwater Monitoring Plan (Hanson, NRT, 2014b) 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 (Ameren, 2017) was approved by Illinois EPA in March 2017. This fifth annual report includes the following elements:

- A summary of groundwater monitoring data collected in 2020 and 2021. 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 (Hanson, NRT, 2014b), including an assessment of any statistically significant increasing trends (Appendix C).

1.2 Groundwater Quality Overview – 2017 to 2021

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 geosynthetic (40-mil HDPE) membrane 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, and include recontouring the ground surface, repairing drainage channels, repairing and replacing lining material, revegetating areas, and removing woody vegetation. Maintenance activities can be found in more detail in the Post-Closure Care Plan (Hanson, NRT, 2014d).

1.2.2 Summary of 2017 to 2021 Groundwater Quality Data Review

Groundwater quality data 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 (Hanson, NRT, 2014b), which are focused on

specific compliance criteria and proposed mitigation actions. This review is intended as a big-picture view of groundwater quality over time since closure.

Boron was identified as the primary indicator constituent for coal ash leachate impacts to groundwater at Ash Pond A in the Closure Plan (Hanson, NRT, 2014a). As such, boron was selected for this groundwater quality data review. Boron concentrations over time 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 boron concentrations in each well. Best fit linear regression lines are included in the figures to provide a convenient means of evaluating general concentration "trends" over time. 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, boron concentrations in most compliance monitoring wells have been stable or decreasing since 2017 and are currently below the Class I Groundwater Standard for the majority of the compliance groundwater monitoring wells.

Sulfate was also identified as an indicator constituent for coal ash at Ash Pond A in the Closure Plan (Hanson, NRT, 2014a); however, sulfate can have other anthropogenic sources for elevated concentrations in groundwater, and sulfate concentrations can decrease in groundwater under strongly reducing conditions. These caveats make sulfate a less reliable indicator for coal ash impacts than boron. Sulfate concentrations over time since 2017 are presented in Figures 1-8 through 1-12. Similar to boron, 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 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 boron concentrations will stabilize shortly after the closure plan is implemented in monitoring wells with low concentrations (wells MW-5 and MW-9), while other wells are 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 (Hanson, NRT, 2014b) 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 Illinois EPA:
  - 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 Illinois EPA. 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 Illinois EPA. Post-closure groundwater compliance monitoring will continue for a minimum of ten years from the Illinois EPA'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 sampling and 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 Illinois EPA 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 2021 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 2021, 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 0.005 feet/feet during 2021. 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 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 (2020-2021)

Groundwater samples from the most recent eight monitoring events were collected on February 3, 2020; May 4, 2020; August 3, 2020; October 26, 2020; March 1, 2021; April 26, 2021; September 1, 2021; and November 1, 2021. 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 first, second, and fourth quarter of 2020 and second and third quarter of 2021 due to insufficient water level.

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

- 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 2020-2021 monitoring period, boron concentrations ranged from 0.1 to 3.9 milligrams per liter (mg/L) in shallow compliance monitoring wells. In deep monitoring wells, boron concentrations ranged from 0.05 to 8.3 mg/L (Figure 3-6 and Figure 3-7). As discussed in Sections 1.2.2-1.2.3, boron concentrations have been stable or decreasing in the majority of compliance monitoring wells across the site since closure. During the current monitoring period, boron concentrations continue to be stable over time which indicates that the cover system is functioning to improve overall groundwater quality beneath the ponds.

- 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 2020-2021 monitoring period, sulfate concentrations ranged from 12 to 3,800 mg/L in shallow compliance monitoring wells. In deep monitoring wells, sulfate concentrations ranged from 2.6 to 3,700 mg/L (Figure 3-8 and Figure 3-9). Sulfate concentrations were highest at MW-22S, MW-22D, and MW-3D in 2020 and 2021, where boron concentrations were also highest. Overall, during this reporting period, sulfate distribution was similar to boron distribution at Ash Pond A.
- Box-whisker plots and timeseries plots illustrating concentrations for the most recent eight monitoring events (2020-2021) were developed for additional parameters – manganese and TDS (Figures 3-10 through 3-12). 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 2020-2021 dataset. Trends were evaluated according to the procedure outlined in the Groundwater Monitoring Plan (Hanson, NRT, 2014b).

3.3.1 Outlier Analysis

The Grubbs outlier test determines whether there is statistical evidence of a high or low observation that differs significantly from the other data and provides statistical evidence of potential outliers. The test methodology and results are listed in Appendix C1. Outliers identified during the compliance period (2020-2021) by the Grubbs outlier test based on the date range of 1984-2021 were not eliminated from further statistical analysis due the lack of documentation indicating that the results don't represent actual field conditions. In addition, these 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 listed in Appendix C2.

Data collected in 2020-2021 show 20 cases with positive slopes, 18 cases with negative slopes, and 212 cases with no slope (Table 3-1). Sen's Estimate of Slope requires a minimum of four consecutive samples. Note that since only three samples were collected from MW-3 during 2020-2021, this analysis was not performed. The 20 cases with positive slopes were tested using the Mann-Kendall test to determine if the positive slopes represented increasing trends.

3.3.3 Mann-Kendall Trend Analysis

The Mann-Kendall test is a non-parametric, one-tailed test to determine whether a dataset has a statistically significant increasing or decreasing trend. The test methodology is in Appendix C2. Increasing short-term (compliance) trends are identified in Tables 3-1 and 3-2.

The Mann-Kendall test detected four cases of increasing trends in the 2020-2021 dataset. The increasing short-term trends occurred for iron (MW-22D), manganese (MW-22D), and TDS

(MW-2R and MW-22D). For these four cases, iron, manganese, and TDS concentrations at MW-22D were above the Class I Groundwater Standard (5 mg/L, 0.15 mg/L, and 1,200 mg/L respectively) for all sampling events during this reporting period.

3.4 Site Inspection

The Post-Closure Care Plan (Hanson, NRT, 2014d) requires quarterly inspection until completion of the post-closure period. Inspections are also required after storm events defined as a 25-year, 24-hour event, or approximately 5.37 inches of precipitation. Discontinuation of the site inspections will occur after Illinois EPA 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, and surface water control features. The inspection reports for 2021 are included in Appendix B.

The site inspections performed on March 31, 2021, July 8, 2021, October 5, 2021, and December 12, 2021 noted a small amount of vegetation and debris in the drainage channels.

4. EVALUATION OF COMPLIANCE

Those parameters and wells with increasing short-term trends and concentrations above the Class I Groundwater Standard have been identified in Section 3.3.3 and in Table 3-1 for the most recent eight monitoring events (2020-2021). Iron, manganese, and TDS at MW-22D had both an increasing short-term trend and concentration above the Class I Groundwater Standard during the compliance period (2020-2021).

Short-term increasing trend and Class I Groundwater Standard exceedance of manganese and TDS were isolated and not repeated from the 2019-2020 monitoring period; as such, no further action is required at this time.

Short-term increasing trend and Class I Groundwater Standard exceedance of iron at MW-22D was repeated from the 2019-2020 monitoring period. However, 2019-2020 short-term increasing trend can be attributed to potential analytical data switch that occurred in quarter four of 2019. During the October 2019 data review, inversion was observed for analytical data from MW-22D and MW-23D (Figure 4-1). Investigation indicated possible mislabeling or data switch from MW-22D to MW-23D. Since the Short-term increasing trend and Class I Groundwater Standard exceedance of iron at MW-22D during the reporting period 2019-2020 has a potential superseding cause, this reporting period’s occurrence can be considered as the first and not repeated and 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 the most recent eight rounds of groundwater samples collected for 2020 to 2021 compliance period at the Hutsonville Ash Pond A identified increasing short-term trends for iron, manganese, and TDS and concentrations above the Class I Groundwater Standard (5 mg/L, 0.15 mg/L, and 1,200 mg/L respectively) at MW-22D. This case was isolated for manganese and TDS and not repeated from the 2019-2020 monitoring period; as such, no further action is required at this time. Although short-term increasing trend and Class I Groundwater Standard exceedance of iron at MW-22D was repeated from 2019-2020, there was a potential superseding cause in case of 2019-2020 reporting period. Therefore, short-term increasing trend and Class I Groundwater Standard exceedance of iron at MW-22D during 2020-2021 reporting period can be considered as the first occurrence; as such, no further action is required at this time. The concentration of iron, manganese, and TDS at MW-22D will continue to be monitored and evaluated in 2022.

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.

35 Illinois Administrative Code 620: Groundwater Quality.

35 Illinois Administrative Code 840: Site-Specific Closures of Coal Combustion Waste Surface Impoundments.

TABLES

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

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

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

Notes:

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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Former Hutsonville Power Station - Ash Pond A

	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	None	ID	None	None	None	None	-	None	None	None
Cadmium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Chloride, dissolved	+	+	ID	-	None	-	-	None	+	Decrease	None
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	-	ID	None	None	None	None	Increase	+	None	None
Lead, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Manganese, dissolved	None	None	ID	-	None	None	None	Increase	+	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	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	-	-	+	-	+	-
Thallium, dissolved	None	None	ID	None	None	None	None	None	None	None	None
Total Dissolved Solids	Increase	+	ID	-	-	+	-	Increase	+	+	+
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

Notes: [O: RSD 12/29/21, C: RAB 1/3/22]

- "+" 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 detection limit.
- The most recent eight sampling events were used for analysis; date range for this analysis is 1/1/2020-12/31/2021.
- 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.

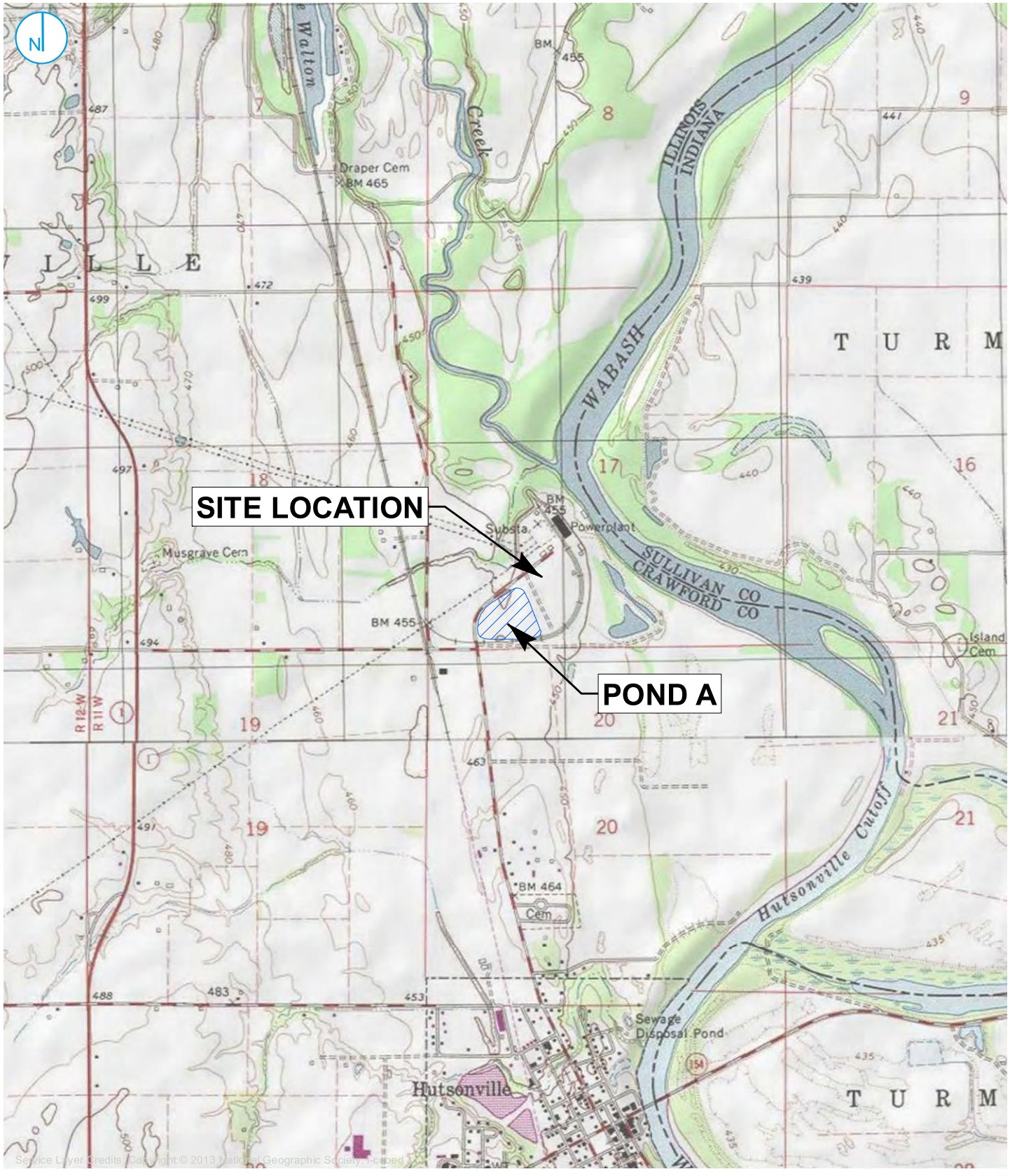
Table 3-2. Summary of Trend Analyses
2021 Annual Report
Former Hutsonville Power Station - Ash Pond A

Time Period	Short-Term Increasing Trends	Long-Term Decreasing Trends
2016-2017	8	-
2017-2018	9	-
2018-2019	10	-
2019-2020	3	-
2020-2021	4	13

[O: RSD 12/29/21, C: RAB 1/3/22]

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: galammc

KEY MAP

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

0 1,000 2,000 Feet

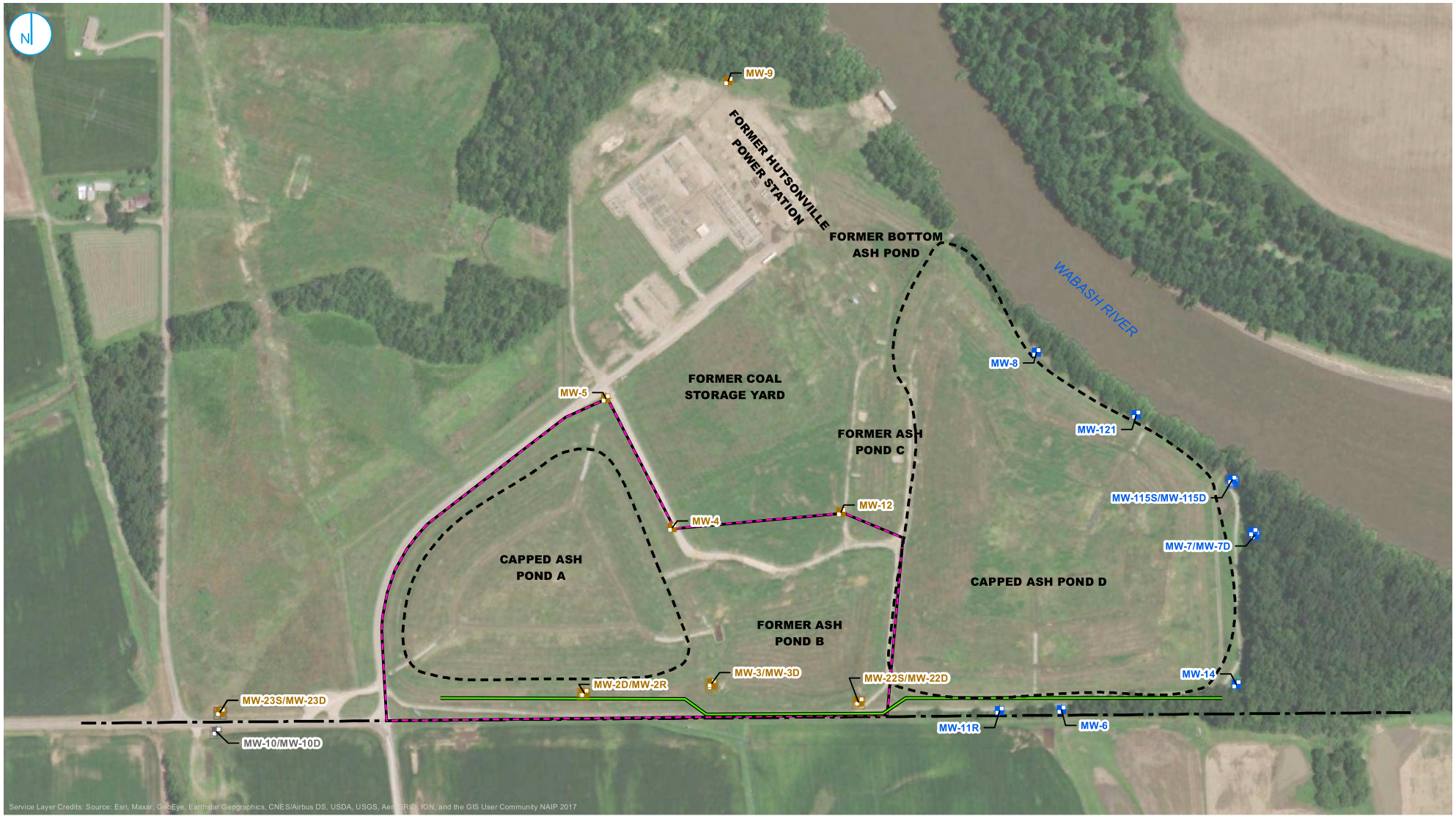
SITE LOCATION MAP

2021 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

RAMBOLL



ASH POND D MONITORING WELL LOCATION
NESTED ASH POND D MONITORING WELL LOCATION
MONITORING WELL LOCATION
NESTED 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

SITE BASEMAP

2021 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

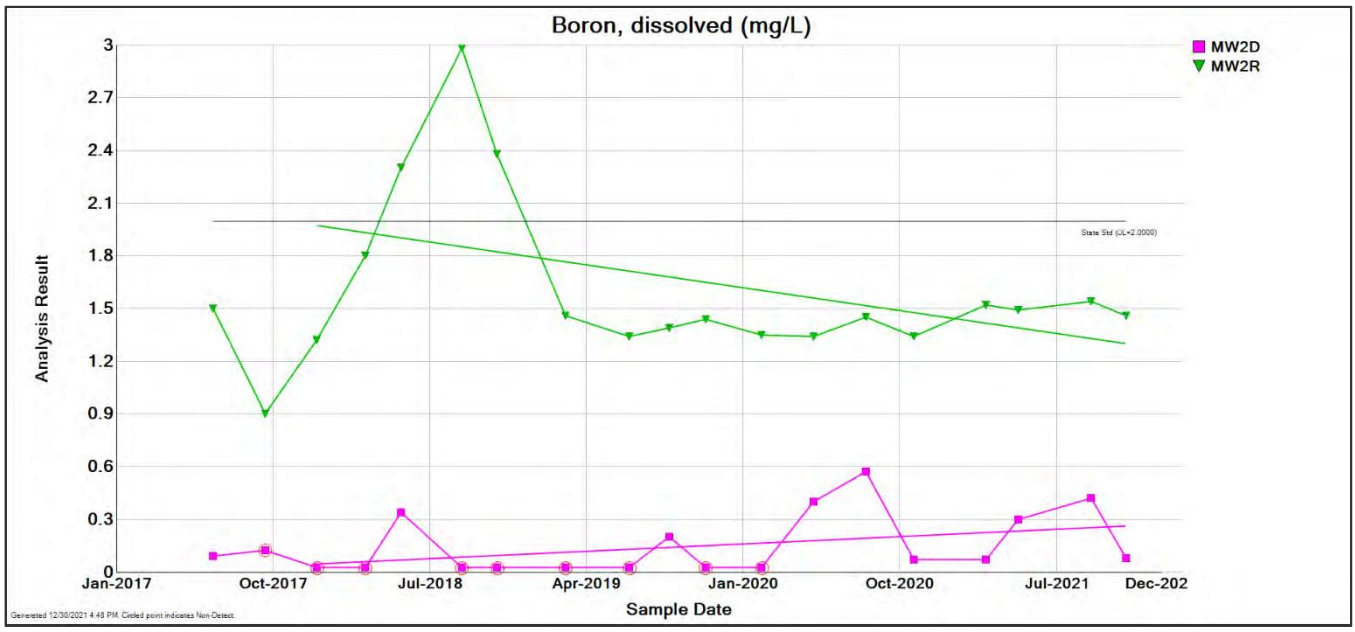


Figure 1-3. Boron concentrations since 2017 at compliance wells MW-2D and MW-2R. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

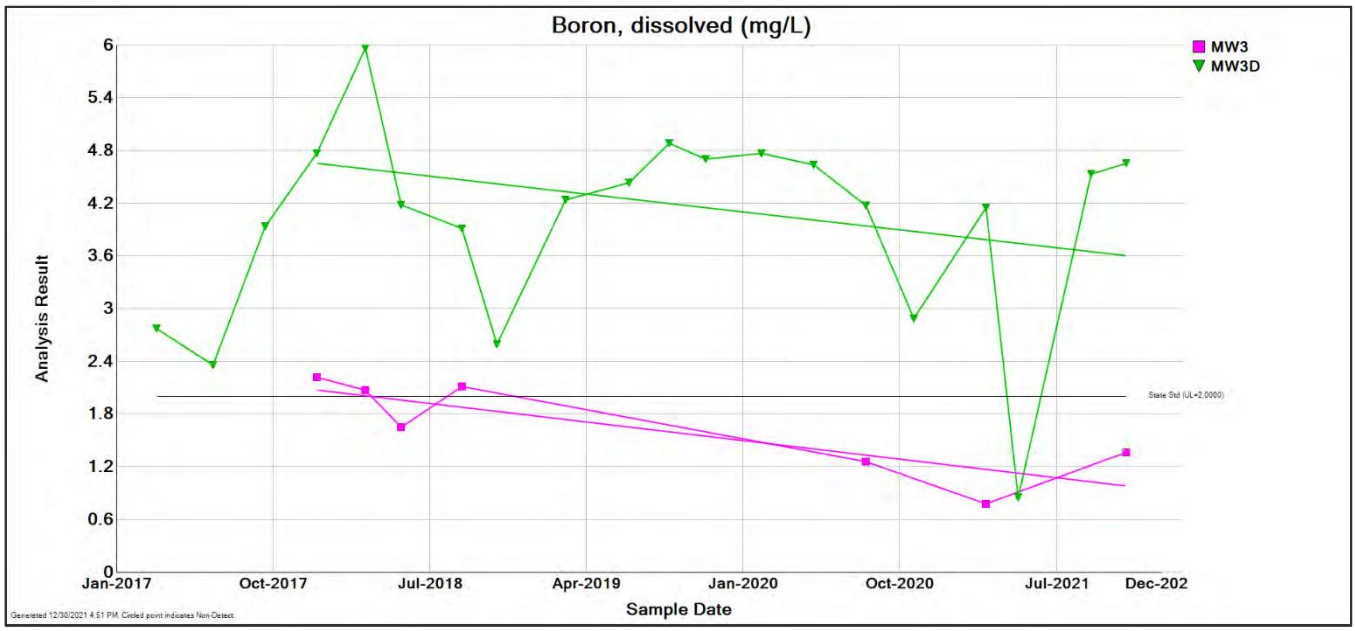


Figure 1-4. Boron concentrations since 2017 at compliance wells MW-3 and MW-3D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

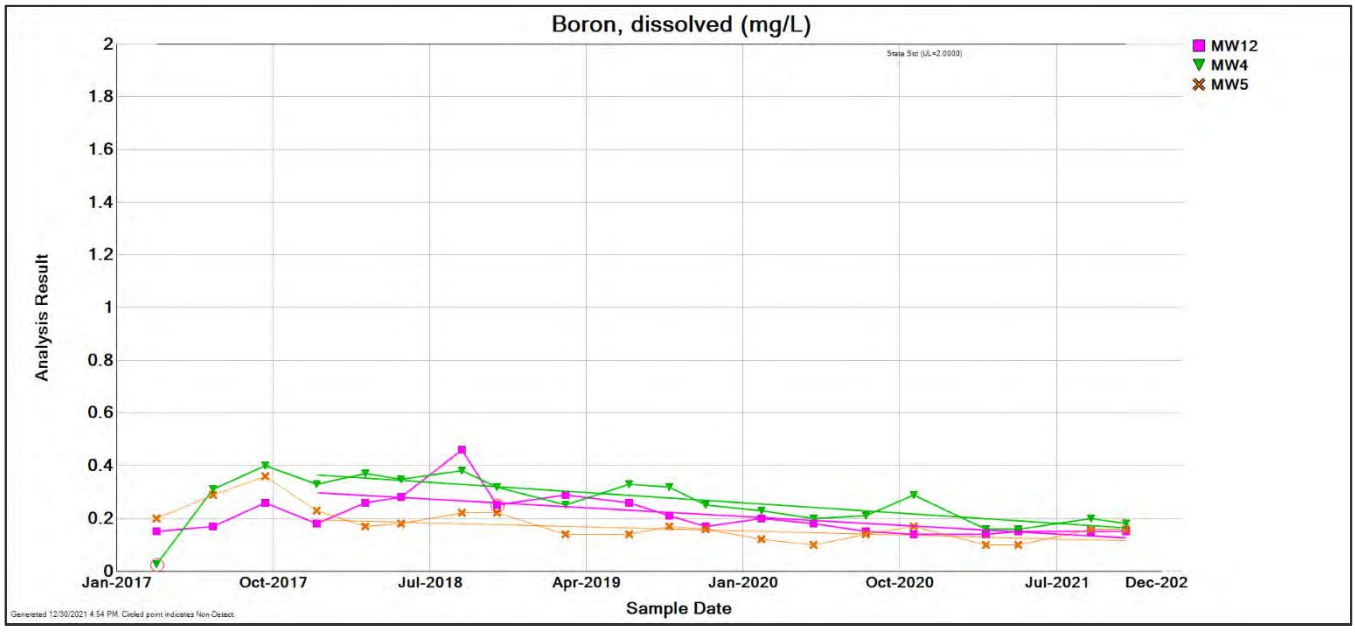


Figure 1-5. Boron concentrations since 2017 at compliance wells MW-4, MW-5 and MW-12. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

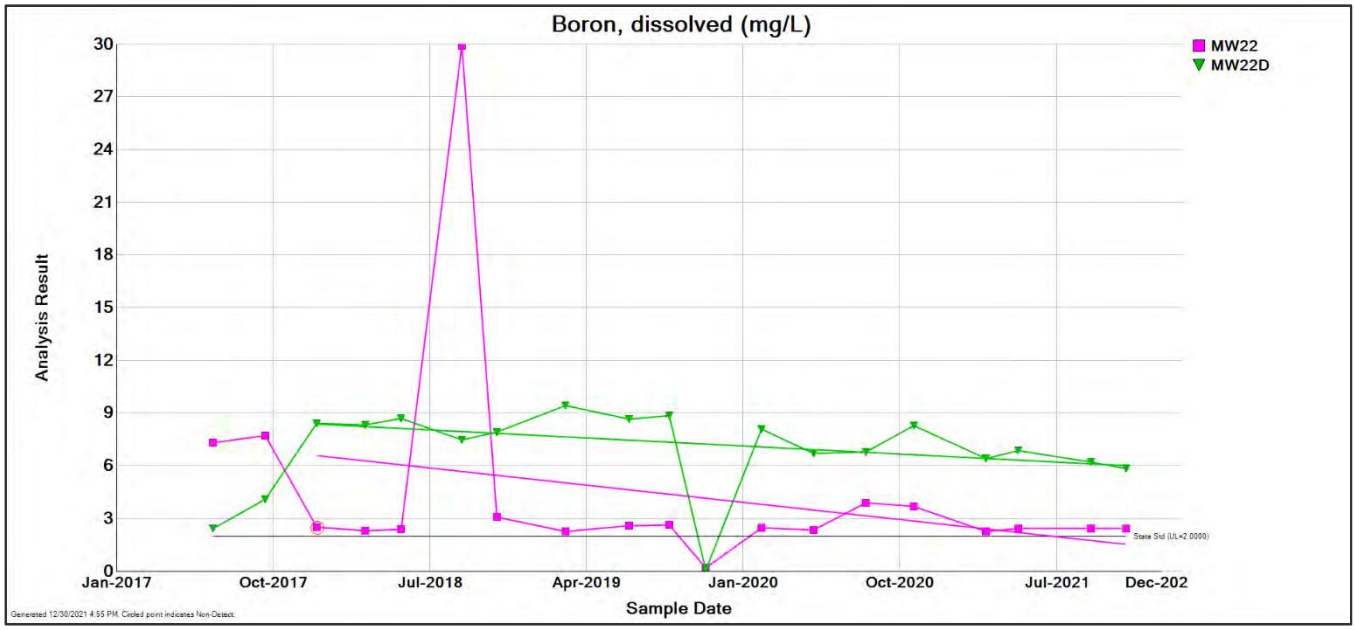


Figure 1-6. Boron concentrations since 2017 at compliance wells MW-22S and MW-22D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

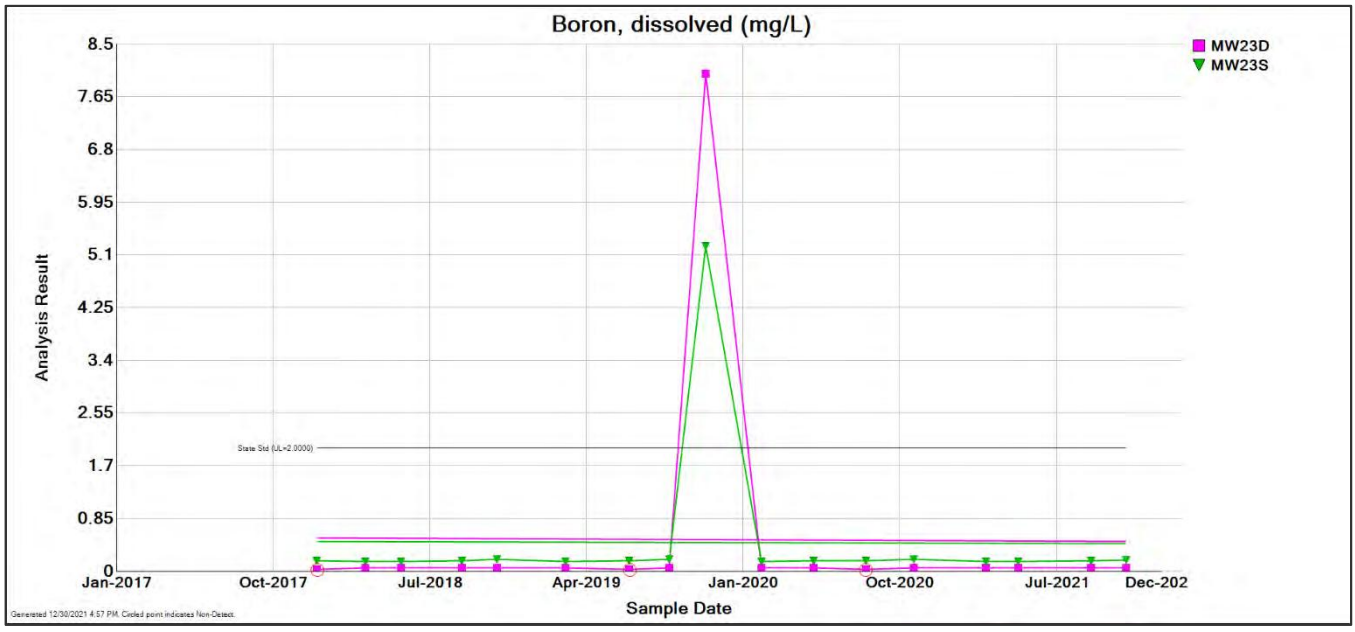


Figure 1-7. Boron concentrations since 2017 at compliance wells MW-23S and MW-23D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

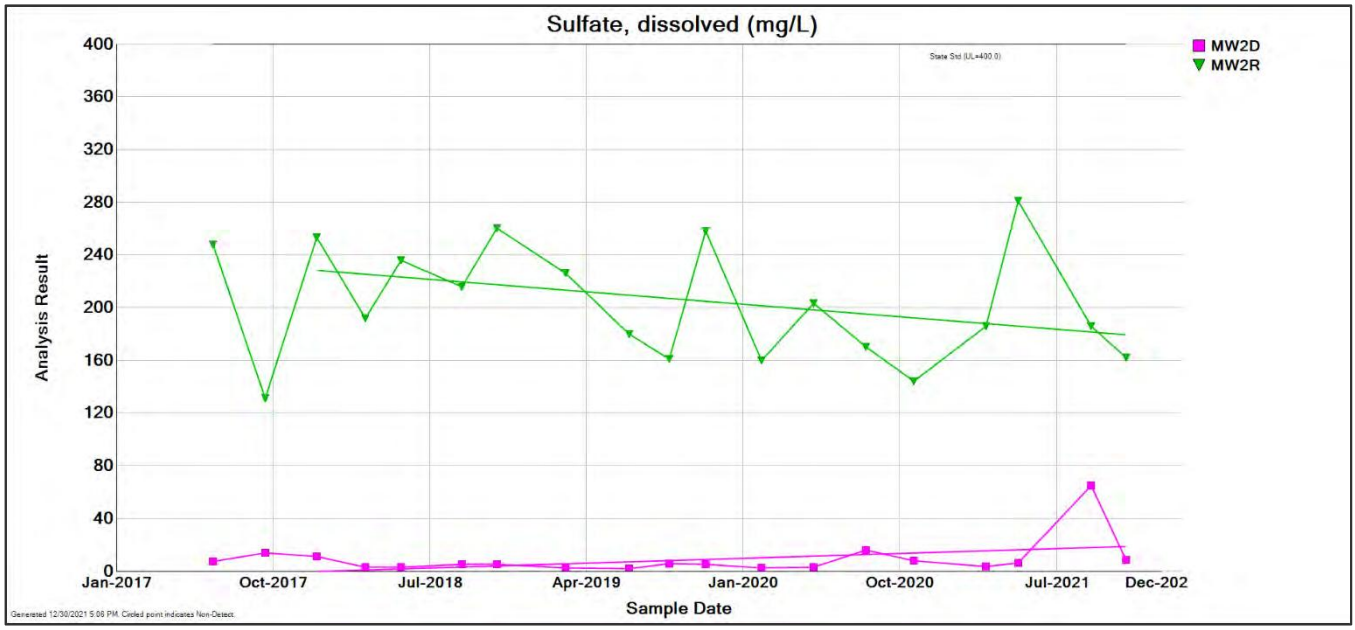


Figure 1-8. Sulfate concentrations since 2017 at compliance wells MW-2D and MW-2R. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

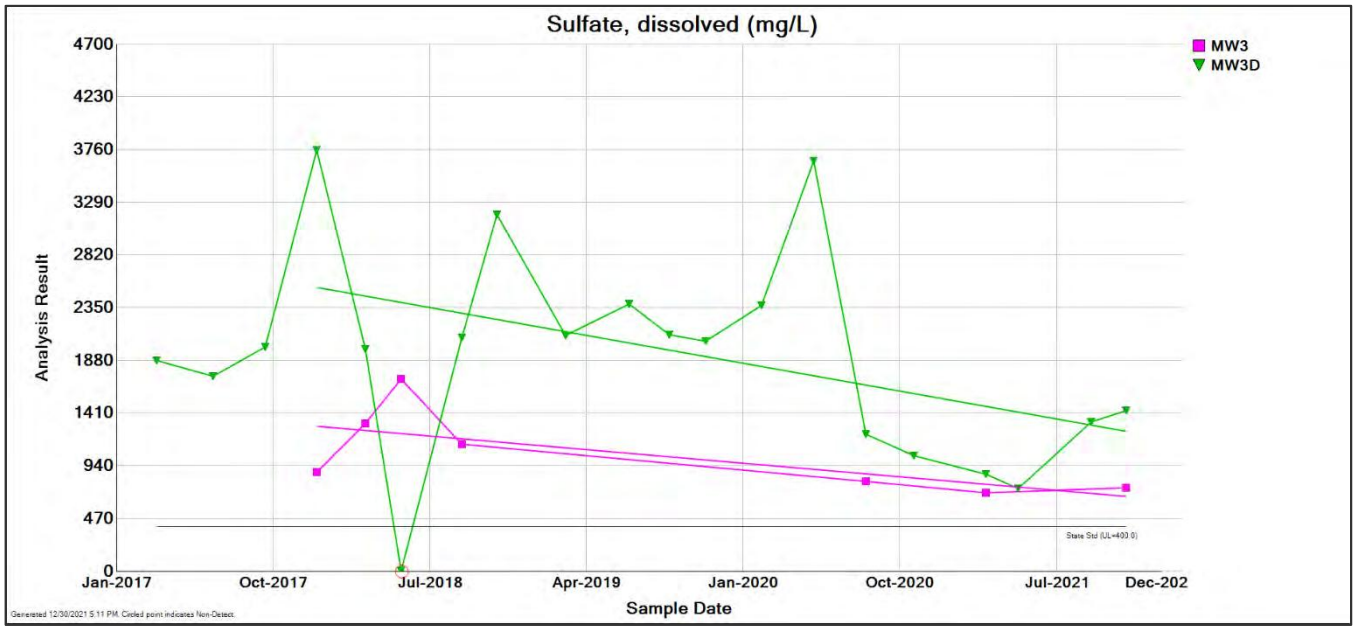


Figure 1-9. Sulfate concentrations since 2017 at compliance wells MW-3 and MW-3D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only. Circled results indicate non-detects.

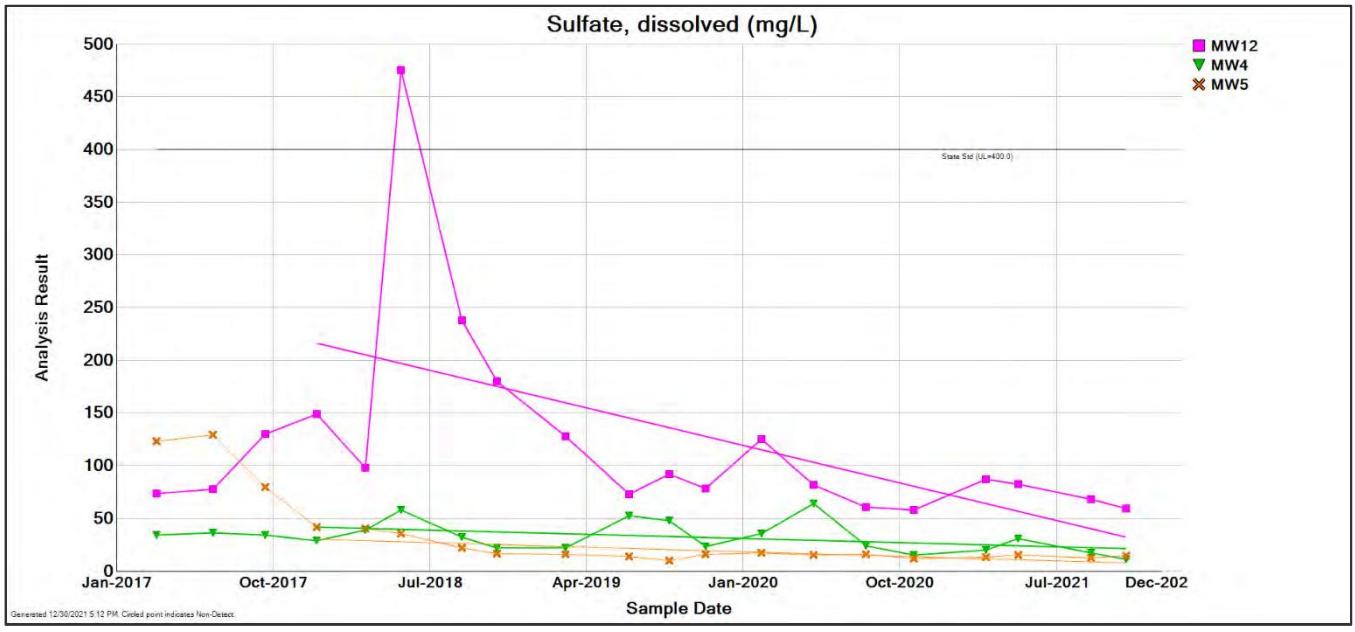


Figure 1-10. Sulfate concentrations since 2017 at compliance wells MW-4, MW-5 and MW-12. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

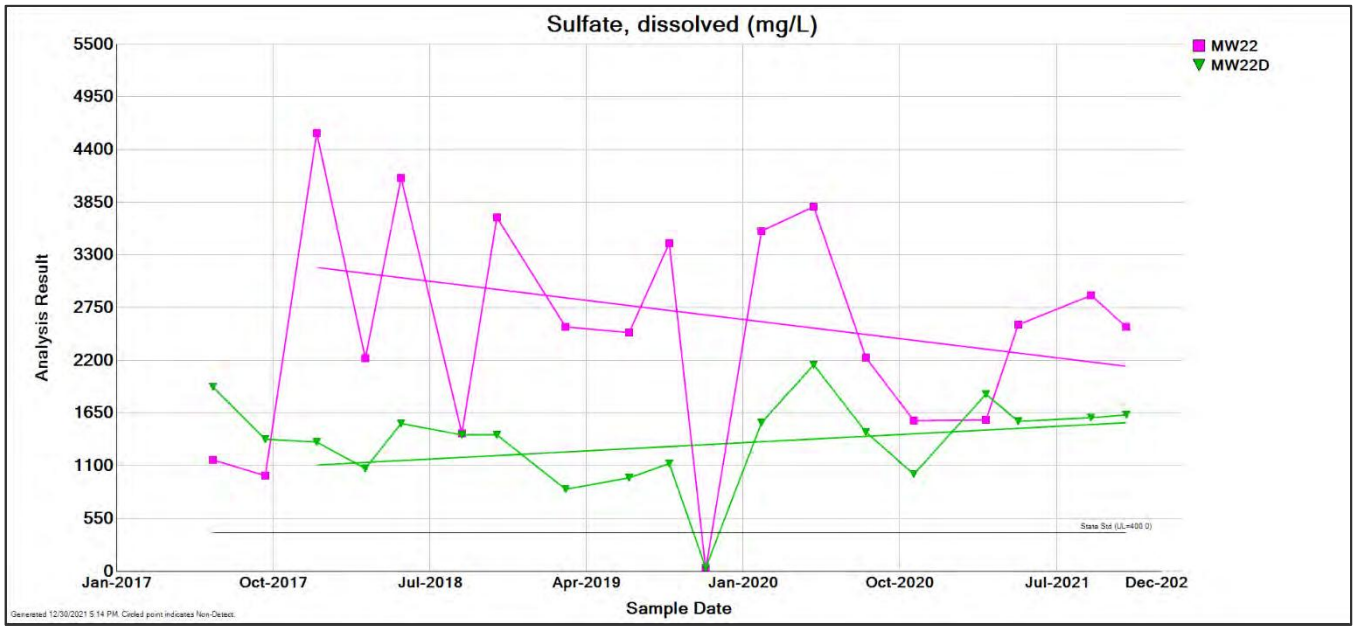


Figure 1-11. Sulfate concentrations since 2017 at compliance wells MW-22S and MW-22D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.

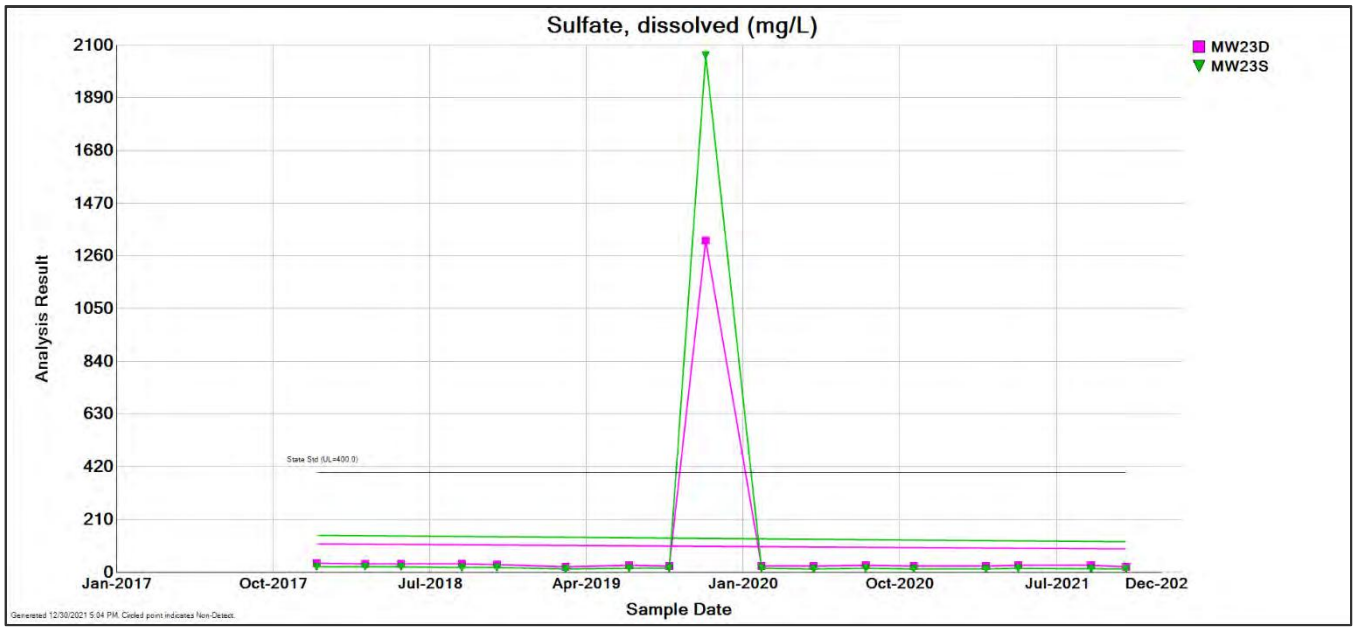
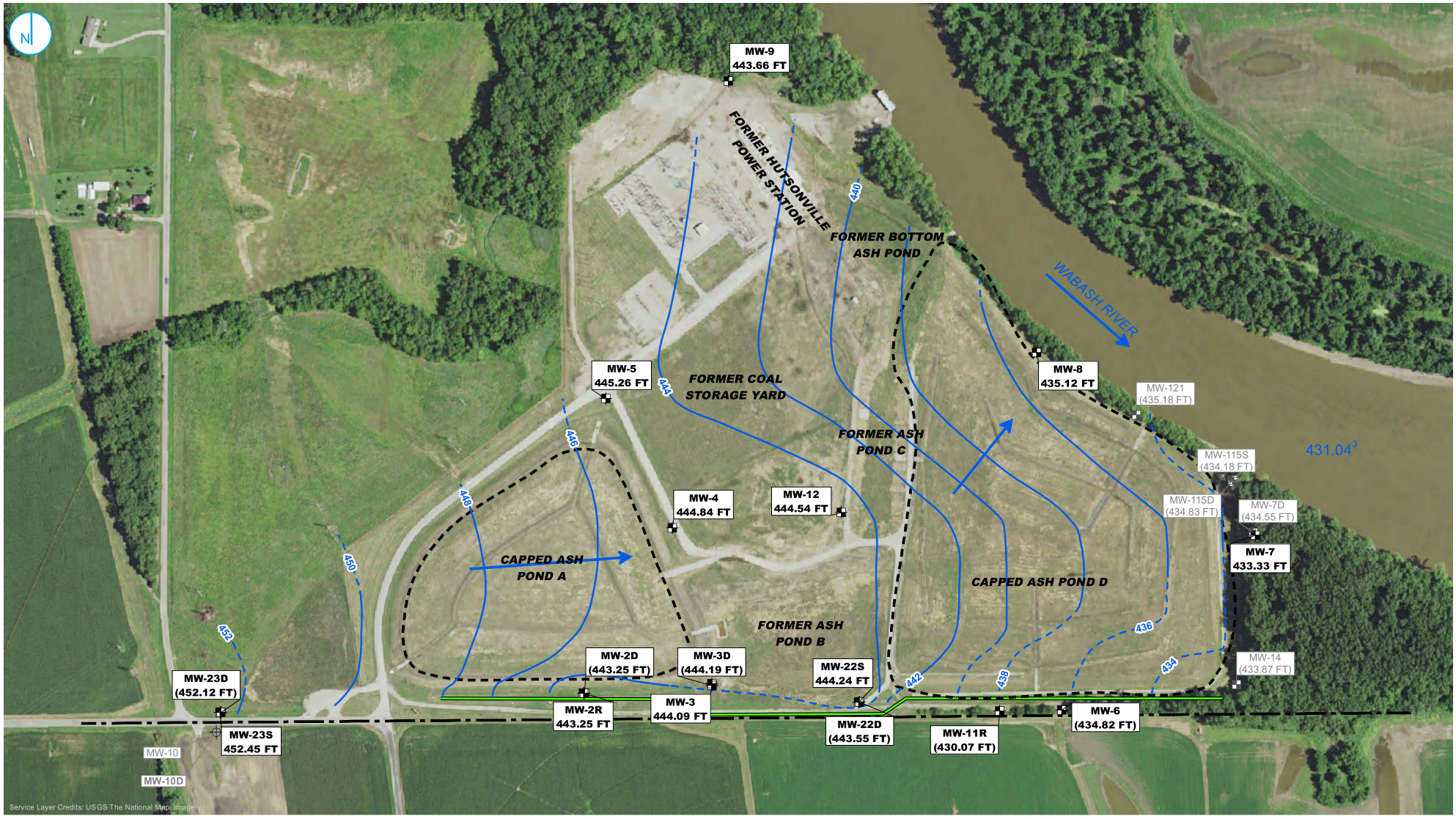


Figure 1-12. Sulfate concentrations since 2017 at compliance wells MW-23S and MW-23D. The Class I Groundwater Standard is not applicable within the GMZ and is shown for reference only.



PROJECT: 169000XXXX | DATED: 4/26/2021 | DESIGNER: galanmc

Y:\Mapping\Projects\24\24201MXDs\2021APA\Figure 3-1_Q1_2021_GW_Elevation.mxd

UPPER MIGRATION ZONE MONITORING WELL

DEEP MIGRATION ZONE MONITORING WELL

ABANDONED MONITORING WELL LOCATION

PROPERTY LINE

0 150 300 Feet

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)

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 1, 2021

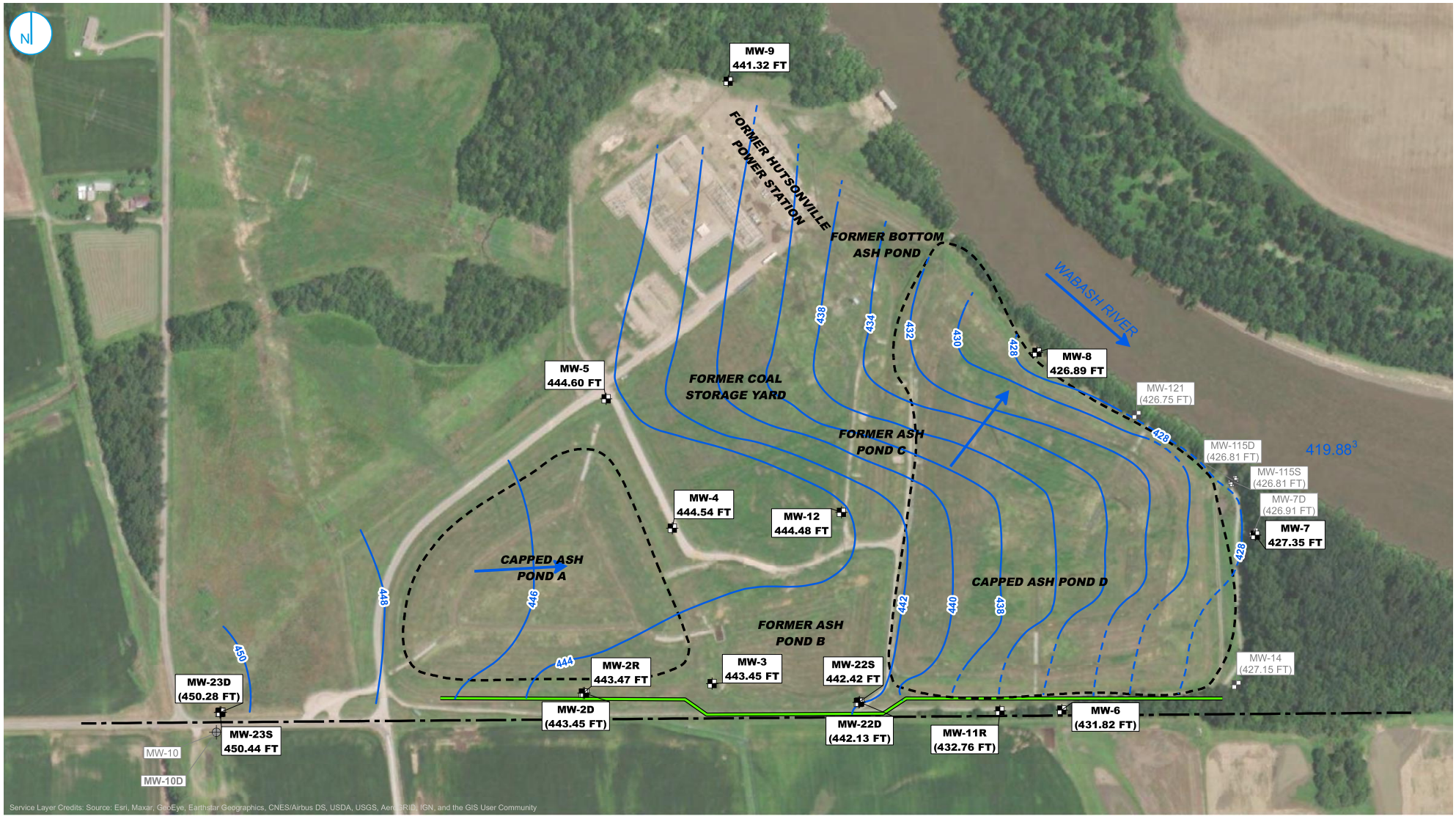
2021 ANNUAL REPORT
FORMER HUTSONVILLE POWER STATION - ASH POND A

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\2021APA\Figure 3-2_Q2_2021_GW_Elevation.mxd

PROJECT: 169000XXXX | DATED: 8/25/2021 | DESIGNER: CHURCHKE

- 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.

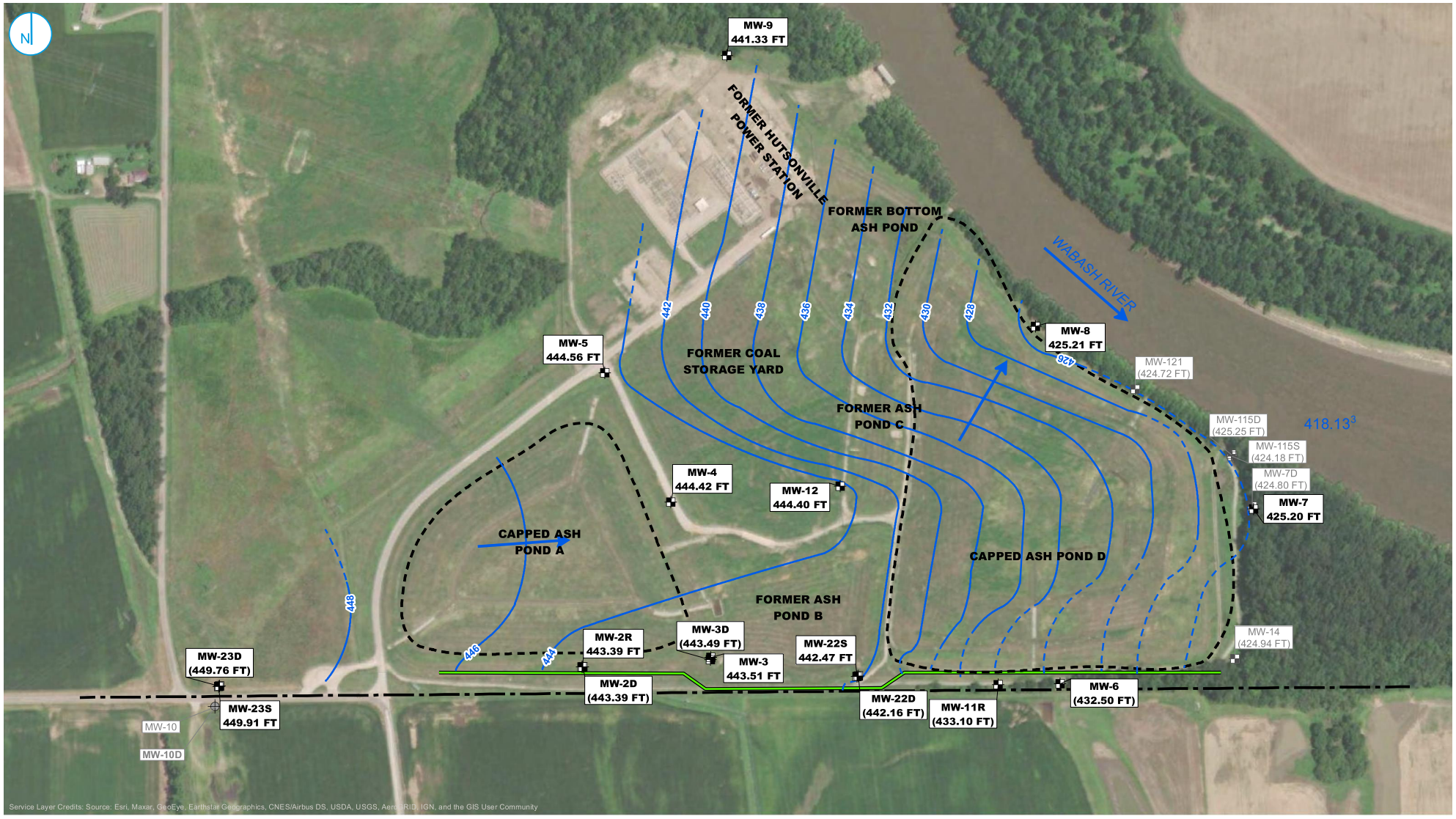
Q2 UPPER MIGRATION ZONE GROUNDWATER ELEVATION CONTOUR MAP APRIL 26, 2021

2021 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



Y:\Mapping\Projects\241240\MXDs\2021APA\Figure 3-3_Q3_2021_GW_Elevation.mxd

PROJECT: 169000XXXX | DATED: 1/6/2022 | 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

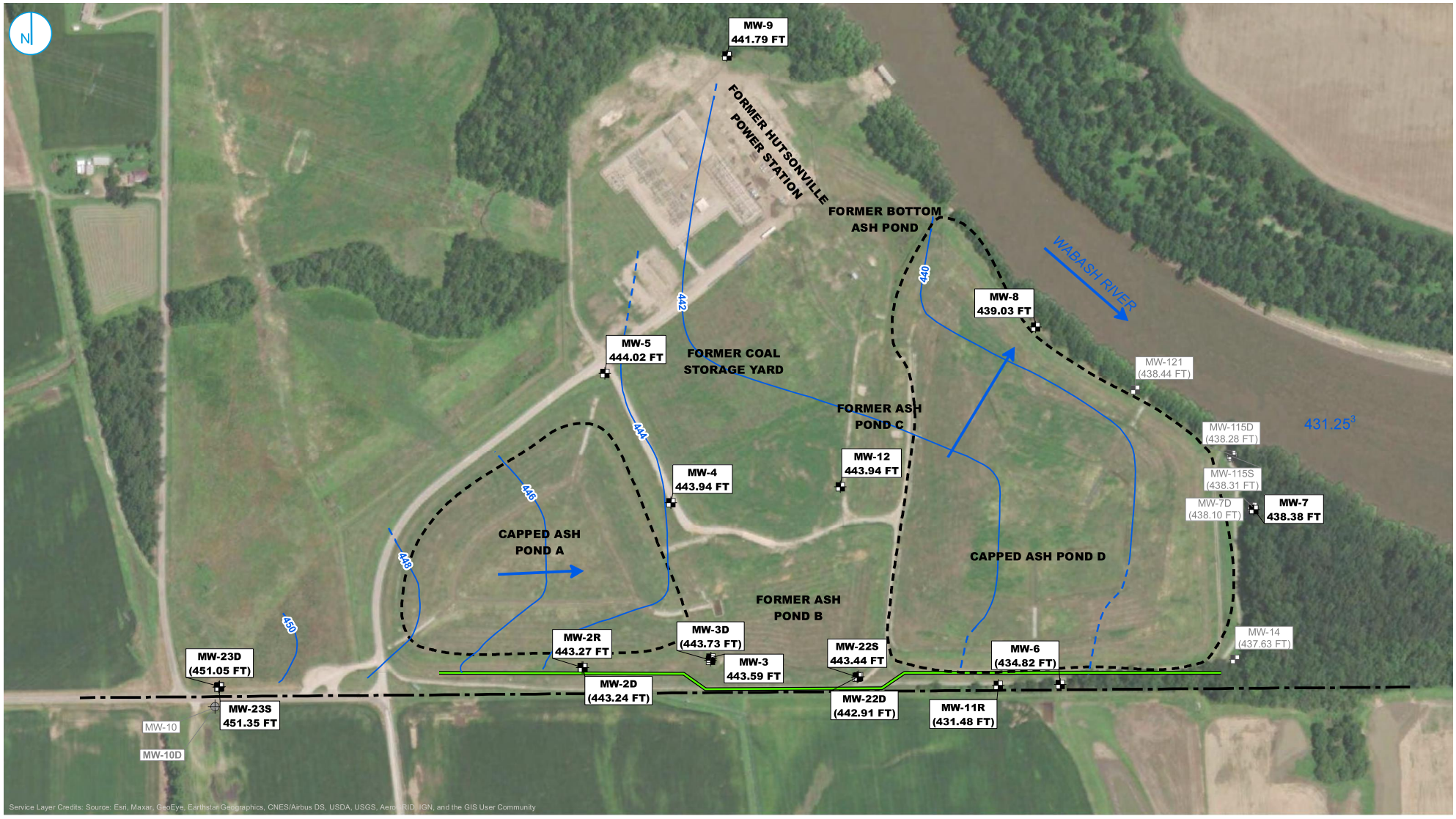
1) GROUNDWATER AND RIVER ELEVATIONS REPORTED IN FEET NORTH AMERICAN VERTICAL DATUM OF 1988.
2) GROUNDWATER ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
3) WABASH RIVER ELEVATIONS AS REPORTED BY USGS FROM USGS 03342000 WABASH RIVER AT RIVERTON, IN LOCATED APPROXIMATELY 12.5 RIVER MILES DOWNSTREAM. 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 SEPTEMBER 1, 2021

2021 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



UPPER MIGRATION ZONE MONITORING WELL
DEEP MIGRATION ZONE MONITORING WELL
ABANDONED MONITORING WELL LOCATION
PROPERTY LINE

0 150 300 Feet

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)

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. NO DATA AVAILABLE FOR NOVEMBER 1, 2021. THE WABASH RIVER ELEVATION PRESENTED ON THIS FIGURE WAS COLLECTED ON OCTOBER 29, 2021.

Q4 UPPER MIGRATION ZONE GROUNDWATER ELEVATION CONTOUR MAP NOVEMBER 1, 2021

2021 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

RAMBOLL

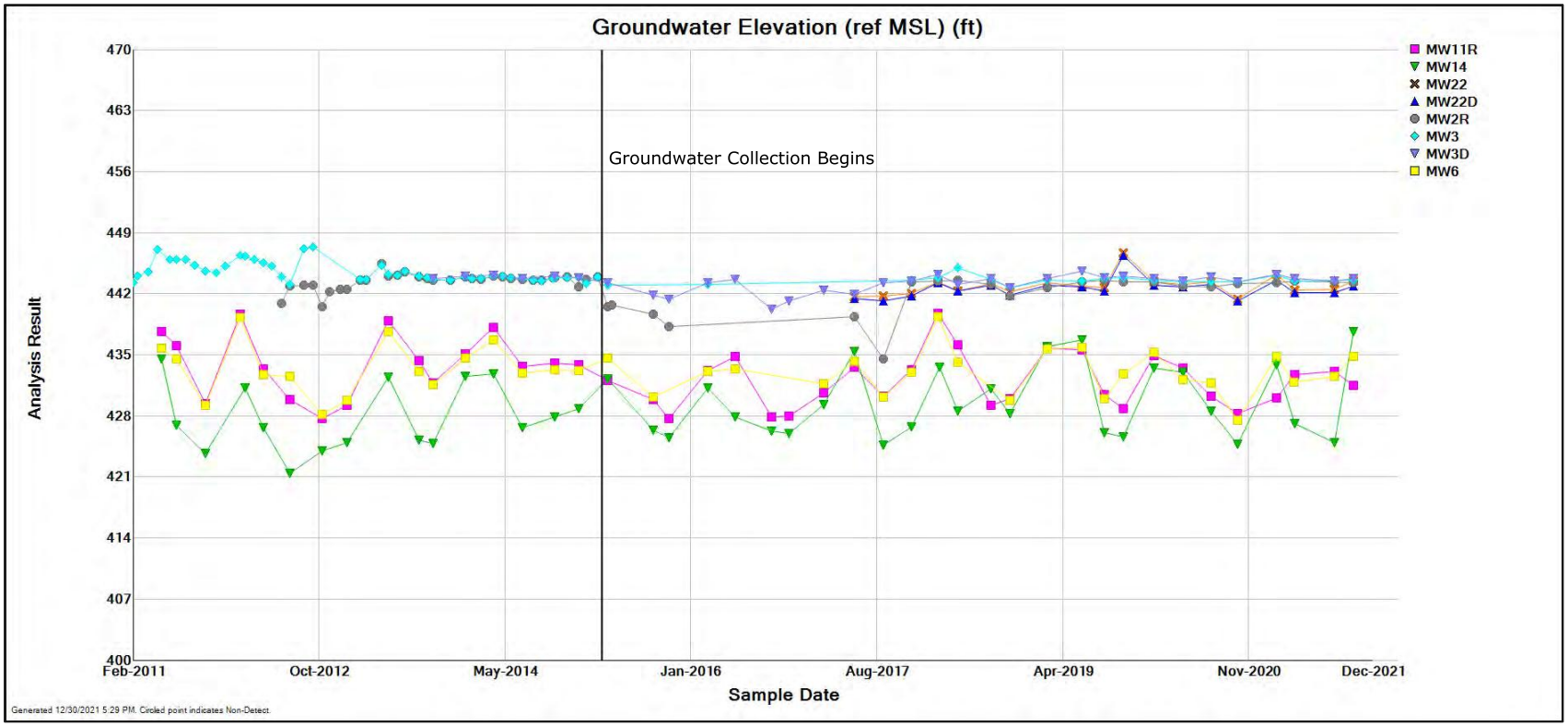


Figure 3-5. Groundwater elevations near groundwater collection trench

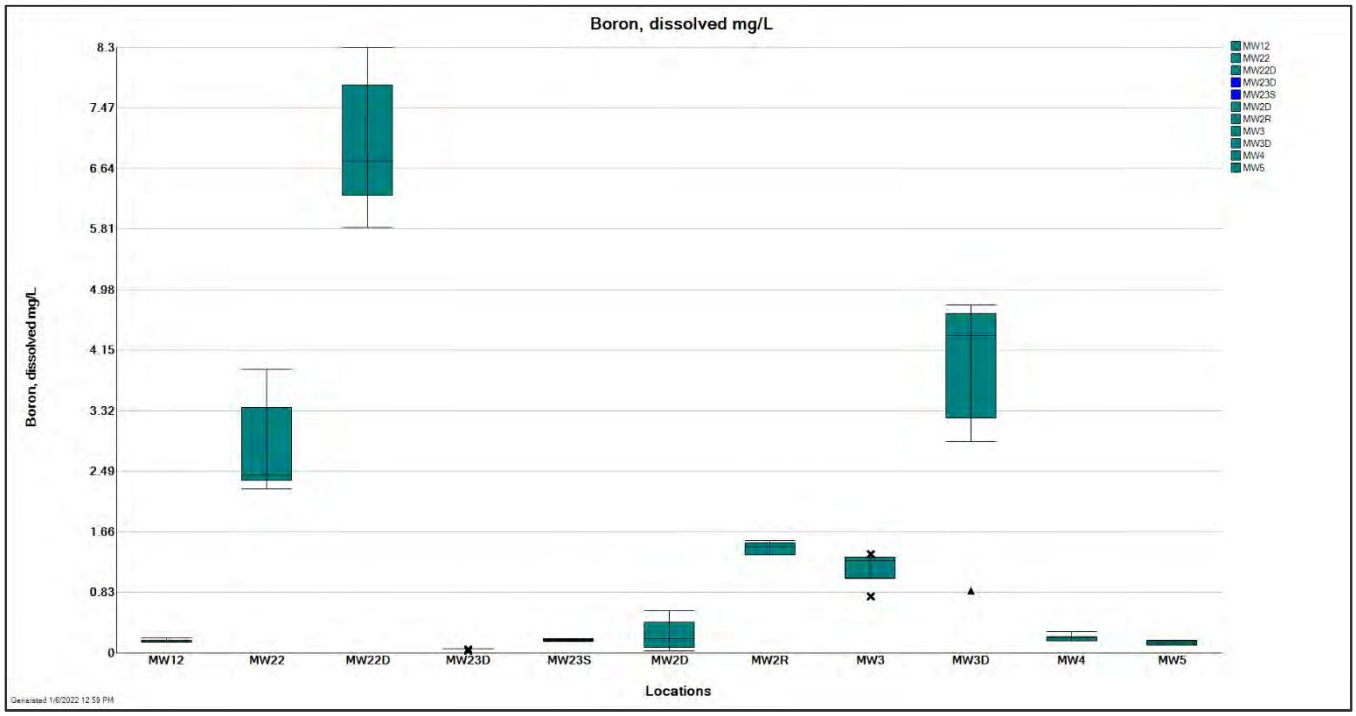


Figure 3-6. Box-whisker plot showing distribution of **boron** concentration by monitoring well for data collected in 2020 and 2021. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

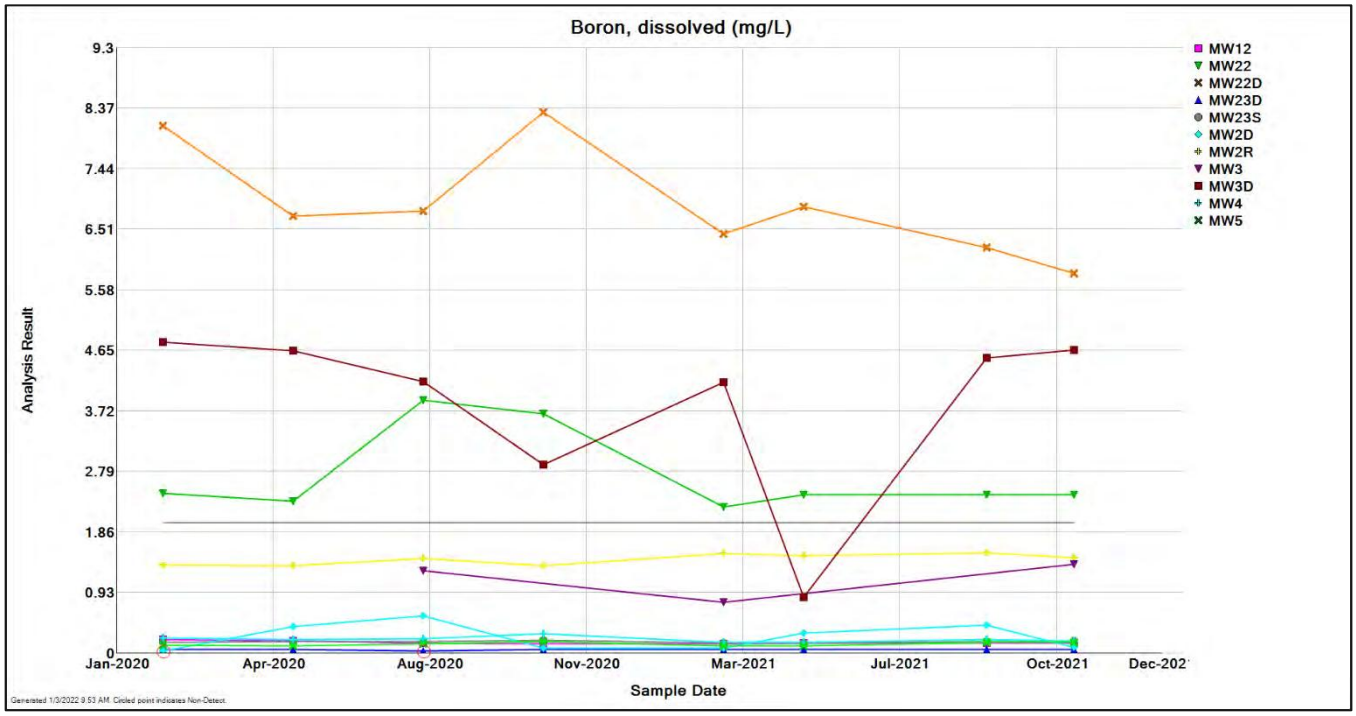


Figure 3-7. Boron concentrations during the reporting period (2020-2021) at all background and compliance wells. Note: Circled results indicate non-detects.

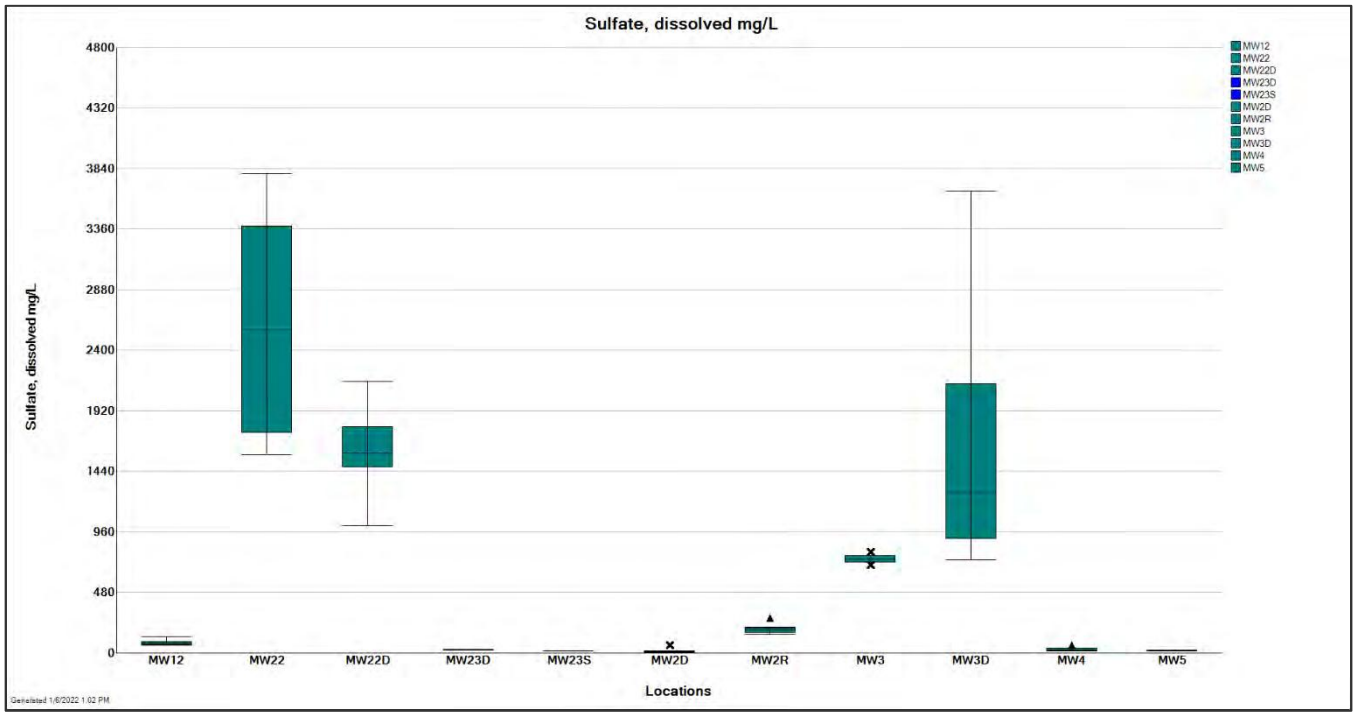


Figure 3-8. Box-whisker plot showing distribution of **sulfate** concentration by monitoring well for data collected in 2020 and 2021. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

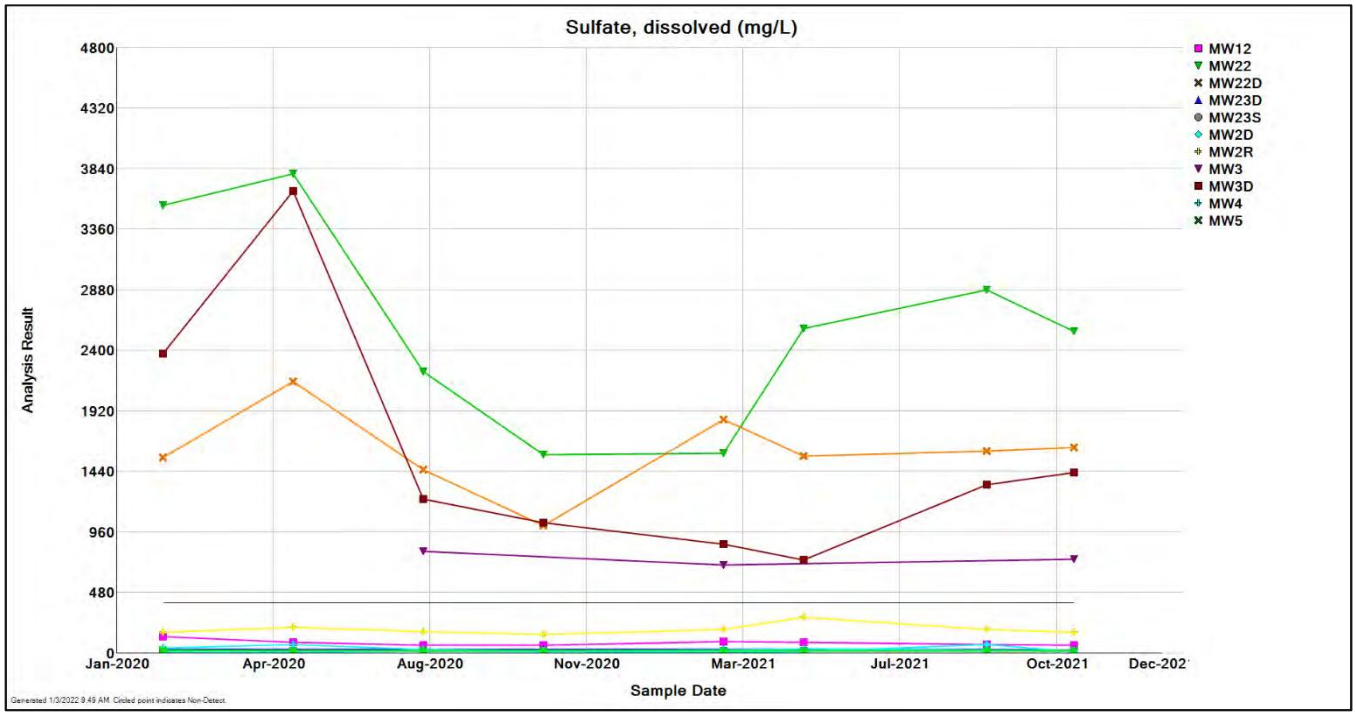


Figure 3-9. Sulfate concentrations during the reporting period (2020-2021) at all background and compliance wells.

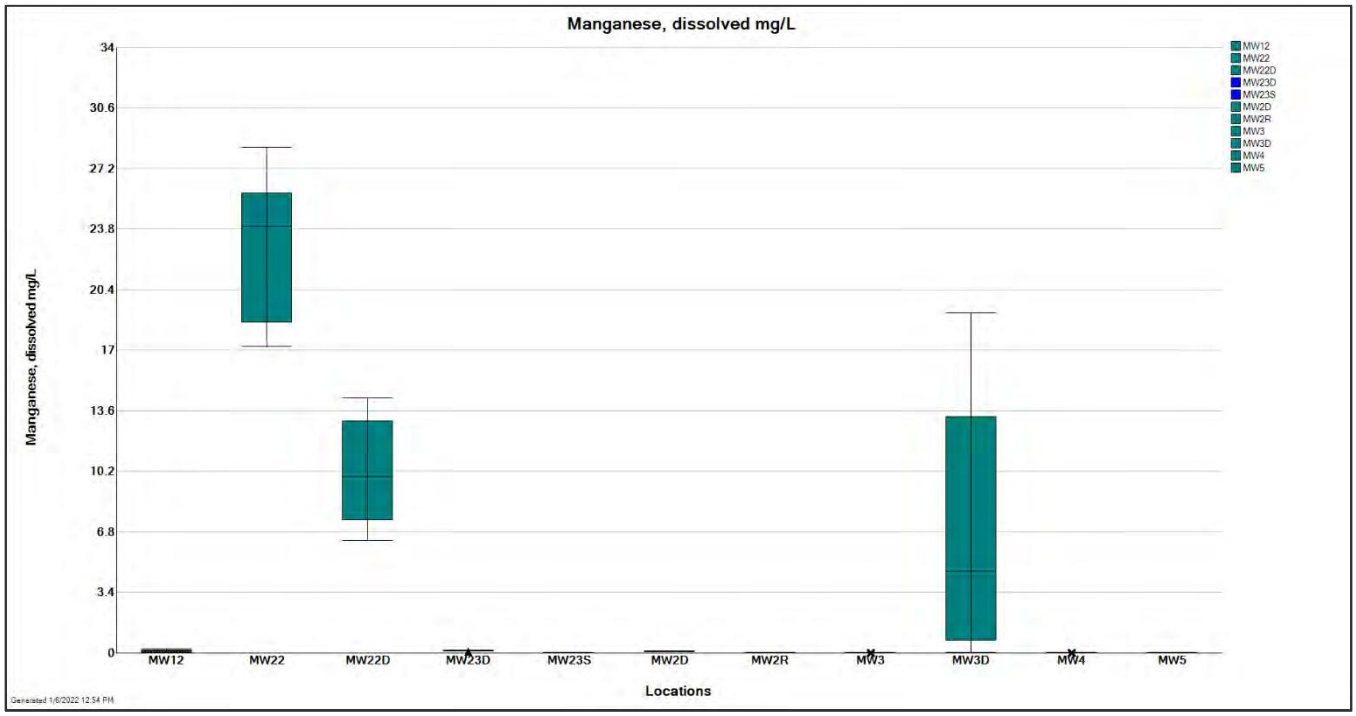


Figure 3-10A. Box-whisker plot showing distribution of **manganese** concentration by monitoring well for data collected in 2020 and 2021. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

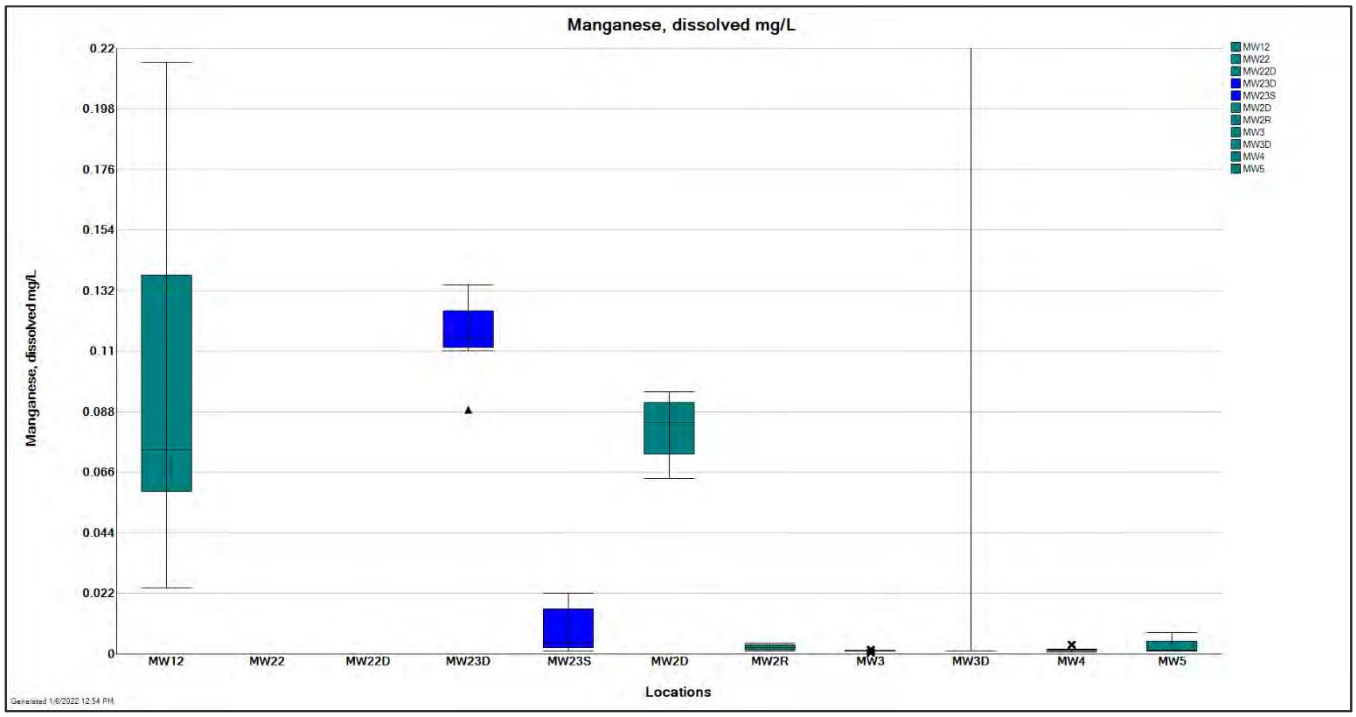


Figure 3-10B. Box-whisker plot showing distribution of **manganese** concentration by monitoring well for data collected in 2020 and 2021 (zoomed in). Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

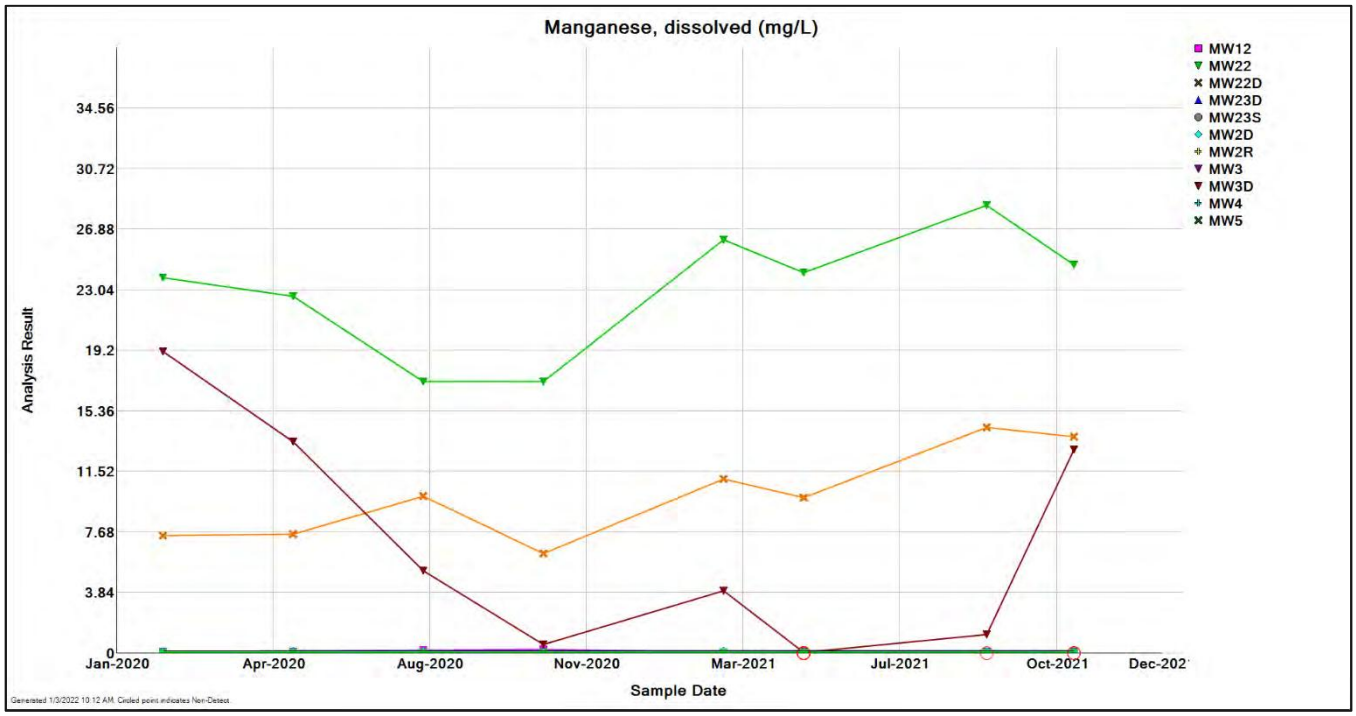


Figure 3-11A. Manganese concentrations during the reporting period (2020-2021) at all background and compliance wells. Note: Circled results indicate non-detects.

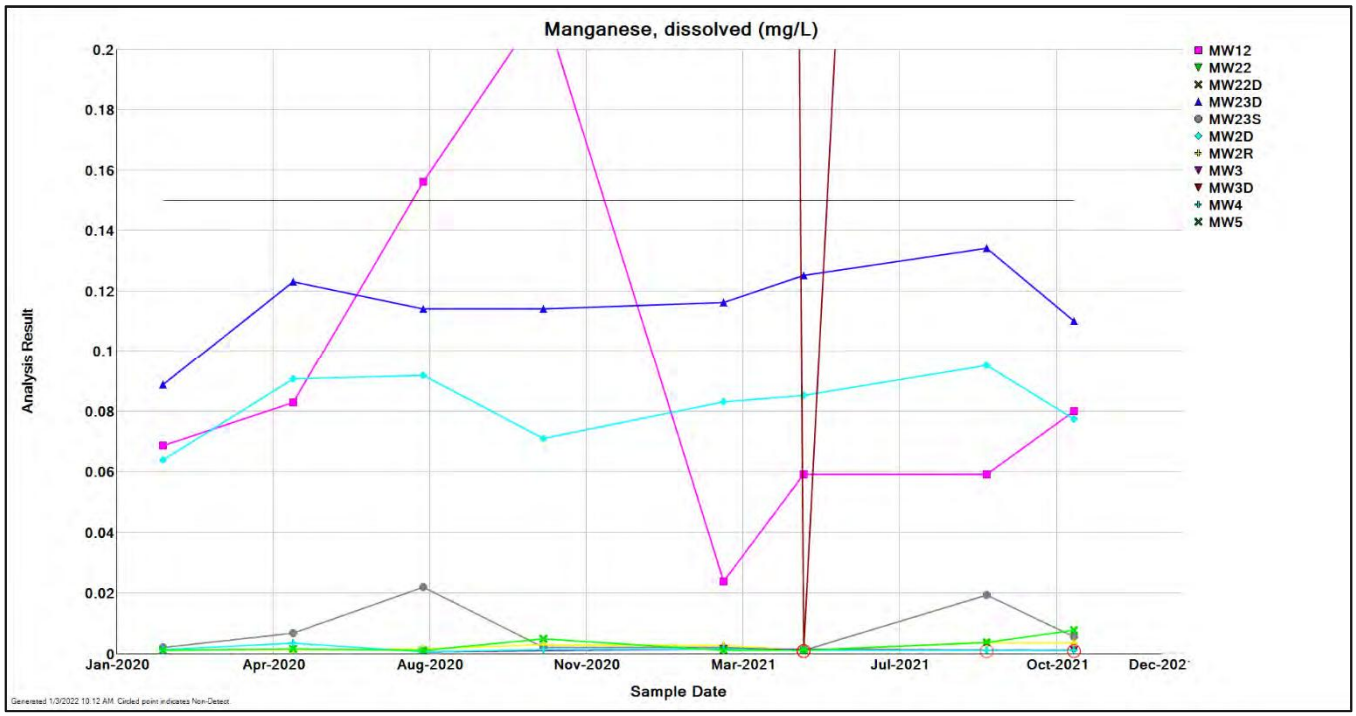


Figure 3-11B. Manganese concentrations during the reporting period (2020-2021) at all background and compliance wells. Zoomed in to show the Class I groundwater standard. Note: Circled results indicate non-detects.

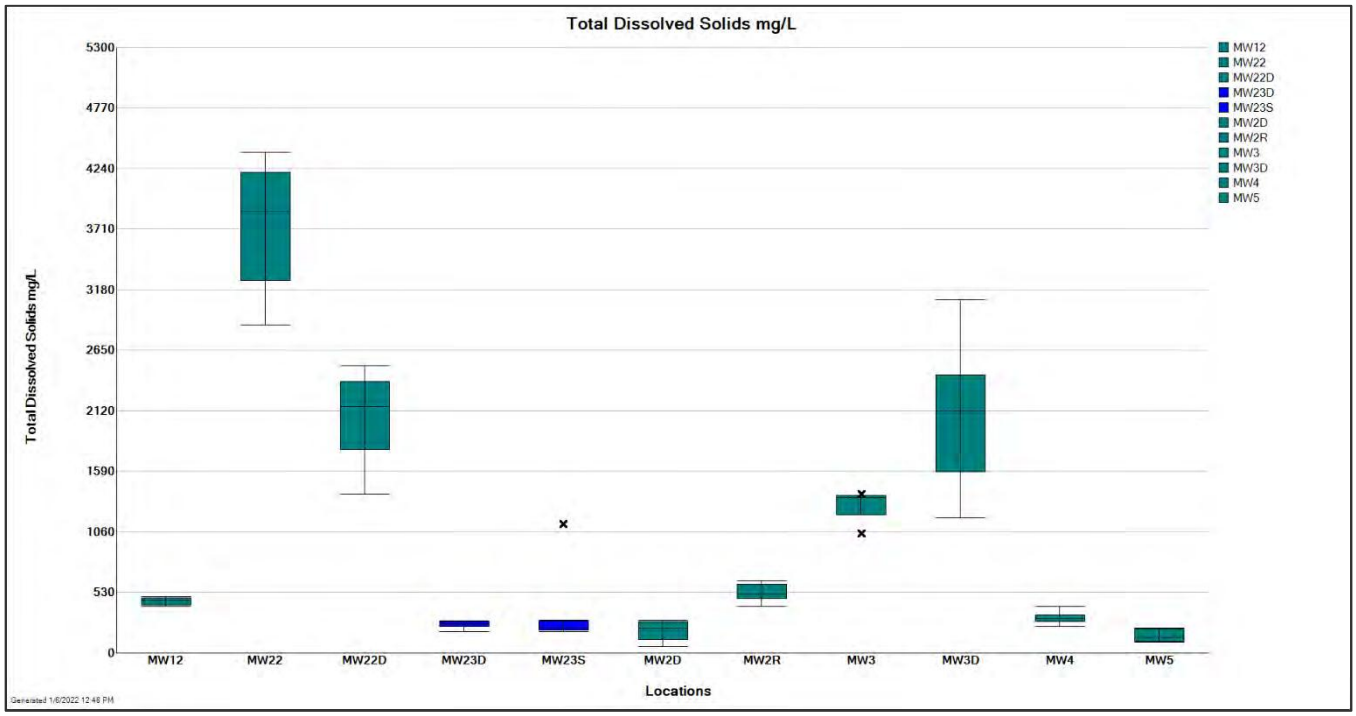


Figure 3-12. Box-whisker plot showing distribution of **total dissolved solids** concentration by monitoring well for data collected in 2020 and 2021. Note: Box-whisker plots for background wells are blue and box-whisker plots for compliance wells are green.

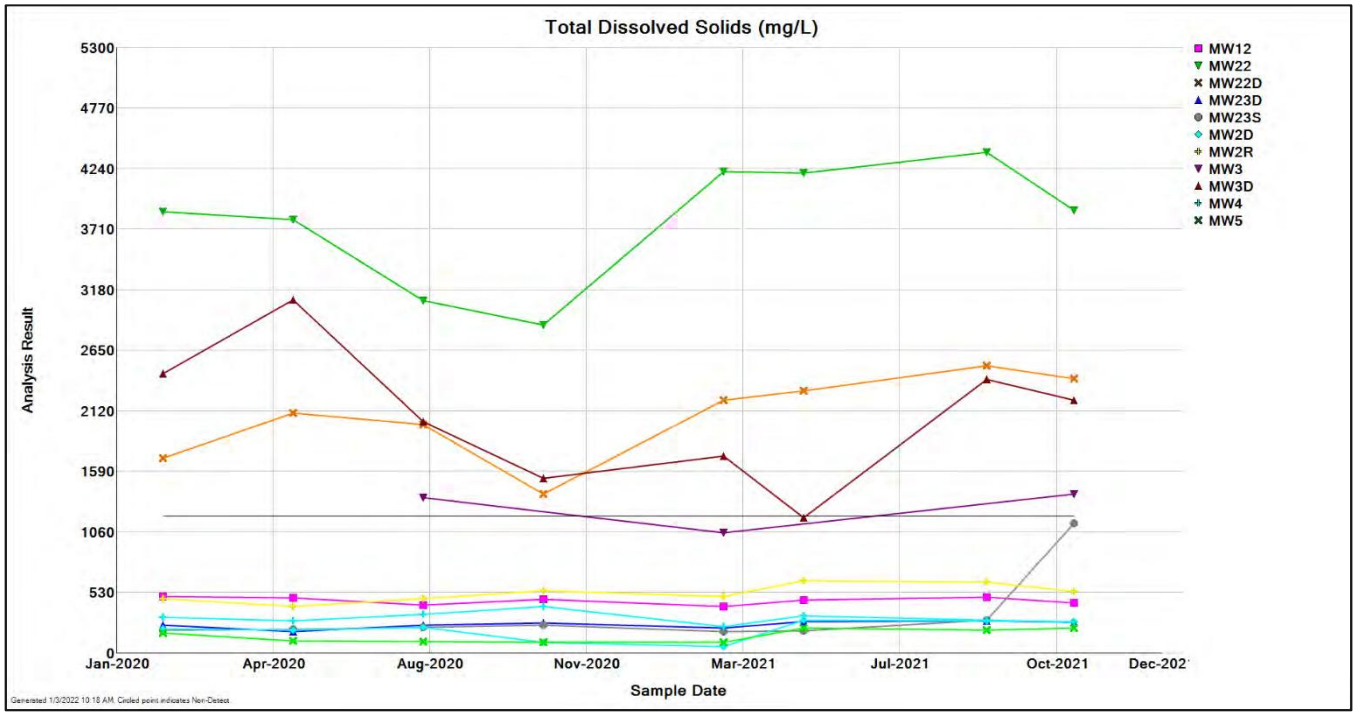


Figure 3-13. Total dissolved solids concentrations during the reporting period (2020-2021) at all background and compliance wells.

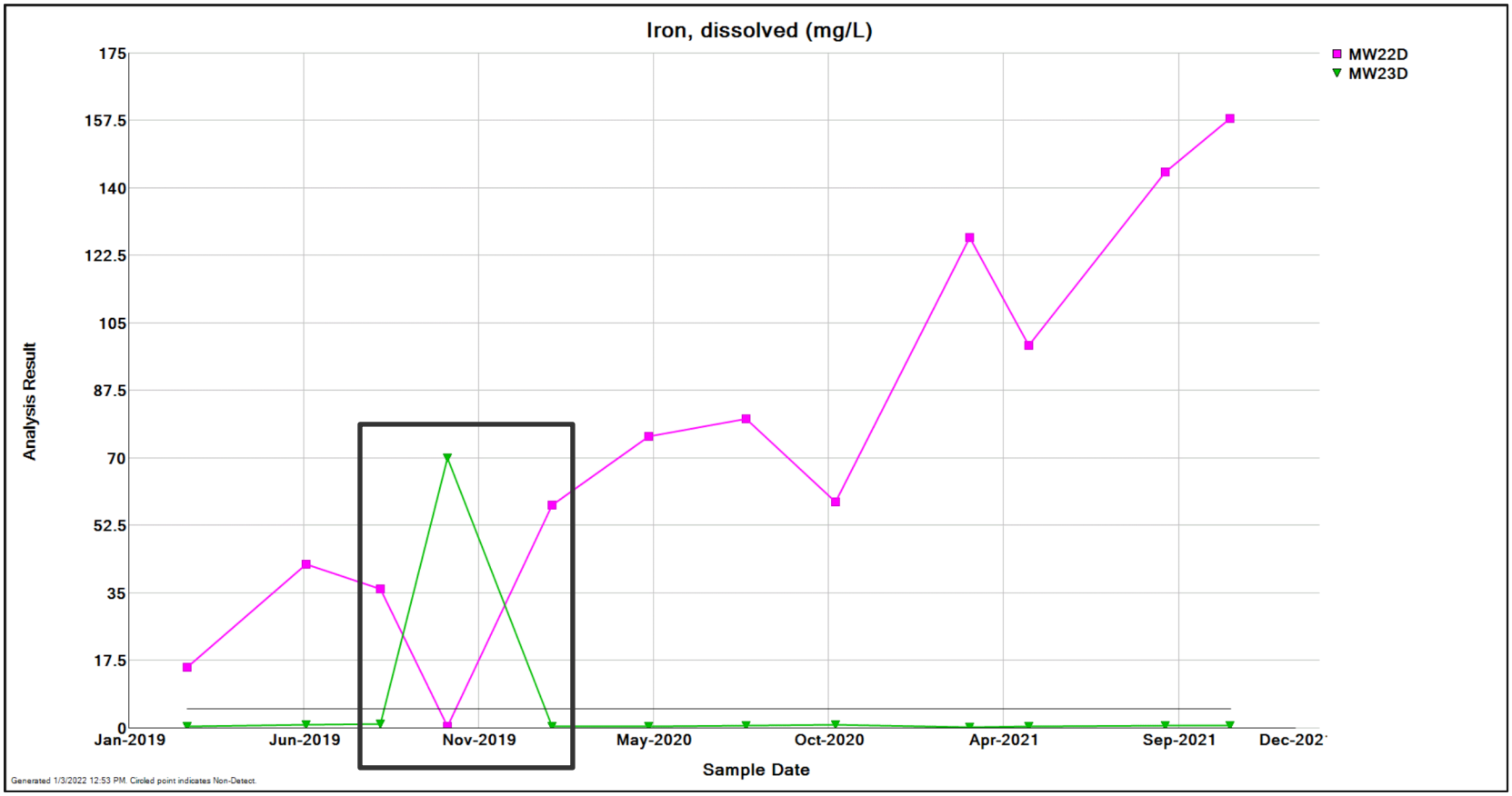


Figure 4-1. Analytical Data Inversion at MW-22D and MW-23D for Iron

APPENDIX A
GROUNDWATER MONITORING RESULTS 2020-2021

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

Date Range: 01/01/2020 to 12/31/2021
Well: MW2D

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0055	0.0054	0.0068	0.0095	0.0044	0.0067	0.0049	0.0075
B, diss, mg/L	<0.0250	0.4000	0.5700	0.0700	0.0700	0.3000	0.4200	0.0800
Ba, diss, mg/L	0.066	0.085	0.103	0.062	0.053	0.092	0.097	0.061
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	11.7	10.9	12.6	11.6	13.7	11.8	13.1	12.1
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	0.2	0.2	0.2	0.2	0.2	<0.1	0.2	<0.1
Fe, diss, mg/L	0.651	0.758	1.480	1.280	0.109	0.133	0.664	0.393
GW Depth (TOC), ft	12.08	12.54	12.68	12.22	12.17	11.97	12.03	12.18
GW Elv, ft	443.34	442.88	442.74	443.20	443.25	443.45	443.39	443.24
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0637	0.0905	0.0916	0.0708	0.0829	0.0851	0.0951	0.0772
Ni, diss, mg/L	<0.0003	<0.0003	<0.0003	0.0002	<0.0003	0.0008	0.0002	<0.0003
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	7.42	7.49	7.43	7.45	7.43	7.53	7.52	7.59
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	<0.0025
SO4, diss, mg/L	2.6	3.2	16.1	8.0	3.7	6.2	64.9	8.2
Spec. Cond. (field), micromho	458	454	522	550	551	514	530	537
TDS, mg/L	208	196	220	92	54	284	276	272
Temp (Fahrenheit), degrees F	54.8	61.3	64.3	59.4	56.5	60.1	66.0	60.8
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: 01/01/2020 to 12/31/2021
Well: MW2R

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
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	1.3500	1.3400	1.4500	1.3400	1.5200	1.4900	1.5400	1.4600
Ba, diss, mg/L	0.029	0.030	0.035	0.032	0.027	0.035	0.028	0.027
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	20.7	19.3	21.1	20.1	23.9	23.1	22.5	19.3
CN, total, mg/L	<0.01	<0.01	<0.01	0.03	<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	0.0003	0.0003	<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	<0.010	0.040	0.116	<0.010	0.036	0.292	0.155
GW Depth (TOC), ft	12.02	12.50	12.60	12.18	12.12	11.90	11.98	12.10
GW Elv, ft	443.35	442.87	442.77	443.19	443.25	443.47	443.39	443.27
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0012	0.0013	0.0015	0.0029	0.0027	<0.0010	0.0037	0.0034
Ni, diss, mg/L	0.0002	<0.0003	0.0002	<0.0003	0.0004	0.0003	0.0003	0.0006
NO3, diss, mg/L	1.350	1.040	0.839	<0.100	1.150	1.290	0.747	0.892
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	7.41	7.40	7.47	7.30	7.41	7.22	7.42
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	0.0033	0.0027	0.0028	0.0043	0.0053	0.0040	0.0048
SO4, diss, mg/L	160.0	203.0	170.0	144.0	186.0	281.0	186.0	162.0
Spec. Cond. (field), micromho	767	782	820	835	941	927	867	856
TDS, mg/L	472	404	472	542	492	628	616	534
Temp (Fahrenheit), degrees F	55.0	60.0	66.0	60.1	54.9	59.1	66.2	62.6
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: 01/01/2020 to 12/31/2021
Well: MW3

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
Ag, diss, mg/L			<0.0003		<0.0003			<0.0003
As, diss, mg/L			<0.0003		<0.0003			<0.0003
B, diss, mg/L			1.2600		0.7800			1.3600
Ba, diss, mg/L			0.010		0.002			0.004
Be, diss, mg/L			<0.0010		<0.0010			<0.0010
Cd, diss, mg/L			<0.0003		<0.0003			<0.0003
Cl, diss, mg/L			1.3		2.5			6.7
CN, total, mg/L			<0.01		<0.01			<0.01
Co, diss, mg/L			<0.001		<0.001			<0.001
Cr, diss, mg/L			0.0005		0.0003			0.0004
Cu, diss, mg/L			<0.0005		<0.0005			<0.0005
F, diss, mg/L			0.3		0.3			0.3
Fe, diss, mg/L			0.069		<0.010			0.143
GW Depth (TOC), ft	11.30	11.50	11.50	11.52	10.75	11.39	11.33	11.25
GW Elv, ft	443.54	443.34	443.34	443.32	444.09	443.45	443.51	443.59
Hg, diss, mg/L			<0.0001		<0.0001			<0.0001
Mn, diss, mg/L			0.0006		0.0016			<0.0010
Ni, diss, mg/L			0.0004		0.0003			0.0002
NO3, diss, mg/L			1.690		0.497			0.884
Pb, diss, mg/L			<0.001		<0.001			<0.001
pH (field), STD			7.20		7.44			7.29
Sb, diss, mg/L			<0.002		<0.002			<0.002
Se, diss, mg/L			0.0056		0.0040			0.0083
SO4, diss, mg/L			803.0		698.0			740.0
Spec. Cond. (field), micromho			1600		1760			1640
TDS, mg/L			1360		1050			1390
Temp (Fahrenheit), degrees F			65.5		51.6			62.4
Tl, diss, mg/L			<0.0003		<0.0003			<0.0003
V, diss, mg/L			<0.001		<0.001			<0.001
Zn, diss, mg/L			0.03		0.02			0.03

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

Date Range: 01/01/2020 to 12/31/2021
Well: MW3D

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0024	0.0010	0.0011	0.0008	0.0042	<0.0003	0.0042	0.0112
B, diss, mg/L	4.7700	4.6400	4.1700	2.8900	4.1500	0.8500	4.5300	4.6500
Ba, diss, mg/L	0.014	0.009	0.020	0.012	0.009	0.003	<0.010	0.013
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cd, diss, mg/L	0.0050	0.0045	<0.0025	0.0009	0.0057	<0.0003	0.0090	0.0080
Cl, diss, mg/L	14.3	15.6	9.4	5.0	7.3	0.7	10.9	10.7
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	0.206	0.143	0.097	0.008	0.154	<0.001	0.262	0.216
Cr, diss, mg/L	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	0.0003	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	0.0012
F, diss, mg/L	0.7	<0.1	0.3	0.4	0.4	0.3	0.8	1.0
Fe, diss, mg/L	5.970	0.027	0.022	0.120	<0.100	0.044	1.480	4.790
GW Depth (TOC), ft	11.23	11.55	11.07	11.66	10.82	11.26	11.52	11.28
GW Elv, ft	443.78	443.46	443.94	443.35	444.19	443.75	443.49	443.73
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	19.1000	13.4000	5.1900	0.5220	3.9300	<0.0010	1.1700	12.9000
Ni, diss, mg/L	0.2560	0.2260	0.1340	0.0239	0.1800	0.0009	0.3150	0.2690
NO3, diss, mg/L	1.310	0.232	0.952	0.861	1.180	0.419	0.655	0.796
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	5.60	5.95	5.52	5.38	5.50	7.26	4.76	4.68
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0050	<0.0050	<0.0050	0.0031	<0.0100	0.0035	<0.0500	<0.0005
SO4, diss, mg/L	2370.0	3660.0	1220.0	1030.0	861.0	734.0	1330.0	1430.0
Spec. Cond. (field), micromho	2460	2940	2290	1680	2130	1380	2490	2290
TDS, mg/L	2440	3090	2020	1530	1720	1180	2390	2210
Temp (Fahrenheit), degrees F	55.4	58.0	62.3	59.6	53.5	56.9	64.3	60.3
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	0.03	0.03	0.04	0.02	0.05	0.02	0.06	0.05

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

Date Range: 01/01/2020 to 12/31/2021
Well: MW4

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
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	0.2300	0.2000	0.2100	0.2900	0.1600	0.1600	0.2000	0.1800
Ba, diss, mg/L	0.018	0.019	0.027	0.023	0.010	0.016	0.017	0.016
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	3.0	1.5	0.7	1.2	4.7	1.1	0.6	12.4
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	0.0005	0.0006	0.0007	0.0004	0.0004	0.0004	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	<0.1	<0.1	0.2	0.3	0.2	<0.1	0.2	0.2
Fe, diss, mg/L	<0.010	0.025	0.042	0.139	0.024	0.037	0.278	0.141
GW Depth (TOC), ft	11.88	12.06	12.24	15.20	11.92	12.22	12.34	12.82
GW Elv, ft	444.88	444.70	444.52	441.56	444.84	444.54	444.42	443.94
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0012	0.0034	0.0006	0.0012	0.0016	<0.0010	<0.0010	<0.0010
Ni, diss, mg/L	<0.0003	0.0003	<0.0003	<0.0003	0.0003	0.0010	<0.0003	<0.0003
NO3, diss, mg/L	3.370	3.660	0.900	1.030	1.180	2.470	0.618	0.509
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.07	7.16	7.25	7.19	7.37	7.12	7.16	7.29
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0023	0.0027	0.0014	0.0016	0.0014	0.0021	0.0015	0.0011
SO4, diss, mg/L	35.7	63.8	24.1	15.1	20.3	30.6	17.6	11.5
Spec. Cond. (field), micromho	545	601	526	556	569	524	484	599
TDS, mg/L	308	282	334	402	232	320	284	264
Temp (Fahrenheit), degrees F	53.0	54.8	69.7	60.7	52.1	54.2	68.1	62.0
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: 01/01/2020 to 12/31/2021
Well: MW5

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
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	0.1200	0.1000	0.1400	0.1700	0.1000	0.1000	0.1600	0.1600
Ba, diss, mg/L	0.018	0.017	0.029	0.027	0.013	0.017	0.022	0.027
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	2.6	4.7	3.6	2.6	3.7	0.8	0.9	16.0
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	0.0003	0.0004	0.0004	0.0005	0.0004	0.0004	<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	<0.010	0.042	0.185	<0.010	0.046	0.304	0.155
GW Depth (TOC), ft	10.43	9.78	9.87	11.42	9.41	10.07	10.11	10.65
GW Elv, ft	444.24	444.89	444.80	443.25	445.26	444.60	444.56	444.02
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0011	0.0015	0.0010	0.0049	0.0010	<0.0010	0.0037	0.0077
Ni, diss, mg/L	<0.0003	0.0002	0.0004	0.0008	0.0003	0.0009	0.0002	0.0002
NO3, diss, mg/L	0.427	0.509	0.383	0.291	0.485	0.336	0.338	0.600
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	6.93	6.93	6.77	6.72	7.06	6.87	6.58	6.77
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0020	0.0013	0.0011	<0.0010	0.0014	0.0020	0.0014	0.0015
SO4, diss, mg/L	17.4	15.2	16.2	11.7	13.5	15.5	12.8	14.9
Spec. Cond. (field), micromho	280	278	297	301	310	253	326	370
TDS, mg/L	172	102	96	94	94	216	200	216
Temp (Fahrenheit), degrees F	53.5	56.1	71.9	63.1	50.3	55.3	70.0	64.6
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: 01/01/2020 to 12/31/2021
Well: MW12

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
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	0.2000	0.1800	0.1500	0.1400	0.1400	0.1500	0.1500	0.1500
Ba, diss, mg/L	0.017	0.017	0.025	0.018	0.013	0.014	0.015	0.016
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050
Cd, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Cl, diss, mg/L	3.6	2.9	2.5	1.8	4.8	2.3	2.0	11.3
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	<0.0010	<0.0010	<0.0010	0.0003	<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	<0.010	0.030	0.151	<0.010	0.036	0.317	0.142
GW Depth (TOC), ft	11.75	12.02	12.40	13.53	12.20	12.26	12.34	12.80
GW Elv, ft	444.99	444.72	444.34	443.21	444.54	444.48	444.40	443.94
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0685	0.0827	0.1560	0.2150	0.0238	0.0590	0.0590	0.0799
Ni, diss, mg/L	0.0008	0.0007	0.0008	0.0009	0.0004	0.0014	0.0003	0.0002
NO3, diss, mg/L	1.440	1.630	1.110	2.220	1.160	1.080	1.360	1.210
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	6.92	7.00	6.95	6.95	7.06	6.92	7.00	6.94
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	0.0029	0.0031	0.0022	0.0013	0.0022	0.0017	0.0023	0.0021
SO4, diss, mg/L	125.0	81.6	60.5	58.1	87.3	82.6	68.1	59.3
Spec. Cond. (field), micromho	811	830	813	825	907	794	834	937
TDS, mg/L	490	478	414	468	406	458	484	434
Temp (Fahrenheit), degrees F	55.0	56.0	65.8	59.6	57.2	55.3	65.0	59.9
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: 01/01/2020 to 12/31/2021
Well: MW22

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0005
As, diss, mg/L	0.0082	0.0082	0.0060	0.0084	0.0074	0.0090	0.0061	0.0100
B, diss, mg/L	2.4500	2.3300	3.8800	3.6700	2.2400	2.4300	2.4300	2.4300
Ba, diss, mg/L	0.006	0.006	0.014	0.009	0.006	0.006	0.008	0.011
Be, diss, mg/L	0.0068	0.0054	0.0082	<0.0100	0.0074	0.0092	0.0111	<0.0100
Cd, diss, mg/L	0.0030	0.0032	0.0042	0.0041	0.0036	0.0048	0.0043	0.0041
Cl, diss, mg/L	10.3	8.2	8.5	<0.3	10.9	8.0	8.9	10.6
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	0.114	0.104	0.086	0.083	0.114	0.117	0.123	0.122
Cr, diss, mg/L	0.0005	0.0005	0.0005	0.0006	0.0004	0.0006	0.0005	<0.0020
Cu, diss, mg/L	0.0055	0.0071	<0.0005	0.0072	0.0122	0.0084	0.0114	0.0096
F, diss, mg/L	0.6	0.6	0.7	1.0	0.7	0.6	0.8	0.6
Fe, diss, mg/L	401.000	333.000	248.000	233.000	450.000	446.000	561.000	420.000
GW Depth (TOC), ft	8.10	8.38	8.08	10.08	7.24	9.06	9.01	8.04
GW Elv, ft	443.38	443.10	443.40	441.40	444.24	442.42	442.47	443.44
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002
Mn, diss, mg/L	23.8000	22.6000	17.2000	17.2000	26.2000	24.1000	28.4000	24.6000
Ni, diss, mg/L	0.1020	0.0938	0.1020	0.0926	0.1190	0.1280	0.1450	0.1220
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	0.006	0.005	0.006	0.005	0.006	0.008	0.007
pH (field), STD	3.67	3.76	3.93	3.89	4.08	3.97	3.71	3.58
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004
Se, diss, mg/L	<0.0050	<0.0025	<0.0250	0.0504	<0.0100	<0.0100	<0.0500	<0.0100
SO4, diss, mg/L	3550.0	3800.0	2230.0	1570.0	1580.0	2570.0	2880.0	2550.0
Spec. Cond. (field), micromho	3210	3090	3140	2880	4090	3730	3870	3550
TDS, mg/L	3860	3790	3080	2870	4210	4200	4380	3870
Temp (Fahrenheit), degrees F	52.9	57.1	65.9	58.8	52.3	57.2	69.5	61.8
Tl, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0005
V, diss, mg/L	0.002	<0.001	0.002	0.002	<0.001	0.003	<0.001	<0.002
Zn, diss, mg/L	0.44	0.40	0.64	0.37	0.65	0.81	0.78	0.55

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

Date Range: 01/01/2020 to 12/31/2021
Well: MW22D

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
Ag, diss, mg/L	<0.0003	<0.0003	<0.0025	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0017	0.0017	0.0014	0.0008	0.0021	0.0020	0.0020	0.0031
B, diss, mg/L	8.1000	6.7100	6.7800	8.3000	6.4300	6.8500	6.2200	5.8300
Ba, diss, mg/L	0.028	0.027	0.038	0.029	0.023	0.027	0.029	0.029
Be, diss, mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	0.0023	0.0027	<0.0100
Cd, diss, mg/L	0.0014	0.0012	<0.0025	0.0010	0.0016	0.0017	0.0019	0.0021
Cl, diss, mg/L	8.4	8.0	8.1	8.2	8.5	8.2	8.7	8.1
CN, total, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co, diss, mg/L	0.091	0.078	0.074	0.057	0.074	0.079	0.113	0.109
Cr, diss, mg/L	<0.0010	<0.0010	0.0003	0.0004	<0.0010	0.0004	<0.0010	<0.0010
Cu, diss, mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0017	0.0024
F, diss, mg/L	0.4	0.5	0.5	0.3	0.5	0.5	0.8	0.6
Fe, diss, mg/L	57.700	75.400	80.000	58.500	127.000	99.000	144.000	158.000
GW Depth (TOC), ft	8.35	8.61	8.33	10.23	7.81	9.23	9.20	8.45
GW Elv, ft	443.01	442.75	443.03	441.13	443.55	442.13	442.16	442.91
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	7.4100	7.5400	9.9100	6.3100	11.0000	9.8200	14.3000	13.7000
Ni, diss, mg/L	0.0420	0.0431	0.0433	0.0321	0.0480	0.0491	0.0647	0.0671
NO3, diss, mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pb, diss, mg/L	0.007	0.008	<0.010	0.003	0.006	0.011	0.010	0.016
pH (field), STD	5.38	5.32	5.32	5.55	5.14	5.16	5.05	4.84
Sb, diss, mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se, diss, mg/L	<0.0050	<0.0025	<0.0050	<0.0025	<0.0100	<0.0050	<0.0050	<0.0050
SO4, diss, mg/L	1550.0	2150.0	1450.0	1010.0	1850.0	1560.0	1600.0	1630.0
Spec. Cond. (field), micromho	1960	1970	2370	1950	2620	2510	2630	2660
TDS, mg/L	1700	2100	2000	1390	2210	2290	2510	2400
Temp (Fahrenheit), degrees F	55.0	59.0	62.0	58.2	52.5	58.5	64.9	59.1
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	0.16	0.15	0.19	0.13	0.22	0.22	0.26	0.28

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

Date Range: 01/01/2020 to 12/31/2021
Well: MW23D

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
Ag, diss, mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
As, diss, mg/L	0.0022	0.0028	0.0032	0.0036	0.0012	0.0030	0.0025	0.0027
B, diss, mg/L	0.0500	0.0500	<0.0250	0.0500	0.0500	0.0500	0.0500	0.0500
Ba, diss, mg/L	0.045	0.045	0.056	0.049	0.043	0.049	0.048	0.042
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	5.3	5.0	4.7	5.0	4.9	4.1	4.7	4.6
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	0.277	0.412	0.565	0.697	0.076	0.248	0.557	0.445
GW Depth (TOC), ft	4.80	5.80	4.24	6.95	3.78	5.62	6.14	4.85
GW Elv, ft	451.10	450.10	451.66	448.95	452.12	450.28	449.76	451.05
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0887	0.1230	0.1140	0.1140	0.1160	0.1250	0.1340	0.1100
Ni, diss, mg/L	0.0002	<0.0003	<0.0003	0.0003	<0.0003	0.0002	0.0003	<0.0003
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	7.60	7.27	7.15	7.33	7.34	7.31	7.30	7.34
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	23.8	25.0	26.0	24.6	24.1	25.8	26.8	22.2
Spec. Cond. (field), micromho	444	466	460	486	524	492	506	482
TDS, mg/L	242	188	240	260	218	272	282	266
Temp (Fahrenheit), degrees F	57.8	58.5	62.1	58.2	52.3	58.2	64.5	60.0
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: 01/01/2020 to 12/31/2021
Well: MW23S

	2/3/2020	5/4/2020	8/3/2020	10/26/2020	3/1/2021	4/26/2021	9/1/2021	11/1/2021
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	0.1700	0.1700	0.1900	0.1500	0.1500	0.1700	0.1800
Ba, diss, mg/L	0.039	0.043	0.049	0.040	0.034	0.042	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	2.3	2.3	2.0	2.0	3.5	1.6	1.9	4.2
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	0.6	<0.1	<0.1	<0.1	<0.1
Fe, diss, mg/L	<0.010	<0.010	0.059	0.148	<0.010	0.036	0.285	0.056
GW Depth (TOC), ft	4.60	4.90	3.90	6.92	3.58	5.59	6.12	4.68
GW Elv, ft	451.43	451.13	452.13	449.11	452.45	450.44	449.91	451.35
Hg, diss, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn, diss, mg/L	0.0021	0.0068	0.0219	0.0020	0.0020	<0.0010	0.0194	0.0055
Ni, diss, mg/L	0.0004	0.0002	0.0004	0.0002	0.0002	0.0003	0.0002	<0.0003
NO3, diss, mg/L	0.287	0.363	0.395	<0.100	0.262	0.269	<0.100	0.248
Pb, diss, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH (field), STD	7.13	7.15	6.86	6.87	7.06	6.81	6.79	6.98
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	14.3	14.1	14.8	14.0	13.2	14.5	13.4	11.5
Spec. Cond. (field), micromho	360	411	420	473	533	444	422	479
TDS, mg/L	196	206	224	240	188	190	288	1130
Temp (Fahrenheit), degrees F	55.7	57.0	62.5	58.8	51.7	57.9	66.9	61.2
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	03/31/2021
Inspector	MRK
Temperature	50 degrees F
Weather	Sunny & clear

	Item	Condition Code *	Comments
Pond Cap	Vent Pipes	GC	
	Drainage Berms	GC	
	Vegetation	GC	
	Erosion on Cap	GC	
	Liner	GC	
	Water Control Features (berms, vegetated flumes, etc.)	GC	Small amount of vegetation, debris in drainage channels
	Other		
Embankment	Vegetation	GC	
	Liner	GC	
	Erosion	GC	
	Fencing	GC	
	Drainage Channels (rip-rap, paved flumes, etc.)	GC	
	Other		
Groundwater Collection Trench and Discharge System	Control Panels	GC	Exterior looks fine - did not open
	Drainage Sumps / Manholes	GC	
	Pumps	NI	
	Groundwater Monitoring Wells	GC	
	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 D Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	07/08/2021
Inspector	MRK
Temperature	80 degrees F
Weather	Sunny

	Item	Condition Code *	Comments
Pond Cap	Vent Pipes	GC	
	Drainage Berms	GC	
	Vegetation	GC	
	Erosion on Cap	GC	
	Liner	GC	
	Water Control Features (berms, vegetated flumes, etc.)	GC	Small amount of vegetation, debris in drainage channels
	Other		
Embankment	Vegetation	GC	
	Liner	GC	
	Erosion	GC	
	Fencing	GC	
	Drainage Channels (rip-rap, paved flumes, etc.)	GC	
	Other		
Groundwater Collection Trench and Discharge System	Control Panels	GC	Exterior looks fine - did not open
	Drainage Sumps / Manholes	GC	
	Pumps	NI	
	Groundwater Monitoring Wells	GC	
	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 Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	10/05/2021
Inspector	MRK
Temperature	62 degrees F
Weather	Sunny

	Item	Condition Code *	Comments
Pond Cap	Vent Pipes	GC	
	Drainage Berms	GC	
	Vegetation	GC	
	Erosion on Cap	GC	
	Liner	GC	
	Water Control Features (berms, vegetated flumes, etc.)	GC	Small amount of vegetation, debris in drainage channels
	Other		
Embankment	Vegetation	GC	
	Liner	GC	
	Erosion	GC	
	Fencing	GC	
	Drainage Channels (rip-rap, paved flumes, etc.)	GC	
	Other		
Groundwater Collection Trench and Discharge System	Control Panels	GC	Exterior looks fine - did not open
	Drainage Sumps / Manholes	GC	
	Pumps	NI	
	Groundwater Monitoring Wells	GC	
	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 Closure Cap - Post-Closure Care Plan
Quarterly Site Inspection Checksheet

Date	12/13/2021
Inspector	MRK
Temperature	43 degrees F
Weather	Cloudy/Hazy

	Item	Condition Code *	Comments
Pond Cap	Vent Pipes	GC	
	Drainage Berms	GC	
	Vegetation	GC	
	Erosion on Cap	GC	
	Liner	GC	
	Water Control Features (berms, vegetated flumes, etc.)	GC	Small amount of vegetation, debris in drainage channels
	Other		
Embankment	Vegetation	GC	
	Liner	GC	
	Erosion	GC	
	Fencing	GC	
	Drainage Channels (rip-rap, paved flumes, etc.)	GC	
	Other		
Groundwater Collection Trench and Discharge System	Control Panels	GC	Exterior looks fine - did not open
	Drainage Sumps / Manholes	GC	
	Pumps	NI	
	Groundwater Monitoring Wells	GC	
	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

APPENDIX C
STATISTICAL OUTPUT

APPENDIX C1
OUTLIER TEST

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Antimony, dissolved, mg/L

Location: MW12

Mean of all data: 0.00166
Standard Deviation of all data: 0.00186
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 4.49
T Critical of all data: Tcr = 2.73

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

Antimony, dissolved, mg/L

Location: MW22

Mean of all data: 0.00211
Standard Deviation of all data: 0.000459
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.00219
Standard Deviation of all data: 0.00332
Largest Observation Concentration of all data: Xn = 0.0180
Test Statistic, high extreme of all data: Tn = 4.76
T Critical of all data: Tcr = 2.68

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: 0.00185
Standard Deviation of all data: 0.00234
Largest Observation Concentration of all data: Xn = 0.00900
Test Statistic, high extreme of all data: Tn = 3.06
T Critical of all data: Tcr = 2.33

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: 0.00137
Standard Deviation of all data: 0.000928
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 0.683
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.00150
Standard Deviation of all data: 0.00114
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.08
T Critical of all data: Tcr = 2.75

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: 0.00134
Standard Deviation of all data: 0.00100
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 1.65
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Arsenic, dissolved, mg/L

Location: MW12

Mean of all data: 0.000184
Standard Deviation of all data: 0.000141
Largest Observation Concentration of all data: Xn = 0.000600
Test Statistic, high extreme of all data: Tn = 2.94
T Critical of all data: Tcr = 2.73

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Arsenic, dissolved, mg/L

Location: MW22

Mean of all data: 0.00586
Standard Deviation of all data: 0.00287
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.44
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Arsenic, dissolved, mg/L

Location: MW22D

Mean of all data: 0.00174
Standard Deviation of all data: 0.00162
Largest Observation Concentration of all data: Xn = 0.00650
Test Statistic, high extreme of all data: Tn = 2.94
T Critical of all data: Tcr = 2.53

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

Arsenic, dissolved, mg/L

Location: MW23D

Mean of all data: 0.00269
Standard Deviation of all data: 0.000927
Largest Observation Concentration of all data: Xn = 0.00410
Test Statistic, high extreme of all data: Tn = 1.52
T Critical of all data: Tcr = 2.48

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Arsenic, dissolved, mg/L
Location: MW23S

Mean of all data: 0.000776
Standard Deviation of all data: 0.00217
Largest Observation Concentration of all data: Xn = 0.00920
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.00732
Standard Deviation of all data: 0.00259
Largest Observation Concentration of all data: Xn = 0.0138
Test Statistic, high extreme of all data: Tn = 2.50
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Arsenic, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000369
Standard Deviation of all data: 0.000760
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 4.78
T Critical of all data: Tcr = 2.68

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.000212
Standard Deviation of all data: 0.000267
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 2.95
T Critical of all data: Tcr = 2.33

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: 0.00145
Standard Deviation of all data: 0.00233
Largest Observation Concentration of all data: Xn = 0.0112
Test Statistic, high extreme of all data: Tn = 4.18
T Critical of all data: Tcr = 2.75

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: 0.000273
Standard Deviation of all data: 0.000531
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 5.14
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.000225
Standard Deviation of all data: 0.000350
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 5.07
T Critical of all data: Tcr = 2.77

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: 0.0183
Standard Deviation of all data: 0.00398
Largest Observation Concentration of all data: Xn = 0.0260
Test Statistic, high extreme of all data: Tn = 1.93
T Critical of all data: Tcr = 2.73

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW22

Mean of all data: 0.0116
Standard Deviation of all data: 0.00986
Largest Observation Concentration of all data: Xn = 0.0420
Test Statistic, high extreme of all data: Tn = 3.08
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.0267
Standard Deviation of all data: 0.00865
Largest Observation Concentration of all data: Xn = 0.0490
Test Statistic, high extreme of all data: Tn = 2.58
T Critical of all data: Tcr = 2.53

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

Barium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.0436
Standard Deviation of all data: 0.00648
Largest Observation Concentration of all data: Xn = 0.0560
Test Statistic, high extreme of all data: Tn = 1.91
T Critical of all data: Tcr = 2.48

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW23S

Mean of all data: 0.0339
Standard Deviation of all data: 0.00933
Largest Observation Concentration of all data: Xn = 0.0490
Test Statistic, high extreme of all data: Tn = 1.62
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L
Location: MW2D

Mean of all data: 0.0735
Standard Deviation of all data: 0.0150
Largest Observation Concentration of all data: Xn = 0.103
Test Statistic, high extreme of all data: Tn = 1.97
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.0346
Standard Deviation of all data: 0.00613
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 2.52
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW3

Mean of all data: 0.00785
Standard Deviation of all data: 0.00428
Largest Observation Concentration of all data: Xn = 0.0150
Test Statistic, high extreme of all data: Tn = 1.67
T Critical of all data: Tcr = 2.33

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 11/01/2021
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: 0.0135
Standard Deviation of all data: 0.00388
Largest Observation Concentration of all data: Xn = 0.0210
Test Statistic, high extreme of all data: Tn = 1.94
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: MW4

Mean of all data: 0.0196
Standard Deviation of all data: 0.00402
Largest Observation Concentration of all data: Xn = 0.0270
Test Statistic, high extreme of all data: Tn = 1.85
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: MW5

Mean of all data: 0.0310
Standard Deviation of all data: 0.0146
Largest Observation Concentration of all data: Xn = 0.0710
Test Statistic, high extreme of all data: Tn = 2.73
T Critical of all data: Tcr = 2.77

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 11/01/2021
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: 0.000966
Standard Deviation of all data: 0.00121
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.34
T Critical of all data: Tcr = 2.73

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

Beryllium, dissolved, mg/L

Location: MW22

Mean of all data: 0.00691
Standard Deviation of all data: 0.00266
Largest Observation Concentration of all data: Xn = 0.0111
Test Statistic, high extreme of all data: Tn = 1.58
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L

Location: MW22D

Mean of all data: 0.00252
Standard Deviation of all data: 0.00254
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 2.95
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/01/2021	<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 11/01/2021
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: 0.00142
Standard Deviation of all data: 0.00175
Largest Observation Concentration of all data: Xn = 0.00820
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.00121
Standard Deviation of all data: 0.000918
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.53

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 11/01/2021
Confidence Level: 95%
Transform: None
LT Multiplier: x 0.50
Number of Outliers: One Outlier

Beryllium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.000731
Standard Deviation of all data: 0.000452
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.595
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L
Location: MW3

Mean of all data: 0.000538
Standard Deviation of all data: 0.000519
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.889
T Critical of all data: Tcr = 2.33

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Beryllium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000703
Standard Deviation of all data: 0.000544
Largest Observation Concentration of all data: Xn = 0.00210
Test Statistic, high extreme of all data: Tn = 2.57
T Critical of all data: Tcr = 2.75

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 11/01/2021
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Beryllium, dissolved, mg/L

Location: MW4

Mean of all data: 0.000667
Standard Deviation of all data: 0.000479
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.695
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: MW5

Mean of all data: 0.000625
Standard Deviation of all data: 0.000492
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.762
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L

Location: MW12

Mean of all data: 0.187
Standard Deviation of all data: 0.0771
Largest Observation Concentration of all data: Xn = 0.460
Test Statistic, high extreme of all data: Tn = 3.54
T Critical of all data: Tcr = 2.73

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Boron, dissolved, mg/L
Location: MW22

Mean of all data: 4.46
Standard Deviation of all data: 6.40
Largest Observation Concentration of all data: Xn = 29.9
Test Statistic, high extreme of all data: Tn = 3.98
T Critical of all data: Tcr = 2.53

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

Boron, dissolved, mg/L
Location: MW22D

Mean of all data: 6.82
Standard Deviation of all data: 2.38
Largest Observation Concentration of all data: Xn = 9.43
Test Statistic, high extreme of all data: Tn = 1.10
T Critical of all data: Tcr = 2.53

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

Boron, dissolved, mg/L
Location: MW23D

Mean of all data: 0.514
Standard Deviation of all data: 1.93
Largest Observation Concentration of all data: Xn = 8.02
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Boron, dissolved, mg/L
Location: MW23S

Mean of all data: 0.467
Standard Deviation of all data: 1.23
Largest Observation Concentration of all data: Xn = 5.24
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.151
Standard Deviation of all data: 0.170
Largest Observation Concentration of all data: Xn = 0.570
Test Statistic, high extreme of all data: Tn = 2.47
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW2R

Mean of all data: 1.82
Standard Deviation of all data: 0.758
Largest Observation Concentration of all data: Xn = 3.55
Test Statistic, high extreme of all data: Tn = 2.28
T Critical of all data: Tcr = 3.01

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 11/01/2021
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: 3.08
Standard Deviation of all data: 1.94
Largest Observation Concentration of all data: Xn = 7.78
Test Statistic, high extreme of all data: Tn = 2.42
T Critical of all data: Tcr = 2.99

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW3D

Mean of all data: 3.52
Standard Deviation of all data: 1.22
Largest Observation Concentration of all data: Xn = 5.96
Test Statistic, high extreme of all data: Tn = 2.00
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW4

Mean of all data: 0.272
Standard Deviation of all data: 0.122
Largest Observation Concentration of all data: Xn = 0.831
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 3.11

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 11/01/2021
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: 0.216
Standard Deviation of all data: 0.133
Largest Observation Concentration of all data: Xn = 0.710
Test Statistic, high extreme of all data: Tn = 3.72
T Critical of all data: Tcr = 3.12

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: 0.000207
Standard Deviation of all data: 0.000232
Largest Observation Concentration of all data: Xn = 0.00125
Test Statistic, high extreme of all data: Tn = 4.49
T Critical of all data: Tcr = 2.73

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

Cadmium, dissolved, mg/L
Location: MW22

Mean of all data: 0.00328
Standard Deviation of all data: 0.00107
Largest Observation Concentration of all data: Xn = 0.00480
Test Statistic, high extreme of all data: Tn = 1.43
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cadmium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00174
Standard Deviation of all data: 0.00105
Largest Observation Concentration of all data: Xn = 0.00450
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 2.53

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

Cadmium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000329
Standard Deviation of all data: 0.000327
Largest Observation Concentration of all data: Xn = 0.00160
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.000535
Standard Deviation of all data: 0.00118
Largest Observation Concentration of all data: Xn = 0.00510
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.000183
Standard Deviation of all data: 0.000113
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.595
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L

Location: MW3

Mean of all data: 0.000135
Standard Deviation of all data: 0.000130
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.889
T Critical of all data: Tcr = 2.33

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 11/01/2021
Confidence Level: 95%
Transform: None
LT Multiplier: x 0.50
Number of Outliers: One Outlier

Cadmium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.00287
Standard Deviation of all data: 0.00288
Largest Observation Concentration of all data: Xn = 0.0100
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

Cadmium, dissolved, mg/L
Location: MW4

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 = 0.695
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: MW5

Mean of all data: 0.000156
Standard Deviation of all data: 0.000123
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.762
T Critical of all data: Tcr = 2.77

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 11/01/2021
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: 4.30
Standard Deviation of all data: 2.76
Largest Observation Concentration of all data: Xn = 11.5
Test Statistic, high extreme of all data: Tn = 2.61
T Critical of all data: Tcr = 2.73

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L
Location: MW22

Mean of all data: 8.79
Standard Deviation of all data: 3.90
Largest Observation Concentration of all data: Xn = 20.6
Test Statistic, high extreme of all data: Tn = 3.03
T Critical of all data: Tcr = 2.53

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

Chloride, dissolved, mg/L
Location: MW22D

Mean of all data: 8.13
Standard Deviation of all data: 1.59
Largest Observation Concentration of all data: Xn = 14.2
Test Statistic, high extreme of all data: Tn = 3.82
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 5.58
Standard Deviation of all data: 1.24
Largest Observation Concentration of all data: Xn = 9.70
Test Statistic, high extreme of all data: Tn = 3.33
T Critical of all data: Tcr = 2.48

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: 3.33
Standard Deviation of all data: 2.15
Largest Observation Concentration of all data: Xn = 10.1
Test Statistic, high extreme of all data: Tn = 3.15
T Critical of all data: Tcr = 2.48

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: 11.8
Standard Deviation of all data: 1.56
Largest Observation Concentration of all data: Xn = 16.5
Test Statistic, high extreme of all data: Tn = 2.99
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/17/2019	16.5	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 19.3
Standard Deviation of all data: 4.22
Largest Observation Concentration of all data: Xn = 26.8
Test Statistic, high extreme of all data: Tn = 1.78
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L
Location: MW3

Mean of all data: 6.83
Standard Deviation of all data: 6.33
Largest Observation Concentration of all data: Xn = 21.9
Test Statistic, high extreme of all data: Tn = 2.38
T Critical of all data: Tcr = 2.33

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: 12.4
Standard Deviation of all data: 4.29
Largest Observation Concentration of all data: Xn = 18.6
Test Statistic, high extreme of all data: Tn = 1.45
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 11/01/2021
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: 2.37
Standard Deviation of all data: 2.35
Largest Observation Concentration of all data: Xn = 12.4
Test Statistic, high extreme of all data: Tn = 4.26
T Critical of all data: Tcr = 2.75

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: 3.67
Standard Deviation of all data: 3.26
Largest Observation Concentration of all data: Xn = 16.0
Test Statistic, high extreme of all data: Tn = 3.78
T Critical of all data: Tcr = 2.79

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: 0.00104
Standard Deviation of all data: 0.00132
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 3.77
T Critical of all data: Tcr = 2.73

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L
Location: MW22

Mean of all data: 0.000974
Standard Deviation of all data: 0.000844
Largest Observation Concentration of all data: Xn = 0.00410
Test Statistic, high extreme of all data: Tn = 3.70
T Critical of all data: Tcr = 2.53

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

Chromium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00133
Standard Deviation of all data: 0.00147
Largest Observation Concentration of all data: Xn = 0.00590
Test Statistic, high extreme of all data: Tn = 3.11
T Critical of all data: Tcr = 2.53

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

Chromium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000959
Standard Deviation of all data: 0.000170
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.243
T Critical of all data: Tcr = 2.48

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 11/01/2021
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: 0.000959
Standard Deviation of all data: 0.000170
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.243
T Critical of all data: Tcr = 2.48

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

Chromium, 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

Chromium, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00137
Standard Deviation of all data: 0.00269
Largest Observation Concentration of all data: Xn = 0.0140
Test Statistic, high extreme of all data: Tn = 4.70
T Critical of all data: Tcr = 2.68

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 11/01/2021
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: 0.00225
Standard Deviation of all data: 0.00401
Largest Observation Concentration of all data: Xn = 0.0140
Test Statistic, high extreme of all data: Tn = 2.93
T Critical of all data: Tcr = 2.33

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: 0.000743
Standard Deviation of all data: 0.000630
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 3.58
T Critical of all data: Tcr = 2.75

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: 0.00139
Standard Deviation of all data: 0.00280
Largest Observation Concentration of all data: Xn = 0.0140
Test Statistic, high extreme of all data: Tn = 4.51
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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L

Location: MW5

Mean of all data: 0.000775
Standard Deviation of all data: 0.00129
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 4.84
T Critical of all data: Tcr = 2.77

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

Cobalt, Dis, mg/L

Location: MW12

Mean of all data: 0.000690
Standard Deviation of all data: 0.000471
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.659
T Critical of all data: Tcr = 2.73

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, Dis, mg/L

Location: MW22

Mean of all data: 0.106
Standard Deviation of all data: 0.0336
Largest Observation Concentration of all data: Xn = 0.180
Test Statistic, high extreme of all data: Tn = 2.20
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cobalt, Dis, mg/L
Location: MW22D

Mean of all data: 0.0823
Standard Deviation of all data: 0.0255
Largest Observation Concentration of all data: Xn = 0.113
Test Statistic, high extreme of all data: Tn = 1.20
T Critical of all data: Tcr = 2.53

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

Cobalt, Dis, mg/L
Location: MW23D

Mean of all data: 0.00782
Standard Deviation of all data: 0.0252
Largest Observation Concentration of all data: Xn = 0.105
Test Statistic, high extreme of all data: Tn = 3.86
T Critical of all data: Tcr = 2.48

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

Cobalt, Dis, mg/L
Location: MW23S

Mean of all data: 0.00629
Standard Deviation of all data: 0.0218
Largest Observation Concentration of all data: Xn = 0.0910
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cobalt, Dis, 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, Dis, mg/L
Location: MW2R

Mean of all data: 0.000731
Standard Deviation of all data: 0.000452
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.595
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, Dis, mg/L
Location: MW3

Mean of all data: 0.00123
Standard Deviation of all data: 0.00148
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 3.22
T Critical of all data: Tcr = 2.33

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Cobalt, Dis, mg/L

Location: MW3D

Mean of all data: 0.0977
Standard Deviation of all data: 0.0868
Largest Observation Concentration of all data: Xn = 0.332
Test Statistic, high extreme of all data: Tn = 2.70
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, Dis, mg/L

Location: MW4

Mean of all data: 0.000667
Standard Deviation of all data: 0.000479
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.695
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, Dis, mg/L

Location: MW5

Mean of all data: 0.000625
Standard Deviation of all data: 0.000492
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.762
T Critical of all data: Tcr = 2.77

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 11/01/2021
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: 0.000423
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 3.55
T Critical of all data: Tcr = 2.73

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

Copper, dissolved, mg/L
Location: MW22

Mean of all data: 0.00731
Standard Deviation of all data: 0.00398
Largest Observation Concentration of all data: Xn = 0.0122
Test Statistic, high extreme of all data: Tn = 1.23
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Copper, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00256
Standard Deviation of all data: 0.00631
Largest Observation Concentration of all data: Xn = 0.0273
Test Statistic, high extreme of all data: Tn = 3.92
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.00128
Standard Deviation of all data: 0.00221
Largest Observation Concentration of all data: Xn = 0.00780
Test Statistic, high extreme of all data: Tn = 2.96
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.000596
Standard Deviation of all data: 0.000469
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 2.99
T Critical of all data: Tcr = 2.68

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: 0.00324
Standard Deviation of all data: 0.00478
Largest Observation Concentration of all data: Xn = 0.0170
Test Statistic, high extreme of all data: Tn = 2.88
T Critical of all data: Tcr = 2.48

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: 0.00123
Standard Deviation of all data: 0.00245
Largest Observation Concentration of all data: Xn = 0.0130
Test Statistic, high extreme of all data: Tn = 4.81
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.00653
Standard Deviation of all data: 0.0332
Largest Observation Concentration of all data: Xn = 0.200
Test Statistic, high extreme of all data: Tn = 5.82
T Critical of all data: Tcr = 2.82

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: 0.000653
Standard Deviation of all data: 0.00124
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 5.14
T Critical of all data: Tcr = 2.82

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: 0.00845
Standard Deviation of all data: 0.0163
Largest Observation Concentration of all data: Xn = 0.0900
Test Statistic, high extreme of all data: Tn = 5.01
T Critical of all data: Tcr = 2.73

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cyanide, total, mg/L
Location: MW22

Mean of all data: 0.00816
Standard Deviation of all data: 0.00248
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 0.743
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW22D

Mean of all data: 0.0105
Standard Deviation of all data: 0.00985
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 4.01
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/14/2018	0.0500	False		1

Cyanide, total, mg/L
Location: MW23D

Mean of all data: 0.00853
Standard Deviation of all data: 0.00235
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 0.626
T Critical of all data: Tcr = 2.48

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 11/01/2021
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: 0.00853
Standard Deviation of all data: 0.00235
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 0.626
T Critical of all data: Tcr = 2.48

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW2D

Mean of all data: 0.00895
Standard Deviation of all data: 0.00357
Largest Observation Concentration of all data: Xn = 0.0200
Test Statistic, high extreme of all data: Tn = 3.10
T Critical of all data: Tcr = 2.53

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: 0.00673
Standard Deviation of all data: 0.00632
Largest Observation Concentration of all data: Xn = 0.0300
Test Statistic, high extreme of all data: Tn = 3.68
T Critical of all data: Tcr = 2.68

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.00385
Standard Deviation of all data: 0.00416
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.48
T Critical of all data: Tcr = 2.33

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW3D

Mean of all data: 0.00533
Standard Deviation of all data: 0.00434
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.07
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW4

Mean of all data: 0.00583
Standard Deviation of all data: 0.00456
Largest Observation Concentration of all data: Xn = 0.0150
Test Statistic, high extreme of all data: Tn = 2.01
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.00769
Standard Deviation of all data: 0.0123
Largest Observation Concentration of all data: Xn = 0.0700
Test Statistic, high extreme of all data: Tn = 5.08
T Critical of all data: Tcr = 2.77

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: 0.112
Standard Deviation of all data: 0.0938
Largest Observation Concentration of all data: Xn = 0.454
Test Statistic, high extreme of all data: Tn = 3.65
T Critical of all data: Tcr = 2.73

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

Fluoride, dissolved, mg/L
Location: MW22

Mean of all data: 0.582
Standard Deviation of all data: 0.217
Largest Observation Concentration of all data: Xn = 0.950
Test Statistic, high extreme of all data: Tn = 1.70
T Critical of all data: Tcr = 2.50

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L
Location: MW22D

Mean of all data: 0.386
Standard Deviation of all data: 0.242
Largest Observation Concentration of all data: Xn = 0.900
Test Statistic, high extreme of all data: Tn = 2.13
T Critical of all data: Tcr = 2.50

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW23D

Mean of all data: 0.144
Standard Deviation of all data: 0.131
Largest Observation Concentration of all data: Xn = 0.600
Test Statistic, high extreme of all data: Tn = 3.47
T Critical of all data: Tcr = 2.44

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: 0.192
Standard Deviation of all data: 0.226
Largest Observation Concentration of all data: Xn = 0.900
Test Statistic, high extreme of all data: Tn = 3.13
T Critical of all data: Tcr = 2.44

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 11/01/2021
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: 0.230
Standard Deviation of all data: 0.0729
Largest Observation Concentration of all data: Xn = 0.400
Test Statistic, high extreme of all data: Tn = 2.33
T Critical of all data: Tcr = 2.50

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW2R

Mean of all data: 0.907
Standard Deviation of all data: 4.14
Largest Observation Concentration of all data: Xn = 21.2
Test Statistic, high extreme of all data: Tn = 4.90
T Critical of all data: Tcr = 2.68

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: 0.254
Standard Deviation of all data: 0.263
Largest Observation Concentration of all data: Xn = 0.984
Test Statistic, high extreme of all data: Tn = 2.78
T Critical of all data: Tcr = 2.33

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L
Location: MW3D

Mean of all data: 0.335
Standard Deviation of all data: 0.376
Largest Observation Concentration of all data: Xn = 1.30
Test Statistic, high extreme of all data: Tn = 2.56
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW4

Mean of all data: 0.226
Standard Deviation of all data: 0.105
Largest Observation Concentration of all data: Xn = 0.484
Test Statistic, high extreme of all data: Tn = 2.46
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW5

Mean of all data: 0.140
Standard Deviation of all data: 0.0948
Largest Observation Concentration of all data: Xn = 0.418
Test Statistic, high extreme of all data: Tn = 2.94
T Critical of all data: Tcr = 2.77

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.137
Standard Deviation of all data: 0.203
Largest Observation Concentration of all data: Xn = 0.710
Test Statistic, high extreme of all data: Tn = 2.82
T Critical of all data: Tcr = 2.73

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

Iron, dissolved, mg/L
Location: MW22

Mean of all data: 318.
Standard Deviation of all data: 182.
Largest Observation Concentration of all data: Xn = 561.
Test Statistic, high extreme of all data: Tn = 1.34
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Iron, dissolved, mg/L
Location: MW22D

Mean of all data: 73.8
Standard Deviation of all data: 82.2
Largest Observation Concentration of all data: Xn = 354.
Test Statistic, high extreme of all data: Tn = 3.41
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Iron, dissolved, mg/L
Location: MW23D

Mean of all data: 4.51
Standard Deviation of all data: 16.9
Largest Observation Concentration of all data: Xn = 70.0
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 12.1
Standard Deviation of all data: 49.5
Largest Observation Concentration of all data: Xn = 204.
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.917
Standard Deviation of all data: 0.948
Largest Observation Concentration of all data: Xn = 3.56
Test Statistic, high extreme of all data: Tn = 2.79
T Critical of all data: Tcr = 2.53

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 11/01/2021
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: 0.152
Standard Deviation of all data: 0.176
Largest Observation Concentration of all data: Xn = 0.603
Test Statistic, high extreme of all data: Tn = 2.57
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Iron, dissolved, mg/L
Location: MW3

Mean of all data: 0.280
Standard Deviation of all data: 0.714
Largest Observation Concentration of all data: Xn = 2.89
Test Statistic, high extreme of all data: Tn = 3.66
T Critical of all data: Tcr = 2.91

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: 3.79
Standard Deviation of all data: 4.41
Largest Observation Concentration of all data: Xn = 15.0
Test Statistic, high extreme of all data: Tn = 2.54
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.0941
Standard Deviation of all data: 0.152
Largest Observation Concentration of all data: Xn = 0.751
Test Statistic, high extreme of all data: Tn = 4.31
T Critical of all data: Tcr = 3.04

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: 0.0776
Standard Deviation of all data: 0.142
Largest Observation Concentration of all data: Xn = 0.840
Test Statistic, high extreme of all data: Tn = 5.39
T Critical of all data: Tcr = 3.05

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: 0.00114
Standard Deviation of all data: 0.00194
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 4.57
T Critical of all data: Tcr = 2.73

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Lead, dissolved, mg/L
Location: MW22

Mean of all data: 0.00553
Standard Deviation of all data: 0.00237
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 = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00626
Standard Deviation of all data: 0.00428
Largest Observation Concentration of all data: Xn = 0.0160
Test Statistic, high extreme of all data: Tn = 2.28
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00106
Standard Deviation of all data: 0.000243
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Lead, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00188
Standard Deviation of all data: 0.00255
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 3.19
T Critical of all data: Tcr = 2.48

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: 0.000769
Standard Deviation of all data: 0.000430
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.537
T Critical of all data: Tcr = 2.68

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 11/01/2021
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: 0.000538
Standard Deviation of all data: 0.000519
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.889
T Critical of all data: Tcr = 2.33

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000667
Standard Deviation of all data: 0.000479
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.695
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW4

Mean of all data: 0.000667
Standard Deviation of all data: 0.000479
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.695
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.000625
Standard Deviation of all data: 0.000492
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 0.762
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L

Location: MW12

Mean of all data: 0.216
Standard Deviation of all data: 0.380
Largest Observation Concentration of all data: Xn = 1.66
Test Statistic, high extreme of all data: Tn = 3.80
T Critical of all data: Tcr = 2.73

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

Manganese, dissolved, mg/L

Location: MW22

Mean of all data: 25.0
Standard Deviation of all data: 20.7
Largest Observation Concentration of all data: Xn = 106.
Test Statistic, high extreme of all data: Tn = 3.91
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L
Location: MW22D

Mean of all data: 8.23
Standard Deviation of all data: 4.57
Largest Observation Concentration of all data: Xn = 19.6
Test Statistic, high extreme of all data: Tn = 2.49
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L
Location: MW23D

Mean of all data: 0.624
Standard Deviation of all data: 2.06
Largest Observation Concentration of all data: Xn = 8.60
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.823
Standard Deviation of all data: 3.27
Largest Observation Concentration of all data: Xn = 13.5
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.0737
Standard Deviation of all data: 0.0123
Largest Observation Concentration of all data: Xn = 0.0951
Test Statistic, high extreme of all data: Tn = 1.75
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L

Location: MW2R

Mean of all data: 0.00784
Standard Deviation of all data: 0.0125
Largest Observation Concentration of all data: Xn = 0.0534
Test Statistic, high extreme of all data: Tn = 3.64
T Critical of all data: Tcr = 3.01

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: 0.0706
Standard Deviation of all data: 0.131
Largest Observation Concentration of all data: Xn = 0.708
Test Statistic, high extreme of all data: Tn = 4.86
T Critical of all data: Tcr = 2.99

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L

Location: MW3D

Mean of all data: 11.8
Standard Deviation of all data: 9.51
Largest Observation Concentration of all data: Xn = 43.7
Test Statistic, high extreme of all data: Tn = 3.35
T Critical of all data: Tcr = 2.75

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: 0.0322
Standard Deviation of all data: 0.157
Largest Observation Concentration of all data: Xn = 1.25
Test Statistic, high extreme of all data: Tn = 7.76
T Critical of all data: Tcr = 3.11

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: 0.00359
Standard Deviation of all data: 0.00703
Largest Observation Concentration of all data: Xn = 0.0380
Test Statistic, high extreme of all data: Tn = 4.89
T Critical of all data: Tcr = 3.12

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Mercury, dissolved, mg/L
Location: MW12

Mean of all data: 0.000114
Standard Deviation of all data: 0.000194
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 4.57
T Critical of all data: Tcr = 2.73

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

Mercury, dissolved, mg/L
Location: MW22

Mean of all data: 0.000153
Standard Deviation of all data: 0.000206
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 4.10
T Critical of all data: Tcr = 2.53

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: 0.0
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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.000153
Standard Deviation of all data: 0.000218
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.0
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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.0000769
Standard Deviation of all data: 0.0000514
Largest Observation Concentration of all data: Xn = 0.000200
Test Statistic, high extreme of all data: Tn = 2.39
T Critical of all data: Tcr = 2.68

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW3

Mean of all data: 0.0000500
Standard Deviation of all data: 0.0000519
Largest Observation Concentration of all data: Xn = 0.000100
Test Statistic, high extreme of all data: Tn = 0.964
T Critical of all data: Tcr = 2.37

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Mercury, dissolved, mg/L
Location: MW3D

Mean of all data: 0.0000700
Standard Deviation of all data: 0.0000535
Largest Observation Concentration of all data: Xn = 0.000200
Test Statistic, high extreme of all data: Tn = 2.43
T Critical of all data: Tcr = 2.75

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 11/01/2021
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: 0.0000700
Standard Deviation of all data: 0.0000535
Largest Observation Concentration of all data: Xn = 0.000200
Test Statistic, high extreme of all data: Tn = 2.43
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: MW5

Mean of all data: 0.0000906
Standard Deviation of all data: 0.000155
Largest Observation Concentration of all data: Xn = 0.000900
Test Statistic, high extreme of all data: Tn = 5.21
T Critical of all data: Tcr = 2.77

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: 0.00238
Standard Deviation of all data: 0.00232
Largest Observation Concentration of all data: Xn = 0.00780
Test Statistic, high extreme of all data: Tn = 2.33
T Critical of all data: Tcr = 2.73

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nickel, dissolved, mg/L
Location: MW22

Mean of all data: 0.0958
Standard Deviation of all data: 0.0324
Largest Observation Concentration of all data: Xn = 0.145
Test Statistic, high extreme of all data: Tn = 1.52
T Critical of all data: Tcr = 2.53

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

Nickel, dissolved, mg/L
Location: MW22D

Mean of all data: 0.0476
Standard Deviation of all data: 0.0220
Largest Observation Concentration of all data: Xn = 0.105
Test Statistic, high extreme of all data: Tn = 2.61
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	0.105	False		1

Nickel, dissolved, mg/L
Location: MW23D

Mean of all data: 0.00320
Standard Deviation of all data: 0.0112
Largest Observation Concentration of all data: Xn = 0.0465
Test Statistic, high extreme of all data: Tn = 3.87
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nickel, dissolved, mg/L
Location: MW23S

Mean of all data: 0.00746
Standard Deviation of all data: 0.0287
Largest Observation Concentration of all data: Xn = 0.119
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.000292
Standard Deviation of all data: 0.000148
Largest Observation Concentration of all data: Xn = 0.000800
Test Statistic, high extreme of all data: Tn = 3.42
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
04/26/2021	0.000800	False		1

Nickel, dissolved, mg/L
Location: MW2R

Mean of all data: 0.00150
Standard Deviation of all data: 0.00267
Largest Observation Concentration of all data: Xn = 0.0120
Test Statistic, high extreme of all data: Tn = 3.93
T Critical of all data: Tcr = 2.68

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.0103
Standard Deviation of all data: 0.0118
Largest Observation Concentration of all data: Xn = 0.0300
Test Statistic, high extreme of all data: Tn = 1.68
T Critical of all data: Tcr = 2.33

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nickel, dissolved, mg/L
Location: MW3D

Mean of all data: 0.158
Standard Deviation of all data: 0.0925
Largest Observation Concentration of all data: Xn = 0.369
Test Statistic, high extreme of all data: Tn = 2.28
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nickel, dissolved, mg/L
Location: MW4

Mean of all data: 0.00223
Standard Deviation of all data: 0.00587
Largest Observation Concentration of all data: Xn = 0.0310
Test Statistic, high extreme of all data: Tn = 4.90
T Critical of all data: Tcr = 2.75

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.00136
Standard Deviation of all data: 0.00197
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 3.36
T Critical of all data: Tcr = 2.77

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: 1.41
Standard Deviation of all data: 0.625
Largest Observation Concentration of all data: Xn = 3.03
Test Statistic, high extreme of all data: Tn = 2.59
T Critical of all data: Tcr = 2.73

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nitrate nitrogen, dissolved, mg/L
Location: MW22

Mean of all data: 0.108
Standard Deviation of all data: 0.0745
Largest Observation Concentration of all data: Xn = 0.350
Test Statistic, high extreme of all data: Tn = 3.25
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nitrate nitrogen, dissolved, mg/L
Location: MW22D

Mean of all data: 0.120
Standard Deviation of all data: 0.0942
Largest Observation Concentration of all data: Xn = 0.450
Test Statistic, high extreme of all data: Tn = 3.50
T Critical of all data: Tcr = 2.53

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

Nitrate nitrogen, dissolved, mg/L
Location: MW23D

Mean of all data: 0.0794
Standard Deviation of all data: 0.0254
Largest Observation Concentration of all data: Xn = 0.100
Test Statistic, high extreme of all data: Tn = 0.812
T Critical of all data: Tcr = 2.48

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nitrate nitrogen, dissolved, mg/L
Location: MW23S

Mean of all data: 0.233
Standard Deviation of all data: 0.119
Largest Observation Concentration of all data: Xn = 0.450
Test Statistic, high extreme of all data: Tn = 1.82
T Critical of all data: Tcr = 2.48

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nitrate nitrogen, dissolved, mg/L
Location: MW2D

Mean of all data: 0.0872
Standard Deviation of all data: 0.0394
Largest Observation Concentration of all data: Xn = 0.200
Test Statistic, high extreme of all data: Tn = 2.86
T Critical of all data: Tcr = 2.53

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: 2.01
Standard Deviation of all data: 2.50
Largest Observation Concentration of all data: Xn = 12.7
Test Statistic, high extreme of all data: Tn = 4.27
T Critical of all data: Tcr = 2.68

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: 1.24
Standard Deviation of all data: 1.01
Largest Observation Concentration of all data: Xn = 3.88
Test Statistic, high extreme of all data: Tn = 2.60
T Critical of all data: Tcr = 2.33

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 11/01/2021
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: 0.584
Standard Deviation of all data: 0.648
Largest Observation Concentration of all data: Xn = 2.56
Test Statistic, high extreme of all data: Tn = 3.05
T Critical of all data: Tcr = 2.75

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: 1.39
Standard Deviation of all data: 1.63
Largest Observation Concentration of all data: Xn = 7.34
Test Statistic, high extreme of all data: Tn = 3.65
T Critical of all data: Tcr = 2.75

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: 1.29
Standard Deviation of all data: 1.34
Largest Observation Concentration of all data: Xn = 5.06
Test Statistic, high extreme of all data: Tn = 2.81
T Critical of all data: Tcr = 2.77

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.33
Largest Observation Concentration of all data: Xn = 8.18
Test Statistic, high extreme of all data: Tn = 3.71
T Critical of all data: Tcr = 3.03

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

pH (field), STD
Location: MW22

Mean of all data: 4.13
Standard Deviation of all data: 0.91
Largest Observation Concentration of all data: Xn = 6.99
Test Statistic, high extreme of all data: Tn = 3.13
T Critical of all data: Tcr = 2.53

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

pH (field), STD
Location: MW22D

Mean of all data: 5.26
Standard Deviation of all data: 0.66
Largest Observation Concentration of all data: Xn = 7.17
Test Statistic, high extreme of all data: Tn = 2.91
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

pH (field), STD
Location: MW23D

Mean of all data: 7.22
Standard Deviation of all data: 0.52
Largest Observation Concentration of all data: Xn = 7.62
Test Statistic, high extreme of all data: Tn = 0.78
T Critical of all data: Tcr = 2.47

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/28/2019	5.28	False	-1	

pH (field), STD
Location: MW23S

Mean of all data: 6.79
Standard Deviation of all data: 0.80
Largest Observation Concentration of all data: Xn = 7.35
Test Statistic, high extreme of all data: Tn = 0.69
T Critical of all data: Tcr = 2.47

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: 7.50
Standard Deviation of all data: 0.08
Largest Observation Concentration of all data: Xn = 7.68
Test Statistic, high extreme of all data: Tn = 2.13
T Critical of all data: Tcr = 2.53

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

pH (field), STD
Location: MW2R

Mean of all data: 7.36
Standard Deviation of all data: 0.15
Largest Observation Concentration of all data: Xn = 7.64
Test Statistic, high extreme of all data: Tn = 1.86
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/20/2013	6.85	False	-1	

pH (field), STD
Location: MW3

Mean of all data: 9.63
Standard Deviation of all data: 34.86
Largest Observation Concentration of all data: Xn = 440.00
Test Statistic, high extreme of all data: Tn = 12.35
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: 6.12
Standard Deviation of all data: 0.48
Largest Observation Concentration of all data: Xn = 7.50
Test Statistic, high extreme of all data: Tn = 2.89
T Critical of all data: Tcr = 3.06

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

pH (field), STD
Location: MW4

Mean of all data: 9.12
Standard Deviation of all data: 24.54
Largest Observation Concentration of all data: Xn = 320.00
Test Statistic, high extreme of all data: Tn = 12.67
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: 7.79
Standard Deviation of all data: 10.29
Largest Observation Concentration of all data: Xn = 150.00
Test Statistic, high extreme of all data: Tn = 13.81
T Critical of all data: Tcr = 3.55

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: 0.00264
Standard Deviation of all data: 0.00208
Largest Observation Concentration of all data: Xn = 0.0112
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.73

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Selenium, dissolved, mg/L
Location: MW22

Mean of all data: 0.0135
Standard Deviation of all data: 0.0147
Largest Observation Concentration of all data: Xn = 0.0504
Test Statistic, high extreme of all data: Tn = 2.51
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L
Location: MW22D

Mean of all data: 0.00818
Standard Deviation of all data: 0.0114
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 3.68
T Critical of all data: Tcr = 2.53

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

Selenium, dissolved, mg/L
Location: MW23D

Mean of all data: 0.000765
Standard Deviation of all data: 0.00109
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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 11/01/2021
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: 0.000765
Standard Deviation of all data: 0.00109
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.000605
Standard Deviation of all data: 0.000459
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.53

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: 0.00534
Standard Deviation of all data: 0.00339
Largest Observation Concentration of all data: Xn = 0.0156
Test Statistic, high extreme of all data: Tn = 3.03
T Critical of all data: Tcr = 2.68

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 11/01/2021
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: 0.0126
Standard Deviation of all data: 0.00866
Largest Observation Concentration of all data: Xn = 0.0365
Test Statistic, high extreme of all data: Tn = 2.75
T Critical of all data: Tcr = 2.33

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: 0.00582
Standard Deviation of all data: 0.0123
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 3.59
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/12/2018	<0.0500	True		1

Selenium, dissolved, mg/L
Location: MW4

Mean of all data: 0.00251
Standard Deviation of all data: 0.00213
Largest Observation Concentration of all data: Xn = 0.00970
Test Statistic, high extreme of all data: Tn = 3.37
T Critical of all data: Tcr = 2.75

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.00197
Standard Deviation of all data: 0.00138
Largest Observation Concentration of all data: Xn = 0.00480
Test Statistic, high extreme of all data: Tn = 2.05
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L

Location: MW12

Mean of all data: 0.000207
Standard Deviation of all data: 0.000232
Largest Observation Concentration of all data: Xn = 0.00125
Test Statistic, high extreme of all data: Tn = 4.49
T Critical of all data: Tcr = 2.73

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

Silver, dissolved, mg/L

Location: MW22

Mean of all data: 0.000263
Standard Deviation of all data: 0.0000574
Largest Observation Concentration of all data: Xn = 0.000500
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Silver, dissolved, mg/L
Location: MW22D

Mean of all data: 0.000368
Standard Deviation of all data: 0.000516
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.53

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.000606
Standard Deviation of all data: 0.00145
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 3.72
T Critical of all data: Tcr = 2.68

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: 0.000273
Standard Deviation of all data: 0.000475
Largest Observation Concentration of all data: Xn = 0.00180
Test Statistic, high extreme of all data: Tn = 3.21
T Critical of all data: Tcr = 2.33

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.000167
Standard Deviation of all data: 0.000120
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.695
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L
Location: MW4

Mean of all data: 0.000178
Standard Deviation of all data: 0.000143
Largest Observation Concentration of all data: Xn = 0.000600
Test Statistic, high extreme of all data: Tn = 2.95
T Critical of all data: Tcr = 2.75

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: 0.000164
Standard Deviation of all data: 0.000136
Largest Observation Concentration of all data: Xn = 0.000500
Test Statistic, high extreme of all data: Tn = 2.46
T Critical of all data: Tcr = 2.77

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

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

Mean of all data: 844
Standard Deviation of all data: 460
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 (field), micromhos/cm
Location: MW22

Mean of all data: 2922
Standard Deviation of all data: 910
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	

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

Mean of all data: 1939
Standard Deviation of all data: 597
Largest Observation Concentration of all data: Xn = 2690
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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

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

Mean of all data: 563
Standard Deviation of all data: 421
Largest Observation Concentration of all data: Xn = 2180
Test Statistic, high extreme of all data: Tn = 4
T Critical of all data: Tcr = 2

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

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

Mean of all data: 526
Standard Deviation of all data: 597
Largest Observation Concentration of all data: Xn = 2800
Test Statistic, high extreme of all data: Tn = 4
T Critical of all data: Tcr = 2

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

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

Mean of all data: 488
Standard Deviation of all data: 54
Largest Observation Concentration of all data: Xn = 551
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
12/18/2017	331	False	-1	

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

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

Mean of all data: 836
Standard Deviation of all data: 121
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 (field), micromhos/cm
Location: MW3

Mean of all data: 2271
Standard Deviation of all data: 850
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 (field), micromhos/cm
Location: MW3D

Mean of all data: 2252
Standard Deviation of all data: 811
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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Specific Conductance (field), micromhos/cm

Location: MW4

Mean of all data: 697
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 (field), micromhos/cm

Location: MW5

Mean of all data: 441
Standard Deviation of all data: 154
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: 105.
Standard Deviation of all data: 82.2
Largest Observation Concentration of all data: Xn = 475.
Test Statistic, high extreme of all data: Tn = 4.51
T Critical of all data: Tcr = 2.73

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Sulfate, dissolved, mg/L
Location: MW22

Mean of all data: 2490.
Standard Deviation of all data: 1180.
Largest Observation Concentration of all data: Xn = 4570.
Test Statistic, high extreme of all data: Tn = 1.75
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW22D

Mean of all data: 1360.
Standard Deviation of all data: 463.
Largest Observation Concentration of all data: Xn = 2150.
Test Statistic, high extreme of all data: Tn = 1.70
T Critical of all data: Tcr = 2.53

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

Sulfate, dissolved, mg/L
Location: MW23D

Mean of all data: 103.
Standard Deviation of all data: 314.
Largest Observation Concentration of all data: Xn = 1320.
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Sulfate, dissolved, mg/L
Location: MW23S

Mean of all data: 136.
Standard Deviation of all data: 496.
Largest Observation Concentration of all data: Xn = 2060.
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 9.31
Standard Deviation of all data: 14.0
Largest Observation Concentration of all data: Xn = 64.9
Test Statistic, high extreme of all data: Tn = 3.97
T Critical of all data: Tcr = 2.53

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: 184.
Standard Deviation of all data: 59.0
Largest Observation Concentration of all data: Xn = 312.
Test Statistic, high extreme of all data: Tn = 2.18
T Critical of all data: Tcr = 3.01

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 11/01/2021
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: 954.
Standard Deviation of all data: 462.
Largest Observation Concentration of all data: Xn = 1930.
Test Statistic, high extreme of all data: Tn = 2.11
T Critical of all data: Tcr = 2.99

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW3D

Mean of all data: 1860.
Standard Deviation of all data: 783.
Largest Observation Concentration of all data: Xn = 3750.
Test Statistic, high extreme of all data: Tn = 2.41
T Critical of all data: Tcr = 2.75

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW4

Mean of all data: 57.3
Standard Deviation of all data: 47.7
Largest Observation Concentration of all data: Xn = 288.
Test Statistic, high extreme of all data: Tn = 4.84
T Critical of all data: Tcr = 3.11

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 47.2
Standard Deviation of all data: 36.1
Largest Observation Concentration of all data: Xn = 180.
Test Statistic, high extreme of all data: Tn = 3.67
T Critical of all data: Tcr = 3.12

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: 0.000284
Standard Deviation of all data: 0.000485
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.57
T Critical of all data: Tcr = 2.73

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

Thallium, dissolved, mg/L
Location: MW22

Mean of all data: 0.000382
Standard Deviation of all data: 0.000516
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 4.10
T Critical of all data: Tcr = 2.53

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

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

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: 0.000382
Standard Deviation of all data: 0.000546
Largest Observation Concentration of all data: Xn = 0.00250
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

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: 0.000260
Standard Deviation of all data: 0.000371
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 4.70
T Critical of all data: Tcr = 2.68

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: 0.000304
Standard Deviation of all data: 0.000374
Largest Observation Concentration of all data: Xn = 0.00120
Test Statistic, high extreme of all data: Tn = 2.40
T Critical of all data: Tcr = 2.33

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Thallium, dissolved, mg/L
Location: MW3D

Mean of all data: 0.000243
Standard Deviation of all data: 0.000273
Largest Observation Concentration of all data: Xn = 0.00130
Test Statistic, high extreme of all data: Tn = 3.87
T Critical of all data: Tcr = 2.75

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: 0.000187
Standard Deviation of all data: 0.000140
Largest Observation Concentration of all data: Xn = 0.000600
Test Statistic, high extreme of all data: Tn = 2.96
T Critical of all data: Tcr = 2.75

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: 0.000156
Standard Deviation of all data: 0.000123
Largest Observation Concentration of all data: Xn = 0.000250
Test Statistic, high extreme of all data: Tn = 0.762
T Critical of all data: Tcr = 2.77

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 11/01/2021
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: 531.
Standard Deviation of all data: 127.
Largest Observation Concentration of all data: Xn = 933.
Test Statistic, high extreme of all data: Tn = 3.17
T Critical of all data: Tcr = 3.01

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

Total Dissolved Solids, mg/L
Location: MW22

Mean of all data: 3310.
Standard Deviation of all data: 1060.
Largest Observation Concentration of all data: Xn = 4380.
Test Statistic, high extreme of all data: Tn = 1.01
T Critical of all data: Tcr = 2.53

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

Total Dissolved Solids, mg/L
Location: MW22D

Mean of all data: 1900.
Standard Deviation of all data: 688.
Largest Observation Concentration of all data: Xn = 3650.
Test Statistic, high extreme of all data: Tn = 2.55
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/19/2017	3650.	False		1

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 346.
Standard Deviation of all data: 374.
Largest Observation Concentration of all data: Xn = 1790.
Test Statistic, high extreme of all data: Tn = 3.87
T Critical of all data: Tcr = 2.48

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: 423.
Standard Deviation of all data: 652.
Largest Observation Concentration of all data: Xn = 2800.
Test Statistic, high extreme of all data: Tn = 3.64
T Critical of all data: Tcr = 2.48

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: 205.
Standard Deviation of all data: 103.
Largest Observation Concentration of all data: Xn = 299.
Test Statistic, high extreme of all data: Tn = 0.909
T Critical of all data: Tcr = 2.53

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Total Dissolved Solids, mg/L
Location: MW2R

Mean of all data: 517.
Standard Deviation of all data: 152.
Largest Observation Concentration of all data: Xn = 1010.
Test Statistic, high extreme of all data: Tn = 3.24
T Critical of all data: Tcr = 3.01

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: 2360.
Standard Deviation of all data: 673.
Largest Observation Concentration of all data: Xn = 4000.
Test Statistic, high extreme of all data: Tn = 2.44
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: 2630.
Standard Deviation of all data: 362.
Largest Observation Concentration of all data: Xn = 3140.
Test Statistic, high extreme of all data: Tn = 1.42
T Critical of all data: Tcr = 3.02

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 460.
Standard Deviation of all data: 224.
Largest Observation Concentration of all data: Xn = 1780.
Test Statistic, high extreme of all data: Tn = 5.89
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: 317.
Standard Deviation of all data: 182.
Largest Observation Concentration of all data: Xn = 1010.
Test Statistic, high extreme of all data: Tn = 3.81
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: 0.00514
Standard Deviation of all data: 0.00395
Largest Observation Concentration of all data: Xn = 0.0170
Test Statistic, high extreme of all data: Tn = 3.00
T Critical of all data: Tcr = 2.73

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 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L
Location: MW22

Mean of all data: 0.491
Standard Deviation of all data: 0.202
Largest Observation Concentration of all data: Xn = 0.810
Test Statistic, high extreme of all data: Tn = 1.58
T Critical of all data: Tcr = 2.53

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Zinc, dissolved, mg/L
Location: MW22D

Mean of all data: 0.187
Standard Deviation of all data: 0.106
Largest Observation Concentration of all data: Xn = 0.500
Test Statistic, high extreme of all data: Tn = 2.97
T Critical of all data: Tcr = 2.53

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

Zinc, dissolved, mg/L
Location: MW23D

Mean of all data: 0.0159
Standard Deviation of all data: 0.0449
Largest Observation Concentration of all data: Xn = 0.190
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
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: 0.0400
Standard Deviation of all data: 0.144
Largest Observation Concentration of all data: Xn = 0.600
Test Statistic, high extreme of all data: Tn = 3.88
T Critical of all data: Tcr = 2.48

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: 0.00526
Standard Deviation of all data: 0.00115
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 4.13
T Critical of all data: Tcr = 2.53

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: 0.00749
Standard Deviation of all data: 0.00719
Largest Observation Concentration of all data: Xn = 0.0280
Test Statistic, high extreme of all data: Tn = 2.85
T Critical of all data: Tcr = 2.68

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 11/01/2021
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: 0.0742
Standard Deviation of all data: 0.0501
Largest Observation Concentration of all data: Xn = 0.172
Test Statistic, high extreme of all data: Tn = 1.95
T Critical of all data: Tcr = 2.33

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Zinc, dissolved, mg/L
Location: MW3D

Mean of all data: 0.0258
Standard Deviation of all data: 0.0209
Largest Observation Concentration of all data: Xn = 0.0900
Test Statistic, high extreme of all data: Tn = 3.08
T Critical of all data: Tcr = 2.75

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: 0.00593
Standard Deviation of all data: 0.00708
Largest Observation Concentration of all data: Xn = 0.0390
Test Statistic, high extreme of all data: Tn = 4.67
T Critical of all data: Tcr = 2.75

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

Based on Grubbs one-sided outlier test

Hutsonville Ash Impoundment
Outlier Analysis Results

User Supplied Information

Date Range: 01/17/1984 to 11/01/2021
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L

Location: MW5

Mean of all data: 0.00589
Standard Deviation of all data: 0.00629
Largest Observation Concentration of all data: Xn = 0.0330
Test Statistic, high extreme of all data: Tn = 4.31
T Critical of all data: Tcr = 2.77

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

APPENDIX C2

STATISTICAL OUTPUT – TEST DESCRIPTIONS

ELECTRIC POWER RESEARCH INSTITUTE

MANAGES

Groundwater Data Management and Evaluation Software

Software Manual Product ID #1012581

Software Manual, February 2010

EPRI Project Manager
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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.

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)	
Indicator Function $\mathrm{sgn}(x_{ij} - x_{jk})$	$= 1$ if $(x_{ij} - x_{jk}) > 0$ $= 0$ if $(x_{ij} - x_{jk}) = 0$ $= -1$ if $(x_{ij} - x_{jk}) < 0$ where $x_{i1}, x_{i2}, \ldots, x_{in}$ are the time ordered data (n_i is total of data in the i-th season).
Mann-Kendall Statistic, S_i	$= \sum_{k=1}^{n_i-1} \sum_{j=k+1}^{n_i} \mathrm{sgn}(x_{ij} - x_{jk})$
Variance of S_i $VAR(S_i)$	$VAR(S_i) =$ $\frac{1}{18}\left\{ n_i(n_i-1)(2n_i+5) - \sum_{p=1}^{g_i} t_{ip}(t_{ip}-1)(2t_{ip}+5) - \sum_{q=1}^{h_i} u_{iq}(u_{iq}-1)(2u_{iq}+5) \right\}$ $+ \frac{\sum_{p=1}^{g_i} t_{ip}(t_{ip}-1)(t_{ip}-2) \sum_{q=1}^{h_i} u_{iq}(u_{iq}-1)(u_{iq}-2)}{9n_i(n_i-1)(n_i-2)}$ $+ \frac{\sum_{p=1}^{g_i} t_{ip}(t_{ip}-1) \sum_{q=1}^{h_i} u_{iq}(u_{iq}-1)}{2n_i(n_i-1)}.$ 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.

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 $\lvert Z \rvert \leq Z_{1-\alpha/2}$ 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

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.	
The number of observations taken during a specified scoping period; n	n

Mean of the observed data during the scoping period; $\bar{X}$	$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$ where X_i is the i-th observation.
Standard deviation of observed data; S_x.	$S_x = \sqrt{\frac{1}{(n-1)}\sum_{i=1}^{n}(X_i - \bar{X})^2}$
Test statistics: T_l & T_n	Sort the data into ascending order, then compute the statistics $T_l = (\bar{X} - X_l)/S_x$ $T_n = (X_n - \bar{X})/S_x$ 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., $X_{(j)} = \text{Ln}[X_{(j)}]$.
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).