Intended for
Ameren Missouri

Date
December 19, 2024

Project No.
1940108083

2024 ANNUAL REPORT

FORMER VENICE POWER PLANT, ASH PONDS 2 & 3

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FORMER VENICE POWER PLANT, ASH PONDS 2 & 3

Project name	**Former Venice Power Plant**
Project no.	**1940108083**
Recipient	**Ameren Missouri**
Document type	**2024 Annual Report**
Revision	**0**
Version	**FINAL**
Date	**December 19, 2024**
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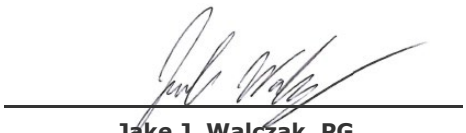

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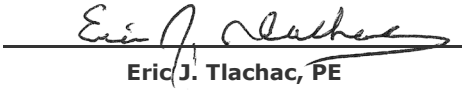

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ACRONYMS AND ABBREVIATIONS

Ameren	Ameren Missouri
GMZ	Groundwater Management Zone
IAC	Illinois Administrative Code
ILCS	Illinois Compiled Statutes
IEPA	Illinois Environmental Protection Agency
MDL	method detection limit
mg/L	milligrams per liter
NAVD88	North American Vertical Datum of 1988
NRT	Natural Resource Technology, Inc
PQL	practical quantitation limit
PVC	polyvinyl chloride
RL	reporting limit
Site	Former Venice Power Plant Ash Ponds 2 & 3
TDS	total dissolved solids

1. INTRODUCTION

1.1 Background

In May 2011, the Illinois Environmental Protection Agency (IEPA) approved Ameren Missouri's (Ameren) Closure Plan (Natural Resource Technology, Inc. [NRT], 2011) for the Former Venice Power Plant Ash Ponds 2 & 3 (Site) and established a Groundwater Management Zone (GMZ) for the Site. The Closure Plan included specifications for construction of a cover system over Ash Ponds 2 & 3 that conformed to the standards for final cover set forth in Illinois Landfill Regulations and a site-specific rulemaking governing closure of an ash pond at The Hutsonville Power Station, owned by an Ameren-affiliated company. See, generally, 35 Illinois Administrative Code (IAC) 840.126 and 35 IAC 811.314. Cover construction was completed in October 2012.

Groundwater quality has been monitored at the Site since 1996. The Closure Plan included a summary of the groundwater quality at the Site as of 2009 and a revised Groundwater Monitoring Plan that outlined a schedule for monitoring five field and 24 laboratory parameters at 12 groundwater monitoring wells (**Tables 1-1, 1-2, and 1-3, Figure 1-1**). The new Groundwater Monitoring Plan was implemented in March 2011 with existing groundwater monitoring wells (MW-2, MW-3, MW-5, MW-6, MW-8, and MW-9). In accordance with the approved Closure Plan, additional groundwater monitoring wells were installed in July 2011 (MW-2D, MW-3D, MW-6D, MW-10, MW-11, and MW-11D) and included in the Groundwater Monitoring Plan. In 2019, IEPA approved a request to change the groundwater monitoring schedule from quarterly to semi-annually and to cease monitoring for beryllium, mercury, and thallium in accordance with the Groundwater Monitoring Plan. Recommendations presented in both the 2020 and 2021 Annual Reports included plans to cease monitoring for lead and selenium in accordance with the Groundwater Monitoring Plan. We request written concurrence to ceasing monitoring for lead and selenium.

This 2024 Annual Report is submitted per Section 5.4 of the Closure Plan and includes a review of the post-closure groundwater quality at the Site to provide an overview of the effectiveness of the cover system in improving groundwater quality downgradient from Ash Ponds 2 & 3. This report also includes the following Groundwater Monitoring Plan compliance elements:

- A summary of groundwater monitoring data collected during March 2021 through August 2023 and data collected in 2024 for completeness because they are used in the statistical analysis of groundwater quality data. Data tables are included in **Appendix A**.
- Short term trend analysis results per Section 3.4 of the Closure Plan.
- Groundwater monitoring field data worksheets which note descriptions of any maintenance or replacement activities performed (**Appendix B**).
- Final cover site inspection reports and a description of any maintenance activities performed on the cover (**Appendix C**).

1.2 Post-Closure Overview – 2012 to 2024

Groundwater quality data since completion of pond closure in 2012 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 Closure Plan presented

in this report, which are focused on specific compliance criteria. This review is intended as a broad view of groundwater quality over time since closure.

1.2.1 Summary of Cover System Construction and Maintenance

As part of closure activities, Ameren removed all standing surface waters from Ash Ponds 2 & 3 and a geosynthetic cover was constructed to provide a barrier to infiltration and subsequent generation and release of leachate from the ponds (NRT, 2011). The cover system consists of (from bottom up) a 40-mil geomembrane; a geocomposite drainage layer constructed of a geonet encapsulated in geotextile; and a 3-foot thick protective soil layer placed over re-graded ash in the ponds. The geocomposite was provided to drain surface water that infiltrates the protective soil layer. Storm water precipitation is routed away from the cover system toward two low areas at the north and south ends of the cover, then pumped over the levee to the Mississippi River. The cover is graded such that there is no off-site contribution, or run-on, of storm water from areas outside of the ash ponds.

Inspections of the cover system are performed on a quarterly schedule. Routine maintenance activities are performed at the Site, 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 Closure Plan.

1.2.2 Summary of 2012 to 2024 Groundwater Quality Data Review

Appendix C of the Closure Plan identified boron as the primary indicator constituent for coal ash impacts to groundwater at the Site. As such, boron was selected for this groundwater quality data review. Dissolved boron concentrations over time from closure completion (2012) to the present are presented in **Figures 1-2 to 1-7**. Best fit linear regression lines are included in the figures to provide a convenient means of evaluating general concentration patterns since closure. It should be noted that the regression lines are not equivalent to the statistical trends discussed in the groundwater compliance section of this report.

Generally, dissolved boron concentrations in most compliance monitoring wells have exhibited decreasing trends since 2012. In addition, decreasing trends for other 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 decreasing dissolved boron 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 ponds. This observation is consistent with the results of groundwater modeling performed in 2010 to simulate changes in groundwater quality resulting from pond closure. Modeling results suggested that dissolved boron concentrations in all monitoring wells would stabilize at levels below the Class I Groundwater Standard within 14 to 20 years, with the exception of on-site well MW-6, where dissolved boron concentrations were predicted to persist for a longer time period.

2. GROUNDWATER MONITORING PLAN COMPLIANCE

2.1 Applicable Groundwater Quality Standards

As described in Section 3.3 of the Closure Plan:

- On-site, prior to the completion of the post-closure care period, the applicable groundwater quality standards at Ash Ponds 2 & 3 are the concentrations as determined by groundwater monitoring if such concentrations exceed the Class I Groundwater Standards.
- After completion of the post-closure care period, the on-site concentrations of contaminants from Ash Ponds 2 & 3 as determined by groundwater monitoring, are the applicable groundwater standards, if such concentrations exceed the Class I Groundwater Standards, and if:
  - 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 the Former Venice Power Plant site 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 IEPA is in effect. Existing potable uses of groundwater may be preserved as long as such uses are consistent with human consumption in accordance with accepted water supply principles.

Off-site standards were not proposed because: 1) Ameren did not receive permission from the adjacent property owner to monitor groundwater on that property; 2) the ponds have been covered, which minimizes exceedances of groundwater quality standards to the extent practical; 3) there are no groundwater receptors in this area; and 4) there is a groundwater restriction ordinance in effect for this area.

2.2 Demonstration of Compliance

As described in Section 3.4 of the Closure Plan:

- Compliance with on-site groundwater quality standards will be achieved when no statistically significant increasing trend that can be attributed to Ash Ponds 2 & 3 is detected in the concentrations of all constituents monitored at the downgradient boundaries of the Site for four consecutive years after changing to an annual monitoring frequency (**Table 1-1**).
- If the Sen's non-parametric estimate of slope shows a positive slope at any compliance monitoring well located at the downgradient boundaries of the Site GMZ as specified in **Table 1-2**, for any parameter (**Table 1-3**) a Mann-Kendall test will be performed at 95 percent confidence to determine whether the positive slope represents a statistically significant increasing trend. If a statistically significant increasing trend is identified, Ameren will take action as described below, and initiate more frequent inspection of the surface of the cover system and evaluation of background concentrations.
  - If the statistically significant increasing trend can be attributed to a superseding cause, Ameren will notify IEPA in writing, stating the cause of the increasing trend and providing the rationale used in such a determination.

  - If there is no superseding cause for the statistically significant increasing trend and sampling frequency is semi-annual or annual sampling, a quarterly sampling schedule will be reestablished. After four consecutive quarterly samples show no statistically significant increasing trend, the frequency of groundwater monitoring will return to either semi-annual or annual, whichever frequency was utilized prior to the return to quarterly sampling.
  - Notifications concerning statistically significant increasing trends and revisions of the sampling frequency will be reported to IEPA in writing within 30 days after making the determinations.
- If a statistically significant increasing trend is observed to continue over a period of two or more consecutive years and there are no superseding causes for the trend, then Ameren will perform the following:
  - A hydrogeologic investigation; and
  - Additional site investigation, if necessary.

Based on the outcome of the investigation above, Ameren may take action to mitigate statistically significant increasing trends. 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 elevation contours and flow directions for the two semi-annual monitoring events that occurred in February/March/April 2024 and August 2024 are illustrated in **Figure 3-1** and **Figure 3-2**, respectively. Groundwater was measured in shallow monitoring wells at elevations between approximately 387 to 389 feet North American Vertical Datum of 1988 (NAVD88) on February 13, 2024 (**Figure 3-1**) and 395 to 402 feet NAVD88 on August 5, 2024 (**Figure 3-2**). Groundwater elevations and flow directions in the vicinity of the Site are controlled by the Mississippi River, where water levels within the uppermost aquifer rise and fall with river stage. Monitoring well MW-3 was dry (groundwater elevation below the base of the well screen) on February 13, 2024 when river elevation was low. Groundwater elevation contours in the vicinity of MW-3 were inferred as illustrated on **Figure 3-1** for February 2024. Groundwater flow directions in February 2024 and August 2024 were generally northwest to southwest (toward the Mississippi River), and average horizontal hydraulic gradients were approximately 0.001 and 0.004 feet/foot, respectively. This is the predominant flow pattern during most of the year. During periods of high river stage, groundwater flow reversals can occur with groundwater flow away from the river, however, flow reversals were not observed during the February 2024 and August 2024 semi-annual monitoring events.

3.2 Review of Analytical Data

This report includes specific discussion of the analytical data for the most recent eight monitoring events to provide a basis for statistical analyses required for the compliance evaluation. All laboratory analytical results are tabulated in **Appendix A** for groundwater samples collected on March 1, 2021/ April 19, 2021; September 14, 2021/November 2, 2021/December 13, 2021; March 15, 2022/March 28, 2022; August 15, 2022/November 2, 2022; January 24, 2023/ March 6, 2023; August 31, 2023; February 13, 2024/March 13, 2024/April 4, 2024; and August 5, 2024, the most recent eight groundwater monitoring events used to calculate groundwater quality trends for evaluation of compliance with related closure plan requirements. The field data for 2024 are found in **Appendix B** (field data for previous groundwater monitoring events were presented in previous Annual Reports). Sampling anomalies in 2024, 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 (sampling anomalies for previous groundwater monitoring events were presented in previous Annual Reports):

- MW-3 was not sampled in February or March 2024 due to the wells being dry or water levels too low for sampling. Sampling at MW-3 was performed on April 4, 2024.
- MW-3D was not sampled in February 2024 because the well was obstructed. Sampling at MW-3D was performed on March 13, 2024 after Ameren removed the obstruction.
- Barium, cadmium, chloride, copper, cyanide, nickel, lead, total dissolved solids (TDS), and zinc detections were observed in the field blanks and boron, copper, cyanide, and zinc detections were observed in the method blank during the February/March/April 2024 sampling event. All sample concentrations of chloride and TDS were ten times greater than the field blank concentrations thus were not qualified. Barium, boron, cadmium, copper, cyanide, lead, nickel, and zinc sample concentrations were all qualified as biased high. Boron, copper, and TDS detections were observed in the field blanks and cyanide and zinc detections were

observed in the method blank in the August 2024 sampling event. All sample concentrations of TDS were ten times greater than the field blank concentrations thus were not qualified. Boron, copper, and cyanide detected sample concentrations were qualified as estimated. Copper, cyanide, and zinc sample concentrations were qualified as non-detect at the reporting limit (RL) where the associated sample concentrations were less than or equal to the method blank concentration. Ameren is investigating the cause and will work to lower detections in the field blanks for the subsequent sampling events.

Select monitored parameters are discussed below.

- Boron was identified as the primary indicator constituent for coal ash impacts to groundwater at the Site (see Appendix C of the Closure Plan). In the 2021 - 2024 monitoring period, dissolved boron concentrations ranged from 0.09 to 5.08 milligrams per liter (mg/L) in shallow compliance monitoring wells, except in MW-10 where dissolved boron concentrations ranged from 12.42 to 14.60 mg/L (**Figure 3-3**). In deep monitoring wells, dissolved boron concentrations ranged from 1.44 to 15.42 mg/L (**Figure 3-3**). As discussed in **Sections 1.2.2 and 1.2.3**, dissolved boron concentrations have decreased in the majority of compliance monitoring wells across the Site since closure. During the current monitoring period, dissolved boron concentrations are continuing to decrease in the majority of compliance wells from concentrations observed prior to closure indicating that the cover system is functioning to improve overall groundwater quality beneath the ponds.
- Chloride can be an indicator constituent for coal ash; however, there are several other anthropogenic sources for elevated chloride concentrations in groundwater, so it is a less reliable indicator for coal ash impacts than boron. Dissolved chloride concentrations exhibited increasing trends in some monitoring wells, but background monitoring wells MW-8 and MW-9 have historically had, and continue to have, relatively higher dissolved chloride concentrations than the compliance monitoring wells (although still below the Class I Groundwater Standard of 200 mg/L) (**Figure 3-4**).
- Sulfate can be an indicator constituent for coal ash; however, there are other anthropogenic sources for elevated sulfate concentrations in groundwater, and sulfate concentrations can decrease in groundwater under strongly reducing conditions. For these reasons, sulfate is a less reliable indicator for coal ash impacts than boron. As in past monitoring periods, dissolved sulfate concentrations at the Ash Ponds 2 & 3 were highest at MW-6D, MW-10, and MW-11D (**Figure 3-5**) during the 2021 - 2024 monitoring period, where dissolved boron concentrations were also highest. However, there are also differences between the spatial distribution of dissolved sulfate concentrations and dissolved boron concentrations at the Site. For example, MW-6 had a median dissolved boron concentration of 4.45 mg/L (above the Class I Groundwater Standard for boron of 2.0 mg/L), suggesting coal ash impacts, even though the median dissolved sulfate concentration was at 11.6 mg/L (below the Class I Groundwater Standard for sulfate of 400 mg/L). Conversely, background monitoring wells MW-8 and MW-9 had low dissolved boron concentrations (median concentrations of 0.70 mg/L and 0.60 mg/L, respectively, below the Class I Groundwater Standard for boron), yet dissolved sulfate concentrations were similar to or higher than some of the wells which had elevated boron concentrations (*i.e.,* wells MW-2, MW-2D, MW-3D, MW-5, and MW-6). Due to these differences, which are consistent with previous monitoring periods, boron appears to be a more reliable indicator of coal ash constituents in groundwater and will, therefore, continue to be used as the primary indicator constituent for Ash Ponds 2 & 3.

3.3 Statistical Analysis

Analytical data were evaluated to identify short-term (compliance) data trends in the 2021 - 2024 dataset. Trends were evaluated following a three-step procedure:

- Test for outliers using the Grubbs outlier test as described in **Section 3.3.1**.
- Determine Sen's estimate of slope (in accordance with Section 3.4 of the Closure Plan).
- Perform a Mann-Kendall trend analysis for any cases (monitoring well/constituent) with a positive Sen's estimate of slope (in accordance with Section 3.4 of the Closure Plan).

3.3.1 Outlier Analysis

The Grubbs outlier test determines whether there is a high or low observation that differs statistically from the other data based upon the parameters of the test with the presumption that the data are normally distributed. The test methodology and results are listed in **Appendix D**.

The Grubbs test provides statistical evidence of potential outliers, but cannot be used alone to determine whether or not an observation is a true outlier that should be excluded from future statistical analysis. Corroborating evidence needed to exclude observations includes a discrete data reporting or analytical error, or potential laboratory bias. Absent corroborating evidence, the flagged observations are considered true but extreme values in the data set.

Outliers identified by the Grubbs outlier test based on the date range of 1996 - 2024 were considered for elimination from further statistical analysis. Ultimately, no new outliers were eliminated from statistical analysis.

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 observations in the time period being analyzed. The slopes represent the rate of change of the observations, with the y-axis being the observation 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 values. The test methodology is listed in **Appendix D**.

Observations from the 2021 - 2024 monitoring period (most recent eight monitoring events) exhibited 23 cases with positive slopes, 33 cases with negative slopes, and 196 cases with no slope (**Table 3-1**). The 23 cases with positive slopes were tested using the Mann-Kendall test (described in **Section 3.3.3**) to determine if the positive slopes represented statistically significant short-term (2021 - 2024) 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 D**. Increasing short-term (compliance) trends are identified in **Tables 3-1 and 3-2**.

The Mann-Kendall test detected three cases of short-term increasing trends in the 2021 - 2024 dataset; these included dissolved iron (MW-5, MW-6D) and TDS (MW-3). Of these identified short-term trends, none have persisted over a period of two or more consecutive years.

3.4 Groundwater Monitoring System Maintenance and Inspection

The monitoring wells were inspected during each sampling event of 2024 and maintained as necessary as described in the Groundwater Monitoring Plan. Groundwater monitoring field data worksheets which contain inspection records for 2024 are included in **Appendix B**.

3.5 Cover Inspection and Maintenance

Fly Ash Pond Final Cover Inspection Reports (**Appendix C**) are shared with the Venice plant by Ameren upon completion. The plant responds promptly to correct issues (if any) as they are reported. No issues were reported during the 2024 quarterly cover inspections.

4. EVALUATION OF COMPLIANCE

The increasing short-term trends for the most recent eight monitoring events (2021-2024) as identified in **Section 3.3.3** and in **Table 3-1** were either first-time or non-consecutive occurrences and likely do not indicate a potential release from Ash Ponds 2 & 3.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Statistical evaluation of analytical results for the eight rounds of groundwater samples collected between 2021 to 2024 did not identify any cases of increasing trends that recurred over a period of two or more consecutive years.

5.2 Recommendations

In accordance with Section 3.4 of the Closure Plan, the semi-annual sampling schedule should be continued.

Per Section 3.2.1 of the Closure Plan (Monitoring Parameters), any constituent that is not detectable at the RL or practical quantitation limit (PQL) in the downgradient wells for four consecutive quarters may be removed from the monitoring program in both the upgradient and downgradient wells. As stated in Section 5.2 of the 2020 Annual Report, lead and selenium were detected at or below the method detection limit (MDL) and, therefore, were detected below the RL/PQL for four consecutive sampling events. As of the 2024 Annual Report, concentrations continue to be low for selenium and lead at upgradient and downgradient wells. Recommendations presented in the 2020, 2021, 2022, and 2023 Annual Reports included plans to cease monitoring for lead and selenium in accordance with the Groundwater Monitoring Plan. We request written concurrence for ceasing monitoring for lead and selenium.

6. REFERENCES

Natural Resource Technology, Inc. (2011). *Closure Plan, Venice Power Plant Ash Ponds 2 & 3,* dated February 4, 2011 and revised on March 25, 2011.

TABLES

Table 1-1. Groundwater Monitoring Program Schedule
2024 Annual Report
Former Venice Power Plant - Ash Ponds 2 & 3

Frequency	Duration
Quarterly	Begins: March 2011
	Ends: 5 years after completion of cap and upon demonstration that monitoring effectiveness is not compromised and that there are no increasing trends attributable to the Venice ash ponds.
Semiannual	Begins: after IEPA approves that quarterly monitoring requirements have been satisfied.
	Ends: 5 years after initiation of semiannual monitoring and upon demonstration that monitoring effectiveness is not compromised and that there are no increasing trends attributable to the Venice ash ponds.
Annual	Begins: after IEPA approves that semiannual monitoring requirements have been satisfied.
	Ends: 4 consecutive years after initiation of annual monitoring if no increasing trends can be attributed to Venice Ash Ponds is detected in the concentrations of all constituents monitored at the downgradient boundaries of the Site and upon IEPA approval of a certified post-closure care report.

[O: SJC, C: YAD 3/9/18, U: RAB 11/20/2020]

Table 1-2. Groundwater Monitoring System Wells
2024 Annual Report
Former Venice Power Plant - Ash Ponds 2 & 3

Monitoring Well	Latitude	Longitude	Date Drilled	Surface Elevation (ft.)	Top of Well Casing Elevation (ft.)	Top of Screen Elevation (ft.)	Bottom of Screen Elevation (ft.)	Objective
MW-2	38-39-12.84	90-10-28.39	4/15/1996	412.75	412.31	394	384	Compliance
MW-2D	38-39-12.83	90-10-29.09	7/21/2011	412.61	412.36	370	365	Compliance
MW-3	38-39-03.34	90-10-30.00	4/15/1996	411.41	410.91	397	387	Compliance
MW-3D	38-39-03.40	90-10-30.00	7/20/2011	411.70	411.48	370	365	Compliance
MW-5	38-39-08.97	90-10-11.93	10/14/1997	433.16	432.93	394	384	Compliance
MW-6	38-39-02.24	90-10-18.17	10/15/1997	433.56	433.09	392	382	Compliance
MW-6D	38-39-02.24	90-10-18.09	7/19/2011	433.85	433.55	370	365	Compliance
MW-8	38-39-14.68	90-10-08.46	7/2/1999	416.50	416.27	383	373	Background
MW-9	39-39-27.23	90-10-15.93	7/2/1999	413.65	413.40	382	372	Background
MW-10	38-39-34.84	90-10-33.78	7/21/2011	422.11	424.99	391	381	Compliance
MW-11	38-39-22.64	90-10-32.25	7/22/2011	413.04	412.74	394	384	Compliance
MW-11D	38-39-22.58	90-10-32.24	7/22/2011	412.84	412.50	369	364	Compliance

[O: SJC, C: YAD 3/9/18]

Note:
Surface and well casing elevations based on survey of July 2012, vertical datum is NAVD 1988.

Table 1-3. Groundwater Monitoring Program Parameters
2024 Annual Report
Former Venice Power Plant - Ash Ponds 2 & 3

Field Parameters	Method
pH	SM, 22nd Edition, Method 4500-H+ B
Specific conductance	SM, 22nd Edition, Method 2510
Temperature	SM, 22nd Edition, Method 4500-H+ B
Water level	--
Well depth	--
Laboratory Parameters	**Method**
Antimony	EPA 200.8
Arsenic	EPA 200.8
Barium	EPA 200.8
Beryllium[1]	--
Boron	SM, 22nd Edition, Method 3120 B
Cadmium	EPA 200.8
Chloride	SM, 22nd Edition, Method 4110 B
Chromium	EPA 200.8
Cobalt	EPA 200.8
Copper	EPA 200.8
Cyanide	Lachat 10-204-00-1-X
Fluoride	SM, 22nd Edition, Method 4110 B
Iron	SM, 22nd Edition, Method 3120 B
Lead	EPA 200.8
Manganese	SM, 22nd Edition, Method 3120 B
Mercury[1]	--
Nickel	EPA 200.8
Nitrate as N	SM, 22nd Edition, Method 4110 B
Selenium	EPA 200.8
Silver	EPA 200.8
Sulfate	SM, 22nd Edition, Method 4110 B
Thallium[1]	--
Total Dissolved Solids	SM, 22nd Edition, Method 2540 C
Zinc	EPA 200.8

[O: SJC, C: YAD 3/9/18, U: RAB 12/20/22, C: KLT 12/20/22]

Notes:

[1] Eliminated from the monitoring program June 5, 2019 by IEPA approval.

Table 3-1. Trend Analysis Results
2024 Annual Report
Former Venice Power Plant - Ash Ponds 2 & 3

	MW-2	MW-2D	MW-3	MW-3D	MW-5	MW-6	MW-6D	MW-8	MW-9	MW-10	MW-11	MW-11D
Number of Samples	7	8	6	8	8	8	8	8	8	8	8	9
Antimony, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Arsenic, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Barium, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Boron, dissolved	+	+	+	-	+	decrease	decrease	none	none	none	none	-
Cadmium, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Chloride, dissolved	-	decrease	-	-	-	decrease	+	+	decrease	-	+	-
Chromium, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Cobalt, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Copper, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Cyanide, total	none	none	none	none	none	none	none	none	none	none	none	none
Fluoride, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Iron, dissolved	-	-	none	-	increase	+	increase	none	-	none	none	+
Lead, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Manganese, dissolved	-	none	-	none	none	none	none	none	none	none	none	none
Nickel, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Nitrate nitrogen, dissolved	none	-	+	none	none	none	none	none	none	none	none	none
Selenium, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Silver, dissolved	none	none	none	none	none	none	none	none	none	none	none	none
Sulfate, dissolved	+	+	+	decrease	+	+	decrease	-	+	+	-	-
Total Dissolved Solids	-	+	increase	-	+	-	+	-	-	-	-	-
Zinc, dissolved	none	none	none	none	none	none	none	none	none	none	none	none

|O: RAB 10/30/24, C: KLT 11/1/24|

Notes:
- "+" 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.
- Well MW-2 was dry on August 31, 2023.
- Well MW-3 was dry on August 15, 2022 and August 31, 2023.
- Sampling events from 3/1/2021-8/5/2024 were used for analysis.

Table 3-2. Summary of Trend Analyses
2024 Annual Report
Former Venice Power Plant - Ash Ponds 2 & 3

Reporting Date	Short-Term Increasing Trends	Long-Term Decreasing Trend
2012	15	
2013	14	
2014	6	
2015	1	
2016	20	
2017	10	
2018	2	
2019	3	
2020	11	
2021	3	
2022	10	
2023	16	
2024	3	22

[O: RAB 10/30/24, C: KLT 11/1/24]

Notes:
Short-term trends were generally calculated on the basis of eight consecutive sampling events.
Long-term trend is calculated with data since completion of closure in 2012.
Long -term trend is presented for the current reporting year only.

FIGURES

MONITORING WELL LOCATION

GROUNDWATER MANAGEMENT ZONE

0 150 300 Feet

SITE MAP

FIGURE 1-1

2023 ANNUAL REPORT FORMER VENICE POWER PLANT ASH PONDS 2 & 3

AMEREN MISSOURI

VENICE, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

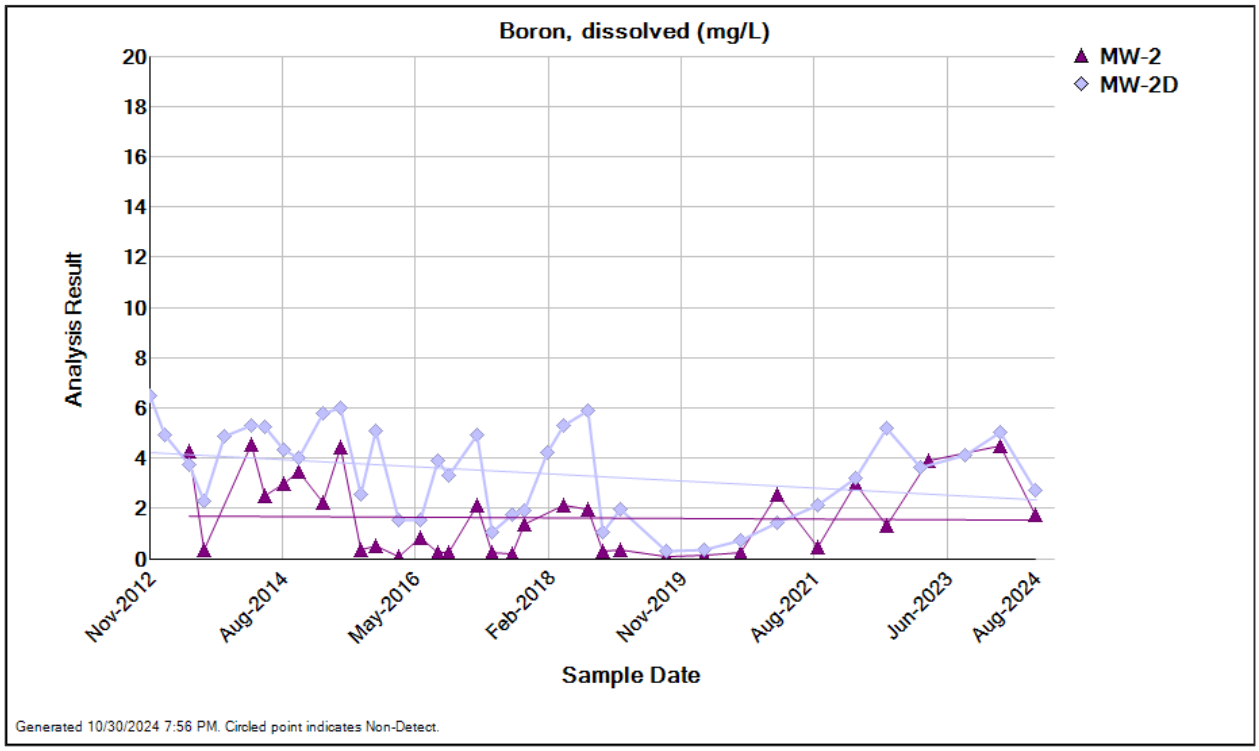

Figure 1-2. Boron concentrations over time since closure completion (2012) at compliance wells MW-2 and MW-2D.

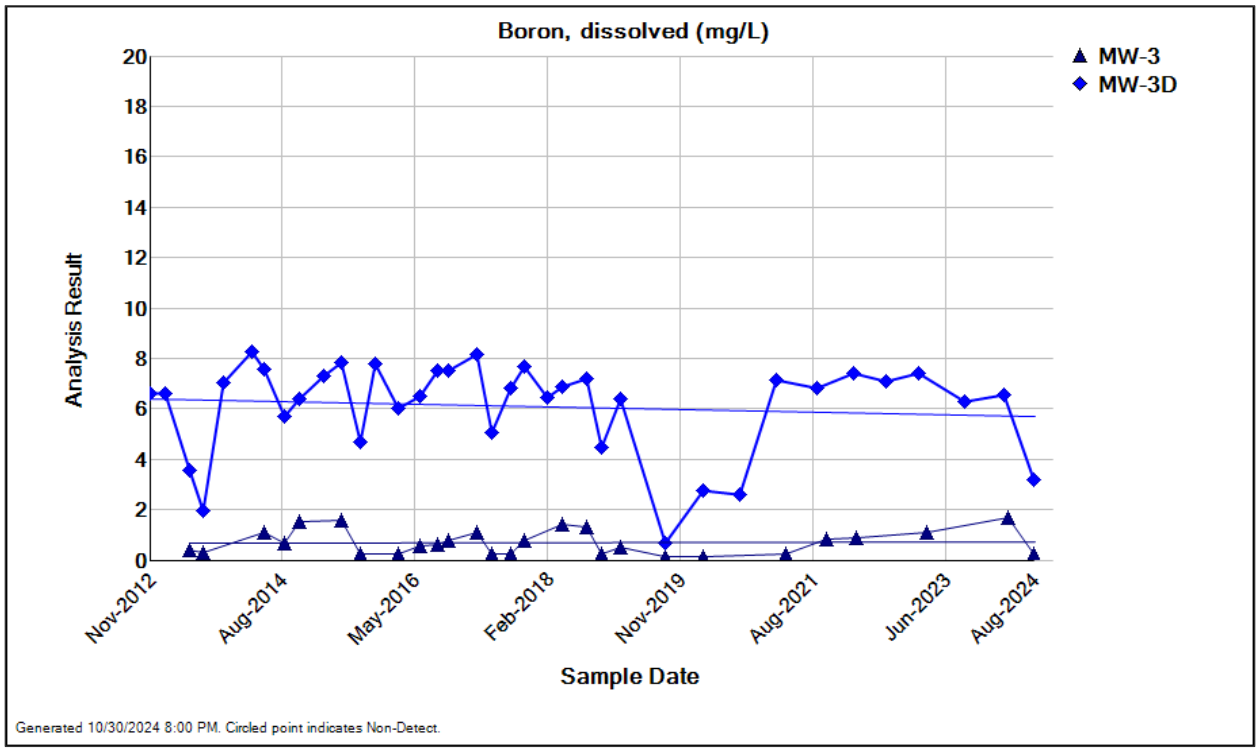

Figure 1-3. Boron concentrations over time since closure completion (2012) at compliance wells MW-3 and MW-3D.

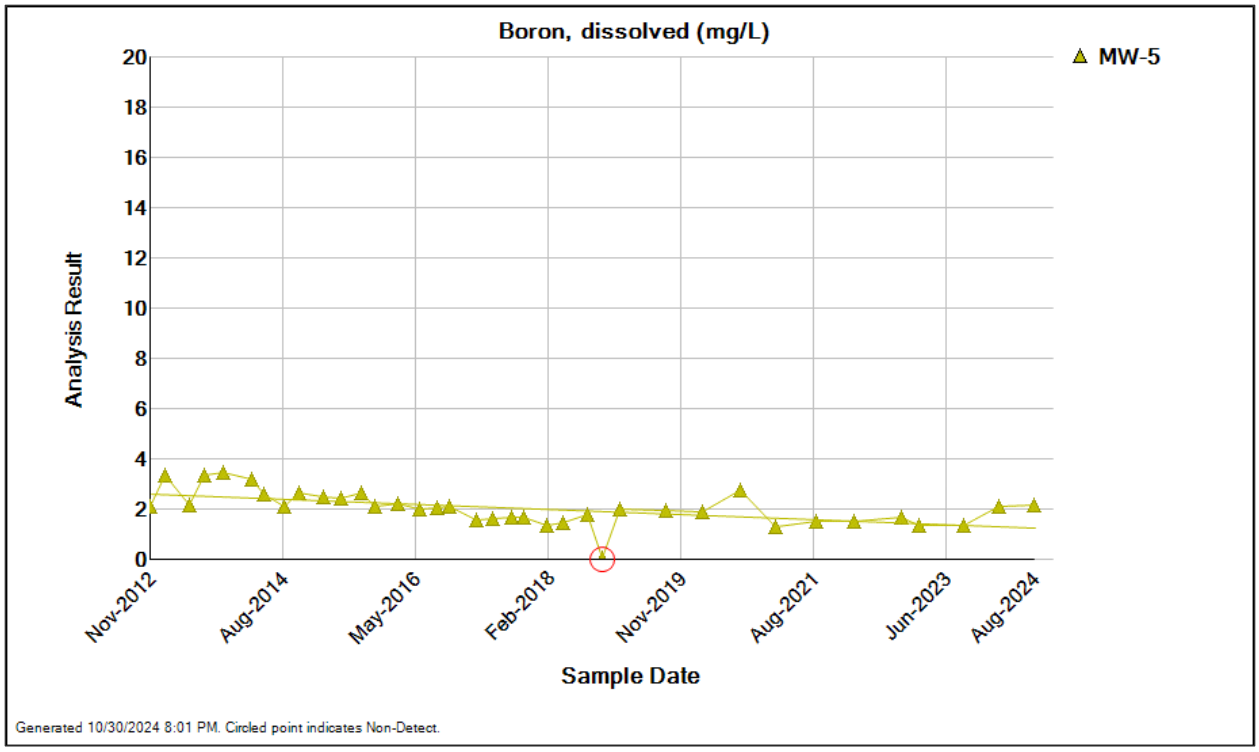

Figure 1-4. Boron concentrations over time since closure completion (2012) at compliance well MW-5.

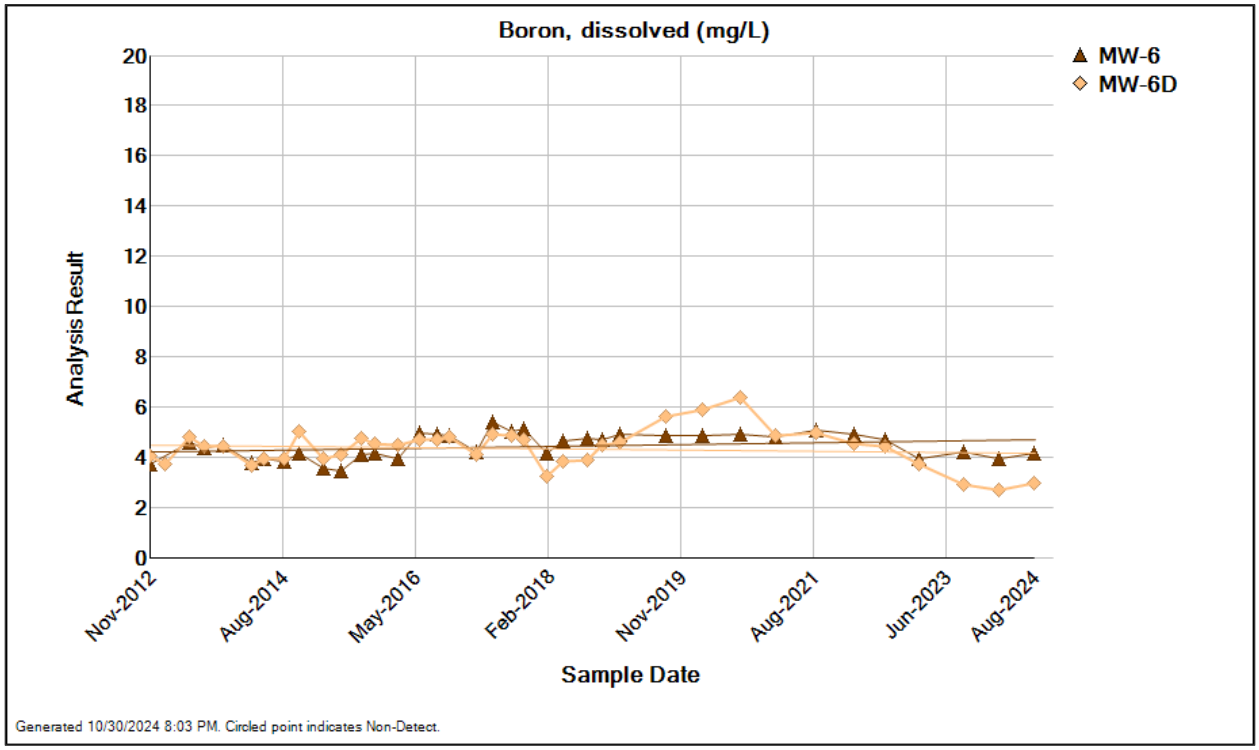

Figure 1-5. Boron concentrations over time since closure completion (2012) at compliance well MW-6 and MW-6D.

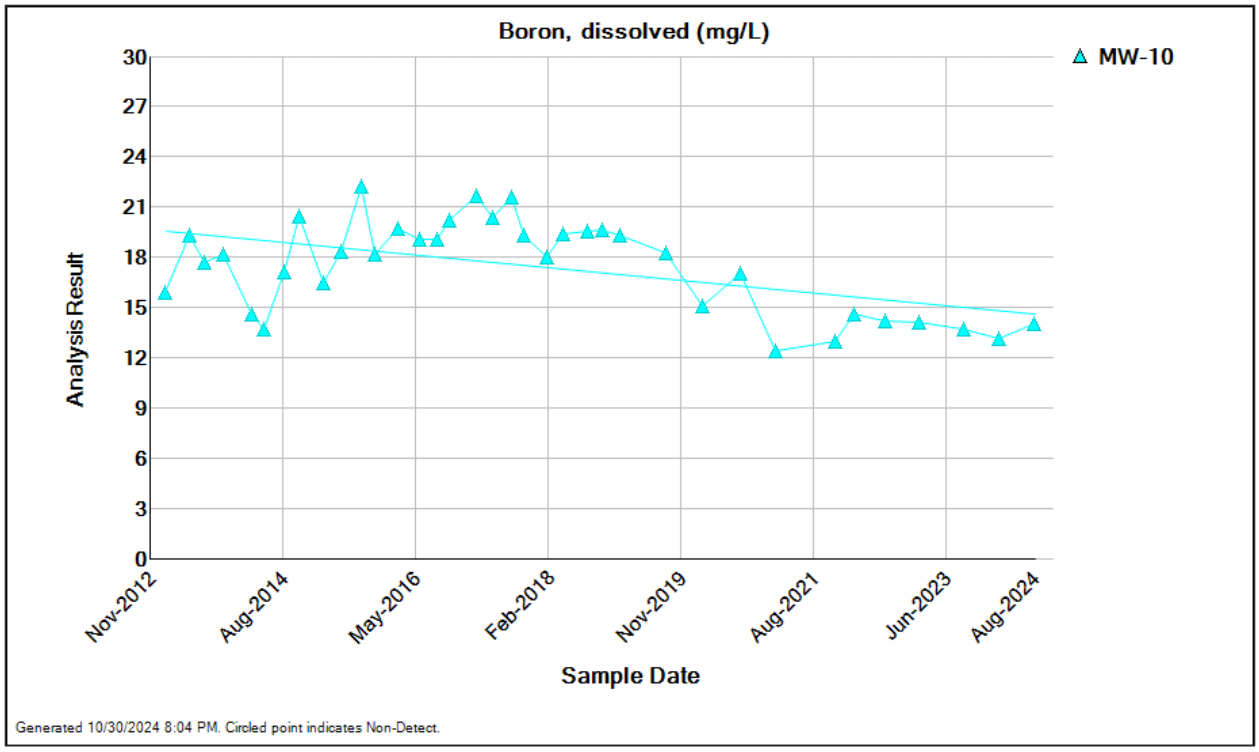

Figure 1-6. Boron concentrations over time since closure completion (2012) at compliance well MW-10.

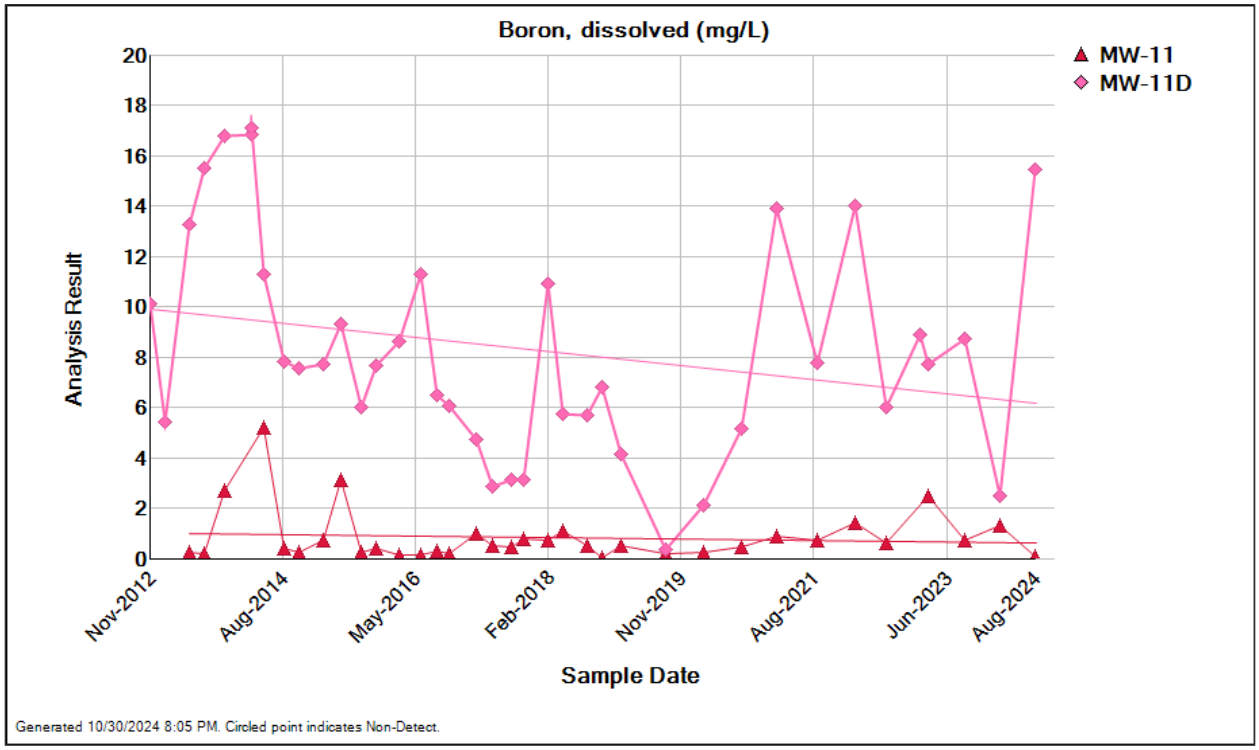

Figure 1-7. Boron concentrations over time since closure completion (2012) at compliance wells MW-11 and MW-11D.

- MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (1-FOOT INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER MANAGEMENT ZONE

0 150 300 Feet

[1] = WELL DRY, GROUNDWATER LEVEL BELOW BOTTOM OF WELL SCREEN, LESS THAN 386.6 FEET NAVD88.

NM = ELEVATION NOT MEASURED ON FEBRUARY 13, 2024

GROUNDWATER ELEVATION CONTOURS
FEBRUARY 13, 2024

2024 ANNUAL REPORT
FORMER VENICE POWER PLANT
ASH PONDS 2 & 3
AMEREN MISSOURI
VENICE, ILLINOIS

FIGURE 3-1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (1-FOOT INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
GROUNDWATER MANAGEMENT ZONE

*RIVER ELEVATION OBTAINED FROM SITE STAFF GAGE AUGUST 5, 2024.

0 150 300 Feet

GROUNDWATER ELEVATION CONTOURS
AUGUST 5, 2024

2024 ANNUAL REPORT
FORMER VENICE POWER PLANT
ASH PONDS 2 & 3
AMEREN MISSOURI
VENICE, ILLINOIS

FIGURE 3-2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

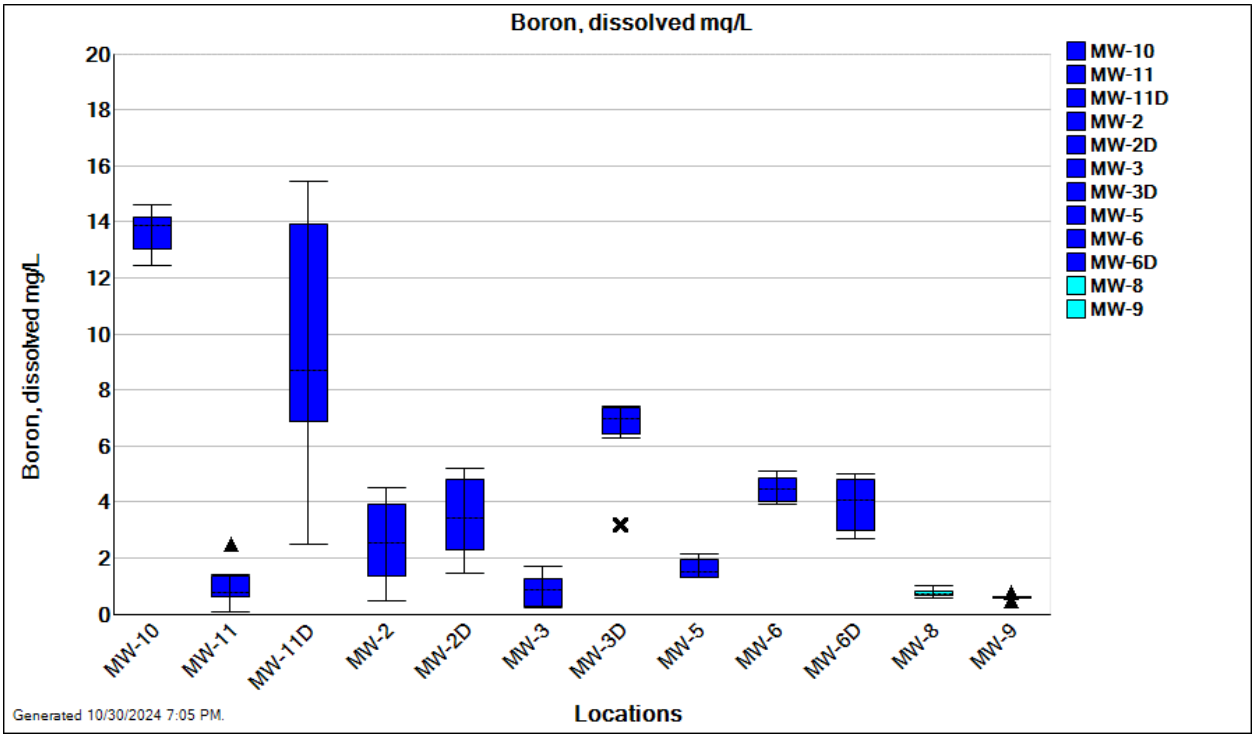

Figure 3-3. Box-whisker plot showing the distribution of boron concentrations by monitoring well for data collected during March 2021 through August 2024.

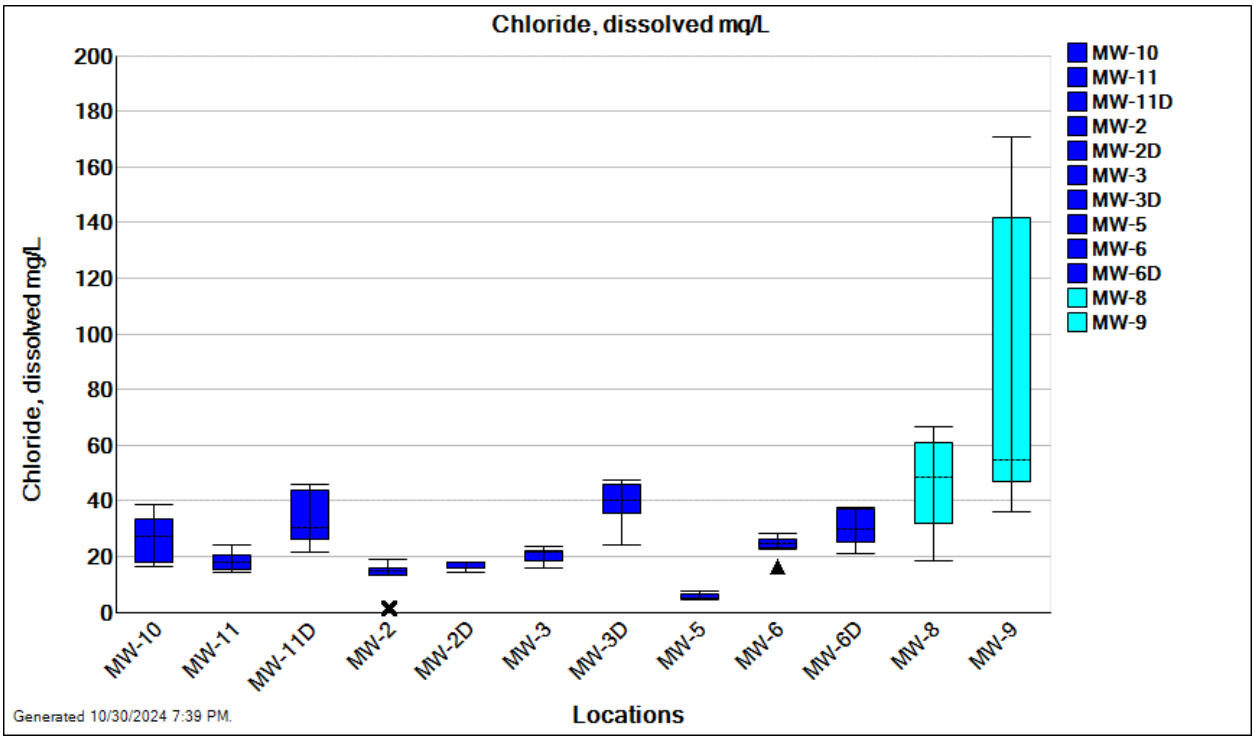

Figure 3-4. Box-whisker plot showing the distribution of chloride concentrations by monitoring well for data collected during March 2021 through August 2024.

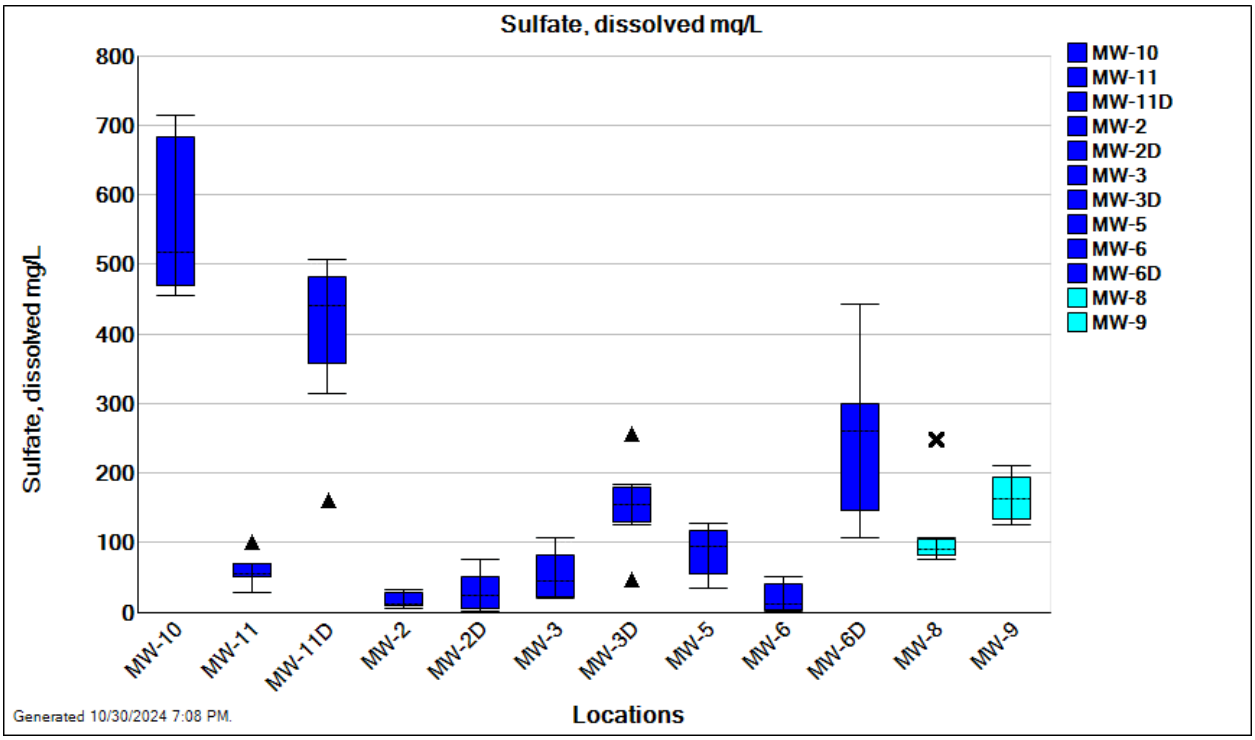

Figure 3-5. Box-whisker plot showing distribution of sulfate concentrations by monitoring well for data collected during March 2021 through August 2024.

APPENDIX A
GROUNDWATER MONITORING RESULTS 2021 - 2024 MONITORING PERIOD

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-2

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	3/6/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000		<0.000	0.000
As, diss, mg/L	0.041		0.033	0.094	0.079	0.074		0.009	0.007
B, diss, mg/L	2.558		0.478	3.000	1.300	3.900		4.490	1.750
Ba, diss, mg/L	0.402		0.282	0.461	0.510	0.507		0.598	0.365
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000		0.001	0.000
Cl, diss, mg/L	15.9		15.9	1.6	14.9	14.4		13.0	18.7
CN, tot, mg/L		0.0012	<0.0020	<0.0010	<0.0010	<0.0010		0.0054	<0.0010
Co, diss, mg/L	0.066		0.013	0.091	0.035	0.022		0.017	0.004
Cr, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000		<0.000	<0.000
Cu, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000		0.026	<0.000
F, diss, mg/L	0.21		0.19	0.30	0.16	0.30		0.21	0.31
Fe, diss, mg/L	3.380		0.745	15.100	10.600	16.200		<0.200	0.320
GW Depth (TOC), ft	23.40	12.70	24.40	23.80	23.30	18.25	27.89	24.00	14.01
GW Elv, ft	388.91	399.61	387.91	388.51	389.01	394.06	384.42		
Mn, diss, mg/L	3.087		0.773	5.100	2.900	2.500		1.060	0.610
Ni, diss, mg/L	0.029		0.011	0.027	0.019	0.013		0.014	0.005
NO3, diss, mg/L	<0.10		<0.10	<0.10	<0.10	<0.10		<0.10	3.40
Pb, diss, mg/L	<0.007		<0.007	<0.000	<0.000	<0.000		<0.000	<0.000
pH (field), STD	7.00	6.90	6.93	6.90	7.00	7.20		7.08	7.30
Sb, diss, mg/L	<0.0002		0.0270	<0.0002	<0.0002	<0.0002		0.0004	0.0009
Se, diss, mg/L	<0.009		0.025	0.001	0.000	0.000		0.001	0.001
SO4, diss, mg/L	7.5		28.0	5.9	16.2	8.8		11.3	32.8
Spec. Cond. (field), micromho	1093	1136	958	1205	1117	1166		1168	922
TDS, mg/L	690		613	763	701	662		710	566
Temp (Celcius), degrees C	15.90	15.70	17.10	18.00	16.70	17.10		15.50	17.20
Zn, diss, mg/L	0.007		0.010	0.001	0.002	0.001		0.011	<0.005

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-2D

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	0.010		0.026	<0.000	0.021	0.031	0.037	0.032	0.027
B, diss, mg/L	1.443		2.144	3.200	5.200	3.650	4.100	5.040	2.700
Ba, diss, mg/L	0.338		0.418	0.420	0.423	0.487	0.491	0.442	0.417
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	0.000
Cl, diss, mg/L	17.8		17.9	15.7	17.4	15.4	16.0	15.9	14.4
CN, tot, mg/L		<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0057	<0.0010
Co, diss, mg/L	<0.001		<0.001	<0.000	0.000	<0.000	<0.000	<0.000	<0.000
Cr, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	0.000	<0.000
Cu, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	0.000	0.001	0.001
F, diss, mg/L	0.24		0.17	0.20	0.17	0.27	0.23	0.14	0.23
Fe, diss, mg/L	18.410		21.930	24.800	21.300	21.780	20.500	16.530	18.340
GW Depth (TOC), ft	22.90	13.00	24.80	24.00	23.80	27.48	28.45	24.09	14.65
GW Elv, ft	389.46	399.36	387.56	388.36	388.56	384.88	383.91		
Mn, diss, mg/L	0.584		1.017	1.400	1.200	1.440	1.400	1.270	1.260
Ni, diss, mg/L	<0.003		<0.003	<0.000	0.000	0.000	<0.000	<0.000	0.001
NO3, diss, mg/L	0.90		1.30	<0.10	1.30	<0.10	0.90	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	7.40	7.00	7.23	7.20	7.10	7.40	7.30	7.46	7.06
Sb, diss, mg/L	<0.0002		0.0270	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		<0.009	<0.000	0.000	<0.000	<0.000	0.000	0.000
SO4, diss, mg/L	5.4		1.1	12.9	36.7	54.8	37.1	76.1	4.3
Spec. Cond. (field), micromho	743	836	1182	1393	1252	1390	1400	1279	1246
TDS, mg/L	660		700	903	790	900	916	792	754
Temp (Celcius), degrees C	15.30	15.70	16.00	16.20	15.90	15.00	16.20	15.10	16.50
Zn, diss, mg/L	0.004		0.008	0.019	<0.000	0.003	0.007	0.024	<0.005

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-3

	3/1/2021	4/19/2021	11/2/2021	3/28/2022	1/24/2023	3/6/2023	4/4/2024	8/5/2024
Ag, diss, mg/L		<0.001	0.001	<0.000		<0.000	0.001	<0.000
As, diss, mg/L		0.001	0.018	<0.000		<0.000	0.000	0.000
B, diss, mg/L		0.228	0.811	0.900		1.100	1.680	0.230
Ba, diss, mg/L		0.223	0.280	0.299		0.371	0.319	0.262
Cd, diss, mg/L		0.001	<0.001	0.000		0.001	0.001	0.001
Cl, diss, mg/L		23.5	21.5	19.1		21.8	21.3	15.6
CN, tot, mg/L		<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	0.0084
Co, diss, mg/L		0.001	0.004	0.001		0.001	0.001	<0.000
Cr, diss, mg/L		0.000	0.001	<0.000		<0.000	<0.000	<0.000
Cu, diss, mg/L		0.002	<0.001	0.001		0.000	0.012	0.002
F, diss, mg/L		0.19	0.20	0.22		0.21	0.27	0.23
Fe, diss, mg/L		0.012	0.218	<0.200		<0.200	<0.200	0.020
GW Depth (TOC), ft	22.30	11.60	22.50	18.50	24.40		22.10	15.69
GW Elv, ft	388.61	399.31	388.41	392.41	386.51			
Mn, diss, mg/L		0.507	1.367	0.900		0.700	0.680	0.160
Ni, diss, mg/L		0.011	0.016	0.010		0.013	0.014	0.009
NO3, diss, mg/L		0.30	2.00	1.20		0.70	<0.10	13.20
Pb, diss, mg/L		0.001	0.007	<0.000		<0.000	<0.000	<0.000
pH (field), STD		6.70	5.48	6.80		6.60	6.60	6.51
Sb, diss, mg/L		0.0007	0.0270	<0.0002		<0.0002	0.0002	<0.0002
Se, diss, mg/L		0.004	0.016	<0.000		0.000	<0.000	0.003
SO4, diss, mg/L		20.7	27.5	20.7		74.0	107.6	63.0
Spec. Cond. (field), micromho		1042	1355	1201		1322	1310	1230
TDS, mg/L		630	657	718		832	836	836
Temp (Celcius), degrees C		16.00	16.00	15.90		17.80	14.60	18.30
Zn, diss, mg/L		<0.000	0.015	0.005		0.002	0.021	0.011

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-3D

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	3/13/2024	8/5/2024
Ag, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	<0.008		0.013	0.001	0.001	0.000	0.000	0.000	0.000
B, diss, mg/L	7.162		6.837	7.400	7.100	7.400	6.300	6.550	3.190
Ba, diss, mg/L	0.206		0.196	0.100	0.149	0.112	0.129	0.114	0.283
Cd, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	35.1		37.9	47.4	44.0	46.6	42.5	36.4	24.0
CN, tot, mg/L		<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	0.0017	0.0110	<0.0010
Co, diss, mg/L	<0.001		0.003	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cr, diss, mg/L	0.001		0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	<0.001		<0.001	<0.000	0.000	<0.000	0.000	0.000	0.000
F, diss, mg/L	0.12		0.12	0.10	0.05	0.08	0.10	0.07	0.17
Fe, diss, mg/L	6.516		6.279	3.100	3.600	1.730	1.800	1.050	5.720
GW Depth (TOC), ft	22.20	12.30	27.00	25.10	26.00	29.05	30.59	28.97	16.13
GW Elv, ft	389.28	399.18	384.48	386.38	385.48	382.43	380.89		
Mn, diss, mg/L	0.380		0.412	0.300	0.300	0.190	0.200	<0.200	0.570
Ni, diss, mg/L	<0.003		<0.003	0.001	0.001	0.001	0.000	<0.000	0.001
NO3, diss, mg/L	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	7.30	6.90	7.15	7.40	7.40	7.30	7.70	7.64	7.31
Sb, diss, mg/L	<0.0002		0.0260	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		0.012	<0.000	<0.000	<0.000	<0.000	<0.000	0.000
SO4, diss, mg/L	183.0		256.6	162.9	166.8	132.4	125.6	146.4	47.2
Spec. Cond. (field), micromho	938	1045	911	720	770	668	753	733	1219
TDS, mg/L	640		606	509	552	449	512	476	772
Temp (Celcius), degrees C	15.60	15.90	16.40	16.20	16.30	15.40	16.70	16.30	17.00
Zn, diss, mg/L	0.003		0.002	<0.000	0.000	0.001	0.002	0.005	<0.005

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-5

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	11/2/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	0.089		0.120	0.082	0.085	0.146	0.075	0.082	0.077
B, diss, mg/L	1.282		1.513	1.500	1.650	1.330	1.300	2.060	2.130
Ba, diss, mg/L	0.100		0.072	0.087	0.086	0.071	0.080	0.109	0.105
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	7.4		4.7	6.5	5.1	4.4	4.2	4.9	5.4
CN, tot, mg/L		0.0087	0.0074	0.0073	0.0100	0.0063	0.0097	0.0110	<0.0010
Co, diss, mg/L	<0.001		<0.001	0.000	0.000	0.001	0.000	0.000	0.000
Cr, diss, mg/L	0.002		<0.001	<0.000	0.000	<0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	0.001		<0.001	0.000	0.000	<0.000	0.000	0.002	0.000
F, diss, mg/L	0.30		0.28	0.30	0.29	0.36	0.27	0.23	0.28
Fe, diss, mg/L	1.316		1.553	2.000	2.060	2.340	1.800	2.440	2.650
GW Depth (TOC), ft	42.00	32.50	38.60	42.70	42.70	47.00	42.50	44.56	30.97
GW Elv, ft	390.93	400.43	394.33	390.23	390.23	385.93	390.43		
Mn, diss, mg/L	2.397		2.276	2.500	2.860	2.360	1.800	2.350	2.120
Ni, diss, mg/L	<0.003		<0.003	0.001	0.001	0.002	0.000	<0.000	0.001
NO3, diss, mg/L	1.00		<0.10	<0.10	<0.10	0.90	<0.10	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	7.30	7.20	7.16	7.60	7.50	7.60	7.60	7.41	7.63
Sb, diss, mg/L	<0.0002		0.0330	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		0.022	<0.000	0.000	0.000	0.000	<0.000	<0.000
SO4, diss, mg/L	99.7		50.7	123.9	91.4	33.7	66.7	127.7	96.8
Spec. Cond. (field), micromho	1177	1107	943	1287	1131	1100	1055	1351	1241
TDS, mg/L	760		609	874	762	591	710	910	830
Temp (Celcius), degrees C	16.20	16.70	17.60	16.80	16.70	14.20	17.50	17.10	19.20
Zn, diss, mg/L	0.005		0.006	0.006	0.000	0.001	0.004	0.009	<0.005

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-6

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	0.058		0.102	0.079	0.078	0.100	0.100	0.098	0.073
B, diss, mg/L	4.773		5.084	4.900	4.700	3.930	4.200	3.950	4.160
Ba, diss, mg/L	0.303		0.325	0.336	0.364	0.347	0.320	0.374	0.327
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	26.0		28.1	25.7	26.0	24.0	22.6	22.9	16.8
CN, tot, mg/L		<0.0010	<0.0020	<0.0010	0.0010	<0.0010	<0.0010	0.0046	<0.0010
Co, diss, mg/L	<0.001		<0.001	0.000	0.000	0.000	0.000	0.000	0.000
Cr, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	0.002		<0.001	0.001	<0.000	<0.000	<0.000	<0.000	0.000
F, diss, mg/L	0.53		0.48	0.40	0.73	0.54	0.54	0.48	0.54
Fe, diss, mg/L	16.910		16.630	24.000	21.700	24.360	21.700	23.350	17.720
GW Depth (TOC), ft	44.10	34.00	43.70	44.30	42.30	47.21	47.27	45.10	34.76
GW Elv, ft	388.99	399.09	389.39	388.79	390.79	385.88	385.82		
Mn, diss, mg/L	2.688		3.010	2.900	3.000	3.010	2.800	3.140	2.870
Ni, diss, mg/L	<0.003		0.003	0.005	0.006	0.007	0.007	0.006	0.006
NO3, diss, mg/L	<0.10		<0.10	<0.10	10.30	<0.10	<0.10	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	7.30	7.00	7.19	7.30	7.10	7.50	7.40	7.09	7.42
Sb, diss, mg/L	<0.0002		<0.0130	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		<0.009	<0.000	0.000	0.000	0.000	0.000	0.000
SO4, diss, mg/L	1.7		10.6	12.6	48.7	3.3	13.4	1.1	51.4
Spec. Cond. (field), micromho	901	887	894	927	937	950	893	974	861
TDS, mg/L	210		574	589	560	562	560	518	536
Temp (Celcius), degrees C	15.30	16.20	16.40	16.40	16.30	15.00	17.20	15.30	18.00
Zn, diss, mg/L	0.007		0.008	<0.000	0.000	0.001	0.003	0.008	<0.005

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-6D

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	0.002		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	<0.008		0.023	0.001	0.001	0.001	0.001	0.001	0.001
B, diss, mg/L	4.872		4.976	4.500	4.400	3.690	2.900	2.690	2.930
Ba, diss, mg/L	0.253		0.299	0.291	0.339	0.305	0.372	0.384	0.398
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	35.4		25.1	24.8	25.2	21.1	37.8	33.9	37.8
CN, tot, mg/L		<0.0010	<0.0020	0.0005	<0.0010	<0.0010	0.0015	0.0049	<0.0010
Co, diss, mg/L	<0.001		<0.001	<0.000	<0.000	0.000	<0.000	<0.000	<0.000
Cr, diss, mg/L	0.001		0.001	0.000	<0.000	0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	0.003		<0.001	<0.000	0.000	<0.000	<0.000	0.001	0.000
F, diss, mg/L	0.05		<0.05	<0.05	<0.05	0.07	0.06	0.08	0.14
Fe, diss, mg/L	0.343		0.446	0.600	0.800	1.030	1.700	1.720	1.520
GW Depth (TOC), ft	44.20	34.40	44.10	44.60	42.70	47.60	47.60	45.40	35.15
GW Elv, ft	389.35	399.15	389.45	388.95	390.85	385.95	385.95		
Mn, diss, mg/L	0.140		0.190	0.200	0.300	0.410	0.600	0.570	0.560
Ni, diss, mg/L	<0.003		<0.003	<0.000	0.001	0.001	<0.000	<0.000	0.001
NO3, diss, mg/L	<0.10		<0.10	<0.10	1.20	<0.10	<0.10	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	8.40	8.10	8.07	8.00	8.00	7.80	7.90	7.91	7.97
Sb, diss, mg/L	<0.0002		0.0270	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		<0.009	0.000	0.000	<0.000	<0.000	0.000	<0.000
SO4, diss, mg/L	283.9		442.9	304.3	264.5	254.0	156.5	106.9	141.6
Spec. Cond. (field), micromho	987	800	1039	1143	1239	1148	13	1257	1249
TDS, mg/L	620		793	865	925	838	890	828	852
Temp (Celcius), degrees C	15.30	16.10	16.80	16.30	16.20	14.90	17.20	15.60	18.00
Zn, diss, mg/L	0.003		0.005	<0.000	0.004	0.001	0.004	0.006	0.007

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-8

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	0.001		0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	<0.008		0.025	0.000	0.000	0.000	0.000	0.000	0.000
B, diss, mg/L	0.818		1.026	0.700	0.700	0.750	0.700	0.590	0.620
Ba, diss, mg/L	0.100		0.115	0.095	0.110	0.096	0.094	0.115	0.107
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	48.2		43.3	55.2	49.2	27.9	18.3	66.4	63.0
CN, tot, mg/L		<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	0.0010	0.0093	<0.0010
Co, diss, mg/L	0.001		0.004	0.002	0.002	0.003	0.002	0.002	0.002
Cr, diss, mg/L	0.001		<0.001	0.000	<0.000	0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	<0.001		<0.001	<0.000	0.001	<0.000	0.000	0.204	0.001
F, diss, mg/L	0.32		0.31	0.30	0.27	0.31	0.30	0.39	0.37
Fe, diss, mg/L	0.099		0.174	<0.200	<0.200	0.030	<0.200	0.270	0.090
GW Depth (TOC), ft	26.50	16.80	24.00	26.40	22.20	28.55	27.34	27.67	16.22
GW Elv, ft	389.77	399.47	392.27	389.87	394.07	387.72	388.93		
Mn, diss, mg/L	0.830		0.880	0.700	0.700	0.850	0.600	0.540	0.530
Ni, diss, mg/L	0.010		0.006	0.006	0.007	0.009	0.006	0.007	0.008
NO3, diss, mg/L	1.50		<0.10	1.00	<0.10	<0.10	<0.10	0.50	<0.10
Pb, diss, mg/L	<0.007		<0.007	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	6.90	6.60	6.68	6.90	6.70	7.10	7.00	6.82	7.23
Sb, diss, mg/L	0.0023		0.0340	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		<0.009	0.001	<0.000	0.000	0.000	<0.000	<0.000
SO4, diss, mg/L	107.0		249.5	84.7	95.0	74.9	77.9	94.9	85.2
Spec. Cond. (field), micromho	1183	1269	1304	1154	1178	1038	1024	1208	1167
TDS, mg/L	640		910	734	840	645	664	562	742
Temp (Celcius), degrees C	15.50	16.10	16.30	16.00	15.80	15.10	15.90	16.00	16.60
Zn, diss, mg/L	0.004		0.007	<0.000	0.001	0.004	0.008	0.023	0.008

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-9

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	<0.008		0.025	0.003	0.004	0.003	0.005	0.003	0.004
B, diss, mg/L	0.637		0.769	0.600	0.600	0.590	0.600	0.490	0.570
Ba, diss, mg/L	0.177		0.184	0.133	0.150	0.158	0.161	0.132	0.137
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	163.0		170.9	78.6	55.8	53.7	48.9	36.2	46.4
CN, tot, mg/L		<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0122	<0.0010
Co, diss, mg/L	<0.001		0.002	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cr, diss, mg/L	0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	<0.001		<0.001	<0.000	0.002	<0.000	<0.000	0.104	<0.000
F, diss, mg/L	0.20		0.25	0.20	0.20	0.21	0.26	0.26	0.31
Fe, diss, mg/L	19.790		22.020	16.600	17.400	19.070	19.500	11.420	17.480
GW Depth (TOC), ft	23.50	14.00	21.40	23.60	19.90	26.05	25.00	24.54	13.67
GW Elv, ft	389.90	399.40	392.00	389.80	393.50	387.35	388.40		
Mn, diss, mg/L	0.941		0.958	0.800	0.800	0.870	0.900	0.750	0.770
Ni, diss, mg/L	<0.003		0.006	<0.000	0.001	0.001	<0.000	0.000	0.001
NO3, diss, mg/L	<0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	6.80	6.70	6.86	7.00	6.80	6.80	7.10	6.85	6.86
Sb, diss, mg/L	0.0011		0.0180	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		0.018	<0.000	<0.000	<0.000	<0.000	<0.000	0.000
SO4, diss, mg/L	143.9		194.9	127.9	142.0	182.2	209.8	125.8	187.3
Spec. Cond. (field), micromho	1667	1558	1640	1288	1274	1272	1379	1099	1213
TDS, mg/L	1010		1087	854	943	860	980	686	818
Temp (Celcius), degrees C	15.60	16.10	16.40	16.10	16.10	15.30	16.50	15.80	17.60
Zn, diss, mg/L	0.005		0.008	<0.000	0.001	0.001	0.006	0.024	0.007

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-10

	3/1/2021	4/19/2021	9/14/2021	12/13/2021	3/15/2022	8/15/2022	1/24/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	0.001		<0.001		<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	0.010		0.067		0.007	0.042	0.006	0.009	0.008	0.042
B, diss, mg/L	12.420			13.000	14.600	14.200	14.110	13.700	13.130	13.990
Ba, diss, mg/L	0.039		0.071		0.054	0.068	0.068	0.049	0.053	0.075
Cd, diss, mg/L	<0.001		<0.001		<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	33.8		21.2		33.2	16.5	38.7	20.9	32.8	16.5
CN, tot, mg/L		<0.0010	<0.0020		<0.0010	<0.0010	<0.0010	0.0024	0.0089	<0.0010
Co, diss, mg/L	<0.001		<0.001		0.001	0.001	0.001	0.000	0.000	0.001
Cr, diss, mg/L	0.001		<0.001		<0.000	<0.000	0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	0.002		<0.001		0.001	0.001	<0.000	0.002	0.004	0.000
F, diss, mg/L	0.20		0.20		0.20	0.15	0.38	0.25	0.19	0.25
Fe, diss, mg/L	0.104		2.474		<0.200	1.400	0.070	<0.200	<0.200	1.780
GW Depth (TOC), ft	35.20	23.10	33.60	38.70	35.70	33.60	39.11	39.45	36.14	24.72
GW Elv, ft	389.79	401.89	391.39	386.29	389.29	391.39	385.88	385.54		
Mn, diss, mg/L	0.041		1.013		0.700	1.000	0.890	0.200	0.610	1.030
Ni, diss, mg/L	<0.003		0.003		0.001	0.002	0.002	0.002	0.001	0.002
NO3, diss, mg/L	4.30		<0.10		0.90	<0.10	1.70	3.60	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007		<0.000	<0.000	<0.000	<0.000	0.000	<0.000
pH (field), STD	7.60	7.20	7.22	7.42	7.30	7.40	7.50	7.50	7.34	7.58
Sb, diss, mg/L	0.0006		0.0320		0.0002	<0.0002	0.0002	<0.0002	0.0002	0.0003
Se, diss, mg/L	<0.009		0.009		0.001	0.000	<0.000	0.000	0.001	0.000
SO4, diss, mg/L	457.1		713.9		505.4	673.3	527.0	509.1	454.8	686.4
Spec. Cond. (field), micromho	1487	1478	1517	1489	1548	1602	1589	1550	1566	1578
TDS, mg/L	1310		1252		1236	1411	1266	1218	1198	1322
Temp (Celcius), degrees C	15.50	16.50	17.40	15.10	16.50	16.50	15.30	17.90	15.30	19.20
Zn, diss, mg/L	0.005		0.007		0.013	0.001	0.001	0.002	0.012	<0.005

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-11

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	3/6/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	<0.008		0.030	0.000	0.001	0.001	0.000	0.001	0.000
B, diss, mg/L	0.860		0.712	1.400	0.600	2.500	0.700	1.300	0.090
Ba, diss, mg/L	0.246		0.214	0.216	0.195	0.251	0.240	0.235	0.151
Cd, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	0.000	<0.000
Cl, diss, mg/L	16.0		18.4	15.3	16.9	14.1	24.0	18.9	21.3
CN, tot, mg/L		<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0049	0.0091
Co, diss, mg/L	<0.001		<0.001	<0.000	0.000	<0.000	<0.000	0.000	<0.000
Cr, diss, mg/L	0.002		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	0.000
Cu, diss, mg/L	<0.001		<0.001	0.001	0.003	<0.000	0.001	0.029	0.001
F, diss, mg/L	0.21		0.16	0.20	0.15	0.25	0.21	0.18	0.51
Fe, diss, mg/L	1.368		0.103	<0.200	<0.200	<0.200	<0.200	<0.200	<0.020
GW Depth (TOC), ft	24.90	12.50	21.80	24.80	21.60	23.40	26.32	25.50	13.21
GW Elv, ft	387.84	400.24	390.94	387.94	391.14	389.34	386.42		
Mn, diss, mg/L	0.192		0.006	0.300	<0.200	0.700	1.000	0.570	<0.020
Ni, diss, mg/L	0.009		<0.003	0.005	0.002	0.007	0.005	0.004	0.002
NO3, diss, mg/L	0.90		7.80	<0.10	2.90	0.80	1.80	0.50	3.00
Pb, diss, mg/L	<0.007		<0.007	0.001	0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	7.00	7.00	6.79	6.80	6.90	7.00	6.90	6.80	7.02
Sb, diss, mg/L	0.0004		0.0240	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		<0.009	<0.000	0.004	<0.000	0.001	0.000	0.001
SO4, diss, mg/L	52.4		68.4	53.5	69.4	101.8	48.0	55.0	28.5
Spec. Cond. (field), micromho	1051	1528	1052	1133	1006	1310	1048	1227	718
TDS, mg/L	1120		736	720	722	864	662	754	424
Temp (Celcius), degrees C	15.80	15.70	15.80	16.70	15.30	16.50	17.60	15.00	19.20
Zn, diss, mg/L	0.010		0.007	0.002	0.004	<0.000	0.009	0.017	0.008

Venice
Groundwater Monitoring Results 2021-2024 Monitoring Period

Date Range: 01/01/2021 to 08/05/2024
Well: MW-11D

	3/1/2021	4/19/2021	9/14/2021	3/15/2022	8/15/2022	1/24/2023	3/6/2023	8/31/2023	2/13/2024	8/5/2024
Ag, diss, mg/L	<0.001		<0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
As, diss, mg/L	<0.008		0.028	0.011	0.012	0.012	0.011	0.010	0.010	0.010
B, diss, mg/L	13.880		7.756	14.000	6.000	8.870	7.700	8.700	2.490	15.420
Ba, diss, mg/L	0.226		0.219	0.250	0.234	<0.000	0.237	0.217	0.152	0.208
Cd, diss, mg/L	<0.001		0.001	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cl, diss, mg/L	30.3		43.9	26.2	45.7	25.5	25.8	30.3	43.2	21.4
CN, tot, mg/L		0.0119	0.0152	0.0600	0.0668	0.0842	0.0751	0.0510	0.0121	0.0157
Co, diss, mg/L	<0.001		<0.001	0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Cr, diss, mg/L	0.001		0.001	0.001	<0.000	0.000	<0.000	<0.000	<0.000	<0.000
Cu, diss, mg/L	<0.001		<0.001	0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
F, diss, mg/L	0.21		0.21	0.20	0.19	0.25	0.20	0.22	0.20	0.28
Fe, diss, mg/L	20.370		20.760	22.800	20.100	23.480	22.300	22.800	15.580	21.960
GW Depth (TOC), ft	22.30	13.70	26.30	24.30	25.40	28.65	16.85	29.94	23.96	15.68
GW Elv, ft	390.20	398.80	386.20	388.20	387.10	383.85	395.65	382.56		
Mn, diss, mg/L	2.900		3.213	3.700	3.100	3.690	3.600	3.400	2.250	3.320
Ni, diss, mg/L	0.003		<0.003	0.002	0.000	0.000	0.000	<0.000	<0.000	0.002
NO3, diss, mg/L	<0.10		2.70	<0.10	<0.10	<0.10	2.60	2.40	<0.10	<0.10
Pb, diss, mg/L	<0.007		<0.007	0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
pH (field), STD	7.20	7.00	7.18	7.00	7.20	7.40	7.20	7.20	7.28	7.57
Sb, diss, mg/L	<0.0002		0.0360	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Se, diss, mg/L	<0.009		<0.009	0.001	<0.000	0.000	0.000	<0.000	<0.000	0.000
SO4, diss, mg/L	507.6		439.7	462.3	313.0	446.2	401.6	426.9	161.7	502.9
Spec. Cond. (field), micromho	1691	718	1574	1807	1633	1769	1724	1673	1258	1611
TDS, mg/L	1710		1256	1469	1310	1387	1262	1356	810	1362
Temp (Celcius), degrees C	15.40	12.70	15.80	15.90	16.00	14.90	16.10	16.80	15.20	16.50
Zn, diss, mg/L	0.006		0.009	0.007	<0.000	<0.000	<0.000	0.000	0.014	<0.005

APPENDIX B
2024 GROUNDWATER MONITORING FIELD DATA WORKSHEETS

Venice Groundwater Monitoring Field Data Worksheet

(Page 1 of 3)

Sample Date: 2 / 13 / 24

River Level: _____ feet

	Well #2	Well #2D	Well #3	Well #3D	Well #5	Well #6
Well name sign, lock, and inner cap present (note any deficiency)		Yes			Yes	
Casing and concrete pad in good condition (note any deficiency)		Yes			Yes	
Internal piping unobstructed and in good condition (note any deficiency)		Yes		Obstructed	Top of pipe cracked	
Water Level (±0.01 feet, from top of casing mark)	24.00	24.09	Dry	24.95	44.56	~~45.10~~ 45.10
Total Well Depth (±0.01 feet)	28.95	47.54		48.80	49.28	~~48.61~~ 51.28
Time purging began (24-hour clock)	16:00	16:30	~~15~~ 15:30	~~15~~ 15:30	14:00	~~14~~ 14:30
Conductivity after 10 minutes µS/cm	1154	1274			1294	951
Temperature °C	15.0	15.4			17.4	15.6
Conductivity after 15 minutes (µS/cm)	1168	1279			1351	974
Temperature °C	15.5	15.1			17.1	15.3
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm						
Time to reach final conductivity (min)						
Temperature °C						
pH (on site) (±0.01)	7.08	7.46			7.41	7.09

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

Venice Groundwater Monitoring Field Data Worksheet

	Well #6D	Well #8	Well #9	Well #10	Well #11	Well #11D
Well name sign, lock, and inner cap present (note any deficiency)			Yes			
Casing and concrete pad in good condition (note any deficiency)			Yes			
Internal piping unobstructed and in good condition (note any deficiency)			Yes			
Water Level (±0.01 feet, from top of casing mark)	45.40	27.67	24.54	36.14 ~~27.07~~	25.50	23.96
Total Well Depth (±0.01 feet)	68.61	43.00	41.64	~~42.00~~ 44.03 ~~42.00~~ 44.03	28.88	48.93
Time purging began (24-hour clock)	15 :00	12 :40	12 :03	17 :50	17 :00	17 :20
Conductivity after 10 minutes µS/cm	~~1225~~ 1265	1205	1098	1583	1254	1256
Temperature °C	15.7	15.8	15.8	14.7	14.9	15.1
Conductivity after 15 minutes (µS/cm)	1257	1208	1099	1566	1227	1258
Temperature °C	15.6	16.0	15.8	15.3	15.0	15.2
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm		1208	1099			
Time to reach final conductivity (min)						
Temperature °C						
pH (on site) (±0.01)	7.91	6.82	6.95	7.34	6.80 ~~5.13~~	7.28

Sample collectors: _____

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

Field blank

pH:

Venice Groundwater Monitoring Field Data Worksheet

NOTES: _____

VEN ORP

2	338
2D	339
5	340
6	336
6D	338
6D DUP	337
8	336
9	332
10	336
11	332
11D	304
~~7D~~	268
split	309

Attach completed form to the Request for Chemical Analysis for inclusion in the final report.

Venice Groundwater Monitoring Field Data Worksheet

Sample Date: 4 / 4 / 24

River Level: 17.5 feet

	Well #2	Well #2D	Well #3	Well #3D	Well #5	Well #6
Well name sign, lock, and inner cap present (note any deficiency)			Yes			
Casing and concrete pad in good condition (note any deficiency)			Yes			
Internal piping unobstructed and in good condition (note any deficiency)			Yes			
Water Level (±0.01 feet, from top of casing mark)			22.10			
Total Well Depth (±0.01 feet)			24.58			
Time purging began (24-hour clock)	___:___	___:___	09:35		:___	___:___
Conductivity after 10 minutes µS/cm			1395			
Temperature °C			19.9			
Conductivity after 15 minutes (µS/cm)			1310			
Temperature °C			19.6			
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm						
Time to reach final conductivity (min)						
Temperature °C						
pH (on site) (±0.01)			6.60			

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

F Ø orp 89

orp : 102

F Ø pH

F Ø cond 0.4

Venice Groundwater Monitoring Field Data Worksheet

(Page 2 of 3)

	Well #6D	Well #8	Well #9	Well #10	Well #11	Well #11D
Well name sign, lock, and inner cap present (note any deficiency)						
Casing and concrete pad in good condition (note any deficiency)						
Internal piping unobstructed and in good condition (note any deficiency)						
Water Level (±0.01 feet, from top of casing mark)						
Total Well Depth (±0.01 feet)						
Time purging began (24-hour clock)	____:____	____:____	____:____	____:____	____:____	____:____
Conductivity after 10 minutes µS/cm Temperature °C						
Conductivity after 15 minutes (µS/cm) Temperature °C						
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm Time to reach final conductivity (min) Temperature °C						
pH (on site) (±0.01)						

Sample collectors: _____

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

Venice Groundwater Monitoring Field Data Worksheet
(Page 3 of 3)

NOTES: _____

Attach completed form to the Request for Chemical Analysis for inclusion in the final report.

Venice Groundwater Monitoring Field Data Worksheet

(Page 1 of 3)

Sample Date: 3 / 13 / 24

River Level: _____ feet

+ Dup

Field D

	Well #2	Well #2D	Well #3	Well #3D	Well #5	Well #6
Well name sign, lock, and inner cap present (note any deficiency)			Yes	Yes		
Casing and concrete pad in good condition (note any deficiency)			Yes	Yes		
Internal piping unobstructed and in good condition (note any deficiency)			Yes	Yes		
Water Level (±0.01 feet, from top of casing mark)			24.59	28.97		
Total Well Depth (±0.01 feet)			24.59	49.00		
Time purging began (24-hour clock)	___:___	___:___	___:___	10 :15	___:___	___:___
Conductivity after 10 minutes µS/cm				713		
Temperature °C				17.1		
Conductivity after 15 minutes (µS/cm)				733 TKH 3/13/24		
Temperature °C				~~16.3~~ 16.3		
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm				733		
Time to reach final conductivity (min)				15		
Temperature °C				16.3		
pH (on site) (±0.01)				7.64		

12:30

3.77

24.7

0.75

24.7

0.43

24.7

0.46

24.7

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

Orp: -9

pH: 6.00

Venice Groundwater Monitoring Field Data Worksheet
(Page 3 of 3)

NOTES: _____

Attach completed form to the Request for Chemical Analysis for inclusion in the final report.

Venice Groundwater Monitoring Field Data Worksheet

(Page 1 of 3)

Sample Date: 4 / 5 / 24

River Level: 14.5 feet

	Well #2	Well #2D	Well #3	Well #3D	Well #5	Well #6
Well name sign, lock, and inner cap present (note any deficiency)						
Casing and concrete pad in good condition (note any deficiency)						
Internal piping unobstructed and in good condition (note any deficiency)						
Water Level (±0.01 feet, from top of casing mark)	14.01	14.65	15.69	16.13	30.97	34.76
Total Well Depth (±0.01 feet)	29.00	47.73	24.55	48.80	49.28	51.18
Time purging began (24-hour clock)	12:00	12:20	12:45	13:05	14:00	14:30
Conductivity after 10 minutes µS/cm	924	1242	1199	1200	1198	850
Temperature °C	17.5	16.7	19.2	17.1	20.0	18.7
Conductivity after 15 minutes (µS/cm)	922	1246	1230	1219	1241	861
Temperature °C	17.2	16.5	18.3	17.0	19.2	18.0
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm	922	1246	1230	1219	1241	861
Time to reach final conductivity (min)	15	15	15	15	15	15
Temperature °C	17.2	16.5	18.3	17.0	19.2	18.0
ORP	29	20	36	3	-5	-42
pH (on site) (±0.01)	7.30	7.06	6.51	7.31	7.63	7.42

Dup

16.13

34.76

51.18

35.15

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

Venice Groundwater Monitoring Field Data Worksheet

(Page 2 of 3)

	Well #6D	Well #8	Well #9	Well #10	Well #11	Well #11D
Well name sign, lock, and inner cap present (note any deficiency)						
Casing and concrete pad in good condition (note any deficiency)						
Internal piping unobstructed and in good condition (note any deficiency)						
Water Level (±0.01 feet, from top of casing mark)	35.15	16.22	13.67	24.72	13.21	15.68
Total Well Depth (±0.01 feet)	68.60	42.98	41.65	44.02	28.85	48.93
Time purging began (24-hour clock)	15 : 00	10 : 35	10 : 05	15 : 30	11 : 00	11 : 20
Conductivity after 10 minutes µS/cm	1202	1134	1172	1540	712	1544
Temperature °C	18.4	17.0	18.4	19.4	19.8	16.5
Conductivity after 15 minutes (µS/cm)	1249	1167	1213	1578	718	1611
Temperature °C	18.0	16.6	17.6	19.2	19.2	16.5
If conductivity changed more than 10% between 10 and 15 minute samples, continue purging and measure conductivity every 5 minutes, until the conductivity changes less than 10% between samples.						
Final Conductivity, µS/cm	1249	1167	1213	1578	718	1611
Time to reach final conductivity (min)	15	15	15 min	15	15	15 ~~16.5~~
Temperature °C	18.0	16.6	17.6	19.2	19.2	16.5 ~~7.57~~
ORP	-8	28.0	2.0	4	25	28
pH (on site) (±0.01)	7.97	7.23	6.86	7.58	7.02	7.57

Sample collectors: EPH / TK H

Note any items requiring maintenance at any well, and report to supervisor after return to Lab Services.

Venice Groundwater Monitoring Field Data Worksheet
(Page 3 of 3)

NOTES: _____

Attach completed form to the Request for Chemical Analysis for inclusion in the final report.

APPENDIX C
2024 FINAL COVER SITE INSPECTION REPORTS

Ameren Missouri
Fly Ash Pond Final Cover Site Inspection

Facility Name: Venice Energy Center Inspection Date: 03/15/2024

Facility Address: 701 Main Street, Venice, IL 62090

Inspection Conditions: 60°F, sunny

SECURITY & ACCESS	YES	NO	N/A	Comments
1. Is access controlled?	X			
2. Are "No Trespassing" signs posted?			X	
3. Is there evidence of trespassing?		X		
COVER & VEGETATION				
4. Is cover in acceptable condition?	X			
5. Is vegetation in acceptable condition?	X			
6. Is there any woody species of plant growing (i.e., trees and shrubs greater than 18")?		X		
7. Is there any area with more than 100 square feet of failed or eroded vegetation?		X		
8. Is there any erosion or sloughing of embankment slopes?		X		
DRAINAGE				
9. Are appropriate temporary runoff controls in place?			X	
10. Are there any rills, gullies, or crevices that are 6" or deeper?		X		
11. Are drainage channels in acceptable condition?	X			
12. Are there any low areas or depressions that could facilitate the ponding of water for extended periods of time?		X		
GEO-MEMBRANE				
13. Is there any exposed flexible membrane?		X		
14. If so, is the flexible membrane damaged?			X	
PUMP STATION				
15. Are the pump station inlets free of debris?	X			
16. Are there any structural deficiencies at the pump station?		X		

N/A = Not Applicable

Item # Additional Comment(s)

Item # Corrective Actions Taken Since Last Report

Inspector Signature: Anna Muehlfarth Date: 03/25/2024

North embankment, facing west

North Pump Station, facing north

North Pump Station, facing south

South Pump Station, facing north

South Pump Station, facing south

South Embankment, facing east

West Embankment, south section

West Embankment, center section

West Embankment, north section

South Pump station, facing east

North Pump station, facing east

Ameren Missouri
Fly Ash Pond Final Cover Site Inspection

Facility Name: Venice Energy Center Inspection Date: 06/06/2024

Facility Address: 701 Main Street, Venice, IL 62090

Inspection Conditions: 80°F, sunny

SECURITY & ACCESS	YES	NO	N/A	Comments
1. Is access controlled?	X			
2. Are "No Trespassing" signs posted?			X	
3. Is there evidence of trespassing?		X		
COVER & VEGETATION				
4. Is cover in acceptable condition?	X			
5. Is vegetation in acceptable condition?	X			
6. Is there any woody species of plant growing (i.e., trees and shrubs greater than 18")?		X		
7. Is there any area with more than 100 square feet of failed or eroded vegetation?		X		
8. Is there any erosion or sloughing of embankment slopes?		X		
DRAINAGE				
9. Are appropriate temporary runoff controls in place?			X	
10. Are there any rills, gullies, or crevices that are 6" or deeper?		X		
11. Are drainage channels in acceptable condition?	X			
12. Are there any low areas or depressions that could facilitate the ponding of water for extended periods of time?		X		
GEO-MEMBRANE				
13. Is there any exposed flexible membrane?		X		
14. If so, is the flexible membrane damaged?			X	
PUMP STATION				
15. Are the pump station inlets free of debris?	X			
16. Are there any structural deficiencies at the pump station?		X		

N/A = Not Applicable

Item # Additional Comment(s)

Item # Corrective Actions Taken Since Last Report

Inspector Signature: Anna Muehlfarth Date: 06/24/2024

North embankment, facing west

North Pump Station, facing north

North Pump Station, facing south

South Pump Station, facing north

South Pump Station, facing south

South Embankment, facing east

West Embankment, south section

West Embankment, center section

West Embankment, north section

South Pump station, facing east

North Pump station, facing east

Ameren Missouri
Fly Ash Pond Final Cover Site Inspection

Facility Name: Venice Energy Center Inspection Date: 08/14/2024

Facility Address: 701 Main Street, Venice, IL 62090

Inspection Conditions: 80°F, sunny

SECURITY & ACCESS	YES	NO	N/A	Comments
1. Is access controlled?	X			
2. Are "No Trespassing" signs posted?			X	
3. Is there evidence of trespassing?		X		
COVER & VEGETATION				
4. Is cover in acceptable condition?	X			
5. Is vegetation in acceptable condition?	X			
6. Is there any woody species of plant growing (i.e., trees and shrubs greater than 18")?		X		
7. Is there any area with more than 100 square feet of failed or eroded vegetation?		X		
8. Is there any erosion or sloughing of embankment slopes?		X		
DRAINAGE				
9. Are appropriate temporary runoff controls in place?			X	
10. Are there any rills, gullies, or crevices that are 6" or deeper?		X		
11. Are drainage channels in acceptable condition?	X			
12. Are there any low areas or depressions that could facilitate the ponding of water for extended periods of time?		X		
GEO-MEMBRANE				
13. Is there any exposed flexible membrane?		X		
14. If so, is the flexible membrane damaged?			X	
PUMP STATION				
15. Are the pump station inlets free of debris?	X			
16. Are there any structural deficiencies at the pump station?		X		

N/A = Not Applicable

Item # Additional Comment(s)

Item # Corrective Actions Taken Since Last Report

Inspector Signature: Anna Muehlfarth Date: 09/04/2024

North embankment, facing west

North Pump Station, facing north

North Pump Station, facing south

South Pump Station, facing north

South Pump Station, facing south

South Embankment, facing east

West Embankment, south section

West Embankment, center section

West Embankment, north section

South Pump station, facing east

North Pump station, facing east

Ameren Missouri
Fly Ash Pond Final Cover Site Inspection

Facility Name: Venice Energy Center Inspection Date: 11/26/2024

Facility Address: 701 Main Street, Venice, IL 62090

Inspection Conditions: 45°F, sunny

SECURITY & ACCESS	YES	NO	N/A	Comments
1. Is access controlled?	X			
2. Are "No Trespassing" signs posted?			X	
3. Is there evidence of trespassing?		X		
COVER & VEGETATION				
4. Is cover in acceptable condition?	X			
5. Is vegetation in acceptable condition?	X			
6. Is there any woody species of plant growing (i.e., trees and shrubs greater than 18")?		X		
7. Is there any area with more than 100 square feet of failed or eroded vegetation?		X		
8. Is there any erosion or sloughing of embankment slopes?		X		
DRAINAGE				
9. Are appropriate temporary runoff controls in place?			X	
10. Are there any rills, gullies, or crevices that are 6" or deeper?		X		
11. Are drainage channels in acceptable condition?	X			
12. Are there any low areas or depressions that could facilitate the ponding of water for extended periods of time?		X		
GEO-MEMBRANE				
13. Is there any exposed flexible membrane?		X		
14. If so, is the flexible membrane damaged?			X	
PUMP STATION				
15. Are the pump station inlets free of debris?	X			
16. Are there any structural deficiencies at the pump station?		X		

N/A = Not Applicable

Item # Additional Comment(s)

Item # Corrective Actions Taken Since Last Report

Inspector Signature:  Date: 11/27/2024

North embankment, facing west

North Pump Station, facing north

North Pump Station, facing south

South Pump Station, facing north

South Pump Station, facing south

South Embankment, facing east

West Embankment, south section

West Embankment, center section

West Embankment, north section

South Pump station, facing east

North Pump station, facing east

APPENDIX D
STATISTICAL OUTPUT (ON CD)

APPENDIX D1
OUTLIER ANALYSIS RESULTS

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Antimony, dissolved, mg/L

Location: MW-10

Mean of all data: 0.00209
Standard Deviation of all data: 0.00493
Largest Observation Concentration of all data: Xn = 0.0320
Test Statistic, high extreme of all data: Tn = 6.06
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0320	False		1

Antimony, dissolved, mg/L

Location: MW-11

Mean of all data: 0.00128
Standard Deviation of all data: 0.00378
Largest Observation Concentration of all data: Xn = 0.0240
Test Statistic, high extreme of all data: Tn = 6.01
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0240	False		1

Antimony, dissolved, mg/L

Location: MW-11D

Mean of all data: 0.00208
Standard Deviation of all data: 0.00537
Largest Observation Concentration of all data: Xn = 0.0360
Test Statistic, high extreme of all data: Tn = 6.31
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0360	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Antimony, dissolved, mg/L

Location: MW-2

Mean of all data: 0.00154
Standard Deviation of all data: 0.00419
Largest Observation Concentration of all data: Xn = 0.0270
Test Statistic, high extreme of all data: Tn = 6.07
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0270	False		1

Antimony, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.00151
Standard Deviation of all data: 0.00409
Largest Observation Concentration of all data: Xn = 0.0270
Test Statistic, high extreme of all data: Tn = 6.23
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0270	False		1

Antimony, dissolved, mg/L

Location: MW-3

Mean of all data: 0.00155
Standard Deviation of all data: 0.00467
Largest Observation Concentration of all data: Xn = 0.0270
Test Statistic, high extreme of all data: Tn = 5.45
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2021	0.0270	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Antimony, dissolved, mg/L

Location: MW-3D

Mean of all data: 0.00128
Standard Deviation of all data: 0.00395
Largest Observation Concentration of all data: Xn = 0.0260
Test Statistic, high extreme of all data: Tn = 6.25
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0260	False		1

Antimony, dissolved, mg/L

Location: MW-5

Mean of all data: 0.00187
Standard Deviation of all data: 0.00476
Largest Observation Concentration of all data: Xn = 0.0330
Test Statistic, high extreme of all data: Tn = 6.55
T Critical of all data: Tcr = 2.93

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0330	False		1

Antimony, dissolved, mg/L

Location: MW-6

Mean of all data: 0.000786
Standard Deviation of all data: 0.00118
Largest Observation Concentration of all data: Xn = 0.00650
Test Statistic, high extreme of all data: Tn = 4.84
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	<0.00650	True		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Antimony, dissolved, mg/L

Location: MW-6D

Mean of all data: 0.00146
Standard Deviation of all data: 0.00409
Largest Observation Concentration of all data: Xn = 0.0270
Test Statistic, high extreme of all data: Tn = 6.24
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0270	False		1

Antimony, dissolved, mg/L

Location: MW-8

Mean of all data: 0.00182
Standard Deviation of all data: 0.00492
Largest Observation Concentration of all data: Xn = 0.0340
Test Statistic, high extreme of all data: Tn = 6.54
T Critical of all data: Tcr = 2.93

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0340	False		1

Antimony, dissolved, mg/L

Location: MW-9

Mean of all data: 0.00138
Standard Deviation of all data: 0.00265
Largest Observation Concentration of all data: Xn = 0.0180
Test Statistic, high extreme of all data: Tn = 6.27
T Critical of all data: Tcr = 2.93

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0180	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Arsenic, dissolved, mg/L
Location: MW-10

Mean of all data: 0.0190
Standard Deviation of all data: 0.0146
Largest Observation Concentration of all data: Xn = 0.0670
Test Statistic, high extreme of all data: Tn = 3.30
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0670	False		1

Arsenic, dissolved, mg/L
Location: MW-11

Mean of all data: 0.00518
Standard Deviation of all data: 0.00648
Largest Observation Concentration of all data: Xn = 0.0300
Test Statistic, high extreme of all data: Tn = 3.83
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0300	False		1

Arsenic, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.0119
Standard Deviation of all data: 0.00768
Largest Observation Concentration of all data: Xn = 0.0340
Test Statistic, high extreme of all data: Tn = 2.88
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Arsenic, dissolved, mg/L

Location: MW-2

Mean of all data: 0.0109
Standard Deviation of all data: 0.0177
Largest Observation Concentration of all data: Xn = 0.0942
Test Statistic, high extreme of all data: Tn = 4.69
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/15/2022	0.0942	False		1

Arsenic, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.0207
Standard Deviation of all data: 0.00853
Largest Observation Concentration of all data: Xn = 0.0430
Test Statistic, high extreme of all data: Tn = 2.61
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Arsenic, dissolved, mg/L

Location: MW-3

Mean of all data: 0.00555
Standard Deviation of all data: 0.00789
Largest Observation Concentration of all data: Xn = 0.0430
Test Statistic, high extreme of all data: Tn = 4.75
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/17/2010	0.0430	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Arsenic, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.00504
Standard Deviation of all data: 0.00661
Largest Observation Concentration of all data: Xn = 0.0420
Test Statistic, high extreme of all data: Tn = 5.59
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/23/2011	0.0420	False		1

Arsenic, dissolved, mg/L
Location: MW-5

Mean of all data: 0.0758
Standard Deviation of all data: 0.0719
Largest Observation Concentration of all data: Xn = 0.690
Test Statistic, high extreme of all data: Tn = 8.54
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2010	0.690	False		1

Arsenic, dissolved, mg/L
Location: MW-6

Mean of all data: 0.0755
Standard Deviation of all data: 0.0181
Largest Observation Concentration of all data: Xn = 0.123
Test Statistic, high extreme of all data: Tn = 2.62
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/20/2002	0.0150	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Arsenic, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.00450
Standard Deviation of all data: 0.00415
Largest Observation Concentration of all data: Xn = 0.0230
Test Statistic, high extreme of all data: Tn = 4.46
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0230	False		1

Arsenic, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00490
Standard Deviation of all data: 0.00656
Largest Observation Concentration of all data: Xn = 0.0350
Test Statistic, high extreme of all data: Tn = 4.59
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/17/2010	0.0350	False		1

Arsenic, dissolved, mg/L
Location: MW-9

Mean of all data: 0.00775
Standard Deviation of all data: 0.00834
Largest Observation Concentration of all data: Xn = 0.0380
Test Statistic, high extreme of all data: Tn = 3.63
T Critical of all data: Tcr = 3.17

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/28/2009	0.0380	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L

Location: MW-10

Mean of all data: 0.0733
Standard Deviation of all data: 0.0440
Largest Observation Concentration of all data: Xn = 0.278
Test Statistic, high extreme of all data: Tn = 4.66
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/23/2011	0.278	False		1

Barium, dissolved, mg/L

Location: MW-11

Mean of all data: 0.194
Standard Deviation of all data: 0.0349
Largest Observation Concentration of all data: Xn = 0.286
Test Statistic, high extreme of all data: Tn = 2.64
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L

Location: MW-11D

Mean of all data: 0.212
Standard Deviation of all data: 0.0573
Largest Observation Concentration of all data: Xn = 0.292
Test Statistic, high extreme of all data: Tn = 1.40
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
01/24/2023	<0.000100	True	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L

Location: MW-2

Mean of all data: 0.249
Standard Deviation of all data: 0.107
Largest Observation Concentration of all data: Xn = 0.598
Test Statistic, high extreme of all data: Tn = 3.27
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.598	False		1

Barium, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.367
Standard Deviation of all data: 0.0644
Largest Observation Concentration of all data: Xn = 0.491
Test Statistic, high extreme of all data: Tn = 1.94
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L

Location: MW-3

Mean of all data: 0.203
Standard Deviation of all data: 0.0699
Largest Observation Concentration of all data: Xn = 0.371
Test Statistic, high extreme of all data: Tn = 2.40
T Critical of all data: Tcr = 2.80

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.175
Standard Deviation of all data: 0.0586
Largest Observation Concentration of all data: Xn = 0.286
Test Statistic, high extreme of all data: Tn = 1.90
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW-5

Mean of all data: 0.0800
Standard Deviation of all data: 0.0197
Largest Observation Concentration of all data: Xn = 0.153
Test Statistic, high extreme of all data: Tn = 3.71
T Critical of all data: Tcr = 2.96

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2020	0.153	False		1

Barium, dissolved, mg/L
Location: MW-6

Mean of all data: 0.310
Standard Deviation of all data: 0.0402
Largest Observation Concentration of all data: Xn = 0.395
Test Statistic, high extreme of all data: Tn = 2.10
T Critical of all data: Tcr = 2.96

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Barium, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.262
Standard Deviation of all data: 0.0778
Largest Observation Concentration of all data: Xn = 0.398
Test Statistic, high extreme of all data: Tn = 1.75
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Barium, dissolved, mg/L
Location: MW-8

Mean of all data: 0.110
Standard Deviation of all data: 0.0160
Largest Observation Concentration of all data: Xn = 0.196
Test Statistic, high extreme of all data: Tn = 5.38
T Critical of all data: Tcr = 2.96

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/01/2018	0.196	False		1

Barium, dissolved, mg/L
Location: MW-9

Mean of all data: 0.153
Standard Deviation of all data: 0.0238
Largest Observation Concentration of all data: Xn = 0.203
Test Statistic, high extreme of all data: Tn = 2.10
T Critical of all data: Tcr = 2.96

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Boron, dissolved, mg/L
Location: MW-10

Mean of all data: 17.5
Standard Deviation of all data: 2.77
Largest Observation Concentration of all data: Xn = 22.2
Test Statistic, high extreme of all data: Tn = 1.69
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW-11

Mean of all data: 1.27
Standard Deviation of all data: 1.72
Largest Observation Concentration of all data: Xn = 7.83
Test Statistic, high extreme of all data: Tn = 3.80
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2012	7.83	False		1

Boron, dissolved, mg/L
Location: MW-11D

Mean of all data: 9.33
Standard Deviation of all data: 5.38
Largest Observation Concentration of all data: Xn = 23.5
Test Statistic, high extreme of all data: Tn = 2.64
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Boron, dissolved, mg/L

Location: MW-2

Mean of all data: 3.19
Standard Deviation of all data: 3.01
Largest Observation Concentration of all data: Xn = 14.0
Test Statistic, high extreme of all data: Tn = 3.60
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/11/2007	14.0	False		1

Boron, dissolved, mg/L

Location: MW-2D

Mean of all data: 3.43
Standard Deviation of all data: 1.92
Largest Observation Concentration of all data: Xn = 8.01
Test Statistic, high extreme of all data: Tn = 2.39
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L

Location: MW-3

Mean of all data: 0.650
Standard Deviation of all data: 0.577
Largest Observation Concentration of all data: Xn = 3.94
Test Statistic, high extreme of all data: Tn = 5.71
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/19/2004	3.94	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Boron, dissolved, mg/L
Location: MW-3D

Mean of all data: 5.90
Standard Deviation of all data: 1.97
Largest Observation Concentration of all data: Xn = 8.24
Test Statistic, high extreme of all data: Tn = 1.19
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW-5

Mean of all data: 3.44
Standard Deviation of all data: 1.86
Largest Observation Concentration of all data: Xn = 7.46
Test Statistic, high extreme of all data: Tn = 2.16
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW-6

Mean of all data: 4.26
Standard Deviation of all data: 0.703
Largest Observation Concentration of all data: Xn = 6.17
Test Statistic, high extreme of all data: Tn = 2.71
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/30/2004	2.00	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Boron, dissolved, mg/L
Location: MW-6D

Mean of all data: 4.41
Standard Deviation of all data: 0.754
Largest Observation Concentration of all data: Xn = 6.38
Test Statistic, high extreme of all data: Tn = 2.61
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Boron, dissolved, mg/L
Location: MW-8

Mean of all data: 0.721
Standard Deviation of all data: 0.300
Largest Observation Concentration of all data: Xn = 2.03
Test Statistic, high extreme of all data: Tn = 4.37
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/16/1999	2.03	False		1

Boron, dissolved, mg/L
Location: MW-9

Mean of all data: 0.667
Standard Deviation of all data: 0.171
Largest Observation Concentration of all data: Xn = 1.07
Test Statistic, high extreme of all data: Tn = 2.38
T Critical of all data: Tcr = 3.17

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2001	0.100	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cadmium, dissolved, mg/L

Location: MW-10

Mean of all data: 0.000453
Standard Deviation of all data: 0.000169
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 3.23
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/01/2018	0.00100	False		1

Cadmium, dissolved, mg/L

Location: MW-11

Mean of all data: 0.000482
Standard Deviation of all data: 0.000204
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 2.54
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L

Location: MW-11D

Mean of all data: 0.00100
Standard Deviation of all data: 0.000672
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 2.97
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2020	0.00300	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cadmium, dissolved, mg/L
Location: MW-2

Mean of all data: 0.00102
Standard Deviation of all data: 0.00100
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 2.97
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW-2D

Mean of all data: 0.000814
Standard Deviation of all data: 0.000468
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 2.53
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW-3

Mean of all data: 0.00103
Standard Deviation of all data: 0.000950
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 3.12
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/29/2016	0.00400	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cadmium, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.000538
Standard Deviation of all data: 0.000266
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 1.74
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW-5

Mean of all data: 0.0286
Standard Deviation of all data: 0.254
Largest Observation Concentration of all data: Xn = 2.31
Test Statistic, high extreme of all data: Tn = 9.00
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	2.31	False		1

Cadmium, dissolved, mg/L
Location: MW-6

Mean of all data: 0.00145
Standard Deviation of all data: 0.00237
Largest Observation Concentration of all data: Xn = 0.0203
Test Statistic, high extreme of all data: Tn = 7.97
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/1998	0.0203	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cadmium, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.000479
Standard Deviation of all data: 0.000203
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 2.57
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cadmium, dissolved, mg/L
Location: MW-8

Mean of all data: 0.000656
Standard Deviation of all data: 0.000548
Largest Observation Concentration of all data: Xn = 0.00310
Test Statistic, high extreme of all data: Tn = 4.46
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/16/1999	0.00310	False		1

Cadmium, dissolved, mg/L
Location: MW-9

Mean of all data: 0.000801
Standard Deviation of all data: 0.000481
Largest Observation Concentration of all data: Xn = 0.00220
Test Statistic, high extreme of all data: Tn = 2.91
T Critical of all data: Tcr = 3.17

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chloride, dissolved, mg/L

Location: MW-10

Mean of all data: 45.5
Standard Deviation of all data: 23.9
Largest Observation Concentration of all data: Xn = 94.0
Test Statistic, high extreme of all data: Tn = 2.03
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L

Location: MW-11

Mean of all data: 17.3
Standard Deviation of all data: 6.40
Largest Observation Concentration of all data: Xn = 41.5
Test Statistic, high extreme of all data: Tn = 3.78
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/22/2013	41.5	False		1

Chloride, dissolved, mg/L

Location: MW-11D

Mean of all data: 36.8
Standard Deviation of all data: 10.9
Largest Observation Concentration of all data: Xn = 57.3
Test Statistic, high extreme of all data: Tn = 1.89
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chloride, dissolved, mg/L

Location: MW-2

Mean of all data: 15.1
Standard Deviation of all data: 3.63
Largest Observation Concentration of all data: Xn = 23.0
Test Statistic, high extreme of all data: Tn = 2.17
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/15/2022	1.60	False	-1	

Chloride, dissolved, mg/L

Location: MW-2D

Mean of all data: 16.4
Standard Deviation of all data: 3.89
Largest Observation Concentration of all data: Xn = 27.0
Test Statistic, high extreme of all data: Tn = 2.73
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L

Location: MW-3

Mean of all data: 20.3
Standard Deviation of all data: 4.42
Largest Observation Concentration of all data: Xn = 33.0
Test Statistic, high extreme of all data: Tn = 2.87
T Critical of all data: Tcr = 2.76

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/27/2014	33.0	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chloride, dissolved, mg/L
Location: MW-3D

Mean of all data: 36.5
Standard Deviation of all data: 7.83
Largest Observation Concentration of all data: Xn = 48.1
Test Statistic, high extreme of all data: Tn = 1.48
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L
Location: MW-5

Mean of all data: 14.5
Standard Deviation of all data: 9.46
Largest Observation Concentration of all data: Xn = 39.2
Test Statistic, high extreme of all data: Tn = 2.61
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L
Location: MW-6

Mean of all data: 26.4
Standard Deviation of all data: 3.62
Largest Observation Concentration of all data: Xn = 33.3
Test Statistic, high extreme of all data: Tn = 1.90
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/10/2020	15.4	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chloride, dissolved, mg/L
Location: MW-6D

Mean of all data: 33.1
Standard Deviation of all data: 6.83
Largest Observation Concentration of all data: Xn = 49.5
Test Statistic, high extreme of all data: Tn = 2.41
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Chloride, dissolved, mg/L
Location: MW-8

Mean of all data: 57.5
Standard Deviation of all data: 26.1
Largest Observation Concentration of all data: Xn = 147.
Test Statistic, high extreme of all data: Tn = 3.41
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/22/2017	147.	False		1

Chloride, dissolved, mg/L
Location: MW-9

Mean of all data: 74.7
Standard Deviation of all data: 34.9
Largest Observation Concentration of all data: Xn = 171.
Test Statistic, high extreme of all data: Tn = 2.75
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L
Location: MW-10

Mean of all data: 0.000850
Standard Deviation of all data: 0.000804
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 3.92
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.00400	False		1

Chromium, dissolved, mg/L
Location: MW-11

Mean of all data: 0.000695
Standard Deviation of all data: 0.000583
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 3.95
T Critical of all data: Tcr = 2.84

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.00300	False		1

Chromium, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.00108
Standard Deviation of all data: 0.00160
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 5.56
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2012	0.0100	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L

Location: MW-2

Mean of all data: 0.00142
Standard Deviation of all data: 0.00492
Largest Observation Concentration of all data: Xn = 0.0410
Test Statistic, high extreme of all data: Tn = 8.04
T Critical of all data: Tcr = 3.08

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0410	False		1

Chromium, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.000668
Standard Deviation of all data: 0.000561
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 4.16
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.00300	False		1

Chromium, dissolved, mg/L

Location: MW-3

Mean of all data: 0.000696
Standard Deviation of all data: 0.000658
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 5.02
T Critical of all data: Tcr = 3.00

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.00400	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.000728
Standard Deviation of all data: 0.000613
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 3.71
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/2015	0.00300	False		1

Chromium, dissolved, mg/L
Location: MW-5

Mean of all data: 0.00228
Standard Deviation of all data: 0.00792
Largest Observation Concentration of all data: Xn = 0.0630
Test Statistic, high extreme of all data: Tn = 7.67
T Critical of all data: Tcr = 3.13

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/26/2001	0.0630	False		1

Chromium, dissolved, mg/L
Location: MW-6

Mean of all data: 0.000919
Standard Deviation of all data: 0.000893
Largest Observation Concentration of all data: Xn = 0.00420
Test Statistic, high extreme of all data: Tn = 3.68
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/30/2004	0.00420	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Chromium, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.000685
Standard Deviation of all data: 0.000644
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 5.15
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.00400	False		1

Chromium, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00123
Standard Deviation of all data: 0.00358
Largest Observation Concentration of all data: Xn = 0.0329
Test Statistic, high extreme of all data: Tn = 8.85
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/21/2004	0.0329	False		1

Chromium, dissolved, mg/L
Location: MW-9

Mean of all data: 0.000914
Standard Deviation of all data: 0.00200
Largest Observation Concentration of all data: Xn = 0.0184
Test Statistic, high extreme of all data: Tn = 8.74
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/29/2005	0.0184	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cobalt, dissolved, mg/L
Location: MW-10

Mean of all data: 0.000903
Standard Deviation of all data: 0.000501
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 2.19
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW-11

Mean of all data: 0.000526
Standard Deviation of all data: 0.000241
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 1.97
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.000530
Standard Deviation of all data: 0.000374
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 3.93
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/2015	0.00200	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
Confidence Level: 95%
Transform: None
LT Multiplier: x 0.50
Number of Outliers: One Outlier

Cobalt, dissolved, mg/L

Location: MW-2

Mean of all data: 0.00752
Standard Deviation of all data: 0.0181
Largest Observation Concentration of all data: Xn = 0.0906
Test Statistic, high extreme of all data: Tn = 4.60
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/15/2022	0.0906	False		1

Cobalt, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.000529
Standard Deviation of all data: 0.000252
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 1.87
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L

Location: MW-3

Mean of all data: 0.00268
Standard Deviation of all data: 0.00172
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 2.51
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cobalt, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.000562
Standard Deviation of all data: 0.000450
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 5.42
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.00300	False		1

Cobalt, dissolved, mg/L
Location: MW-5

Mean of all data: 0.000689
Standard Deviation of all data: 0.000704
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 6.12
T Critical of all data: Tcr = 2.93

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/28/2010	<0.00500	True		1

Cobalt, dissolved, mg/L
Location: MW-6

Mean of all data: 0.000667
Standard Deviation of all data: 0.000692
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 6.27
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/28/2010	<0.00500	True		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cobalt, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.000519
Standard Deviation of all data: 0.000238
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 2.02
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cobalt, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00235
Standard Deviation of all data: 0.000846
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.13
T Critical of all data: Tcr = 2.93

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/28/2010	<0.00500	True		1

Cobalt, dissolved, mg/L
Location: MW-9

Mean of all data: 0.000832
Standard Deviation of all data: 0.00116
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 4.46
T Critical of all data: Tcr = 2.93

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/07/2011	0.00600	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Copper, dissolved, mg/L
Location: MW-10

Mean of all data: 0.00141
Standard Deviation of all data: 0.00153
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 4.31
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2012	0.00800	False		1

Copper, dissolved, mg/L
Location: MW-11

Mean of all data: 0.00175
Standard Deviation of all data: 0.00453
Largest Observation Concentration of all data: Xn = 0.0288
Test Statistic, high extreme of all data: Tn = 5.97
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.0288	False		1

Copper, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.000543
Standard Deviation of all data: 0.000329
Largest Observation Concentration of all data: Xn = 0.00200
Test Statistic, high extreme of all data: Tn = 4.42
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/2015	0.00200	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Copper, dissolved, mg/L

Location: MW-2

Mean of all data: 0.00240
Standard Deviation of all data: 0.00382
Largest Observation Concentration of all data: Xn = 0.0264
Test Statistic, high extreme of all data: Tn = 6.28
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.0264	False		1

Copper, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.000531
Standard Deviation of all data: 0.000204
Largest Observation Concentration of all data: Xn = 0.00100
Test Statistic, high extreme of all data: Tn = 2.30
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Copper, dissolved, mg/L

Location: MW-3

Mean of all data: 0.00169
Standard Deviation of all data: 0.00326
Largest Observation Concentration of all data: Xn = 0.0180
Test Statistic, high extreme of all data: Tn = 5.00
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/23/2017	0.0180	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Copper, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.000695
Standard Deviation of all data: 0.000573
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 4.02
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2020	0.00300	False		1

Copper, dissolved, mg/L
Location: MW-5

Mean of all data: 0.00264
Standard Deviation of all data: 0.0153
Largest Observation Concentration of all data: Xn = 0.140
Test Statistic, high extreme of all data: Tn = 8.98
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/26/2001	0.140	False		1

Copper, dissolved, mg/L
Location: MW-6

Mean of all data: 0.00234
Standard Deviation of all data: 0.0101
Largest Observation Concentration of all data: Xn = 0.0850
Test Statistic, high extreme of all data: Tn = 8.17
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/31/2007	0.0850	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Copper, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.000695
Standard Deviation of all data: 0.000542
Largest Observation Concentration of all data: Xn = 0.00300
Test Statistic, high extreme of all data: Tn = 4.25
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/01/2021	0.00300	False		1

Copper, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00390
Standard Deviation of all data: 0.0223
Largest Observation Concentration of all data: Xn = 0.204
Test Statistic, high extreme of all data: Tn = 8.98
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.204	False		1

Copper, dissolved, mg/L
Location: MW-9

Mean of all data: 0.00296
Standard Deviation of all data: 0.0146
Largest Observation Concentration of all data: Xn = 0.104
Test Statistic, high extreme of all data: Tn = 6.90
T Critical of all data: Tcr = 3.17

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.104	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
Confidence Level: 95%
Transform: None

LT Multiplier: x 0.50
Number of Outliers: One Outlier

Cyanide, total, mg/L

Location: MW-10

Mean of all data: 0.00177
Standard Deviation of all data: 0.00169
Largest Observation Concentration of all data: Xn = 0.00890
Test Statistic, high extreme of all data: Tn = 4.21
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.00890	False		1

Cyanide, total, mg/L

Location: MW-11

Mean of all data: 0.00192
Standard Deviation of all data: 0.00251
Largest Observation Concentration of all data: Xn = 0.0136
Test Statistic, high extreme of all data: Tn = 4.65
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/23/2017	0.0136	False		1

Cyanide, total, mg/L

Location: MW-11D

Mean of all data: 0.0215
Standard Deviation of all data: 0.0229
Largest Observation Concentration of all data: Xn = 0.0842
Test Statistic, high extreme of all data: Tn = 2.73
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cyanide, total, mg/L
Location: MW-2

Mean of all data: 0.00153
Standard Deviation of all data: 0.00137
Largest Observation Concentration of all data: Xn = 0.00540
Test Statistic, high extreme of all data: Tn = 2.82
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L
Location: MW-2D

Mean of all data: 0.00179
Standard Deviation of all data: 0.00183
Largest Observation Concentration of all data: Xn = 0.00830
Test Statistic, high extreme of all data: Tn = 3.55
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/18/2014	0.00830	False		1

Cyanide, total, mg/L
Location: MW-3

Mean of all data: 0.00164
Standard Deviation of all data: 0.00178
Largest Observation Concentration of all data: Xn = 0.00840
Test Statistic, high extreme of all data: Tn = 3.79
T Critical of all data: Tcr = 2.77

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/05/2024	0.00840	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cyanide, total, mg/L

Location: MW-3D

Mean of all data: 0.00189
Standard Deviation of all data: 0.00227
Largest Observation Concentration of all data: Xn = 0.0110
Test Statistic, high extreme of all data: Tn = 4.01
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2024	0.0110	False		1

Cyanide, total, mg/L

Location: MW-5

Mean of all data: 0.00563
Standard Deviation of all data: 0.00280
Largest Observation Concentration of all data: Xn = 0.0130
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Cyanide, total, mg/L

Location: MW-6

Mean of all data: 0.00165
Standard Deviation of all data: 0.00136
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 2.47
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Cyanide, total, mg/L
Location: MW-6D

Mean of all data: 0.00147
Standard Deviation of all data: 0.00106
Largest Observation Concentration of all data: Xn = 0.00490
Test Statistic, high extreme of all data: Tn = 3.23
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.00490	False		1

Cyanide, total, mg/L
Location: MW-8

Mean of all data: 0.00170
Standard Deviation of all data: 0.00164
Largest Observation Concentration of all data: Xn = 0.00930
Test Statistic, high extreme of all data: Tn = 4.64
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.00930	False		1

Cyanide, total, mg/L
Location: MW-9

Mean of all data: 0.00183
Standard Deviation of all data: 0.00198
Largest Observation Concentration of all data: Xn = 0.0122
Test Statistic, high extreme of all data: Tn = 5.24
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	0.0122	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L
Location: MW-10

Mean of all data: 0.516
Standard Deviation of all data: 0.243
Largest Observation Concentration of all data: Xn = 0.850
Test Statistic, high extreme of all data: Tn = 1.38
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW-11

Mean of all data: 0.304
Standard Deviation of all data: 0.116
Largest Observation Concentration of all data: Xn = 0.710
Test Statistic, high extreme of all data: Tn = 3.49
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/13/2013	0.710	False		1

Fluoride, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.428
Standard Deviation of all data: 0.181
Largest Observation Concentration of all data: Xn = 0.760
Test Statistic, high extreme of all data: Tn = 1.84
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L

Location: MW-2

Mean of all data: 0.263
Standard Deviation of all data: 0.0746
Largest Observation Concentration of all data: Xn = 0.550
Test Statistic, high extreme of all data: Tn = 3.85
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/07/2011	0.550	False		1

Fluoride, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.246
Standard Deviation of all data: 0.0930
Largest Observation Concentration of all data: Xn = 0.500
Test Statistic, high extreme of all data: Tn = 2.73
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L

Location: MW-3

Mean of all data: 0.215
Standard Deviation of all data: 0.0552
Largest Observation Concentration of all data: Xn = 0.330
Test Statistic, high extreme of all data: Tn = 2.09
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

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.269
Standard Deviation of all data: 0.149
Largest Observation Concentration of all data: Xn = 0.640
Test Statistic, high extreme of all data: Tn = 2.49
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW-5

Mean of all data: 0.352
Standard Deviation of all data: 0.110
Largest Observation Concentration of all data: Xn = 0.660
Test Statistic, high extreme of all data: Tn = 2.79
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW-6

Mean of all data: 0.584
Standard Deviation of all data: 0.106
Largest Observation Concentration of all data: Xn = 0.830
Test Statistic, high extreme of all data: Tn = 2.32
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Fluoride, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.242
Standard Deviation of all data: 0.157
Largest Observation Concentration of all data: Xn = 0.570
Test Statistic, high extreme of all data: Tn = 2.09
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW-8

Mean of all data: 0.426
Standard Deviation of all data: 0.145
Largest Observation Concentration of all data: Xn = 0.840
Test Statistic, high extreme of all data: Tn = 2.85
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Fluoride, dissolved, mg/L
Location: MW-9

Mean of all data: 0.353
Standard Deviation of all data: 0.118
Largest Observation Concentration of all data: Xn = 0.710
Test Statistic, high extreme of all data: Tn = 3.03
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/05/2012	0.710	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Iron, dissolved, mg/L
Location: MW-10

Mean of all data: 1.42
Standard Deviation of all data: 1.64
Largest Observation Concentration of all data: Xn = 6.59
Test Statistic, high extreme of all data: Tn = 3.15
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/13/2013	6.59	False		1

Iron, dissolved, mg/L
Location: MW-11

Mean of all data: 0.174
Standard Deviation of all data: 0.415
Largest Observation Concentration of all data: Xn = 1.73
Test Statistic, high extreme of all data: Tn = 3.76
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/12/2018	1.73	False		1

Iron, dissolved, mg/L
Location: MW-11D

Mean of all data: 18.8
Standard Deviation of all data: 3.53
Largest Observation Concentration of all data: Xn = 23.5
Test Statistic, high extreme of all data: Tn = 1.33
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/10/2019	5.67	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Iron, dissolved, mg/L

Location: MW-2

Mean of all data: 0.761
Standard Deviation of all data: 2.88
Largest Observation Concentration of all data: Xn = 16.2
Test Statistic, high extreme of all data: Tn = 5.36
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/06/2023	16.2	False		1

Iron, dissolved, mg/L

Location: MW-2D

Mean of all data: 17.2
Standard Deviation of all data: 2.88
Largest Observation Concentration of all data: Xn = 24.8
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Iron, dissolved, mg/L

Location: MW-3

Mean of all data: 1.48
Standard Deviation of all data: 1.44
Largest Observation Concentration of all data: Xn = 4.93
Test Statistic, high extreme of all data: Tn = 2.40
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Iron, dissolved, mg/L
Location: MW-3D

Mean of all data: 5.32
Standard Deviation of all data: 3.34
Largest Observation Concentration of all data: Xn = 13.9
Test Statistic, high extreme of all data: Tn = 2.56
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Iron, dissolved, mg/L
Location: MW-5

Mean of all data: 0.909
Standard Deviation of all data: 0.825
Largest Observation Concentration of all data: Xn = 4.67
Test Statistic, high extreme of all data: Tn = 4.56
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2020	4.67	False		1

Iron, dissolved, mg/L
Location: MW-6

Mean of all data: 19.2
Standard Deviation of all data: 5.60
Largest Observation Concentration of all data: Xn = 30.5
Test Statistic, high extreme of all data: Tn = 2.01
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Iron, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.619
Standard Deviation of all data: 0.358
Largest Observation Concentration of all data: Xn = 1.72
Test Statistic, high extreme of all data: Tn = 3.08
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/13/2024	1.72	False		1

Iron, dissolved, mg/L
Location: MW-8

Mean of all data: 0.0683
Standard Deviation of all data: 0.0728
Largest Observation Concentration of all data: Xn = 0.339
Test Statistic, high extreme of all data: Tn = 3.72
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	0.339	False		1

Iron, dissolved, mg/L
Location: MW-9

Mean of all data: 17.3
Standard Deviation of all data: 3.59
Largest Observation Concentration of all data: Xn = 24.5
Test Statistic, high extreme of all data: Tn = 1.99
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/16/1999	4.21	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Lead, dissolved, mg/L
Location: MW-10

Mean of all data: 0.00213
Standard Deviation of all data: 0.00153
Largest Observation Concentration of all data: Xn = 0.00350
Test Statistic, high extreme of all data: Tn = 0.894
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW-11

Mean of all data: 0.00224
Standard Deviation of all data: 0.00172
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 2.76
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.00265
Standard Deviation of all data: 0.00165
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 2.03
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Lead, dissolved, mg/L

Location: MW-2

Mean of all data: 0.00161
Standard Deviation of all data: 0.00180
Largest Observation Concentration of all data: Xn = 0.0110
Test Statistic, high extreme of all data: Tn = 5.21
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2001	0.0110	False		1

Lead, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.00249
Standard Deviation of all data: 0.00144
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 1.75
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L

Location: MW-3

Mean of all data: 0.00176
Standard Deviation of all data: 0.00189
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 3.30
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/27/2018	0.00800	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Lead, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.00216
Standard Deviation of all data: 0.00158
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 1.80
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Lead, dissolved, mg/L
Location: MW-5

Mean of all data: 0.00143
Standard Deviation of all data: 0.00152
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 3.68
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2020	0.00700	False		1

Lead, dissolved, mg/L
Location: MW-6

Mean of all data: 0.00270
Standard Deviation of all data: 0.00236
Largest Observation Concentration of all data: Xn = 0.0120
Test Statistic, high extreme of all data: Tn = 3.94
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/28/2009	0.0120	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
Confidence Level: 95%
Transform: None
LT Multiplier: x 0.50
Number of Outliers: One Outlier

Lead, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.00227
Standard Deviation of all data: 0.00189
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 3.04
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/27/2018	0.00800	False		1

Lead, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00168
Standard Deviation of all data: 0.00197
Largest Observation Concentration of all data: Xn = 0.0110
Test Statistic, high extreme of all data: Tn = 4.73
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/28/2006	<0.0110	True		1

Lead, dissolved, mg/L
Location: MW-9

Mean of all data: 0.00217
Standard Deviation of all data: 0.00190
Largest Observation Concentration of all data: Xn = 0.0110
Test Statistic, high extreme of all data: Tn = 4.65
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/28/2006	<0.0110	True		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L

Location: MW-10

Mean of all data: 1.21
Standard Deviation of all data: 0.648
Largest Observation Concentration of all data: Xn = 2.50
Test Statistic, high extreme of all data: Tn = 1.98
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L

Location: MW-11

Mean of all data: 0.182
Standard Deviation of all data: 0.313
Largest Observation Concentration of all data: Xn = 1.24
Test Statistic, high extreme of all data: Tn = 3.40
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/12/2018	1.24	False		1

Manganese, dissolved, mg/L

Location: MW-11D

Mean of all data: 2.97
Standard Deviation of all data: 0.583
Largest Observation Concentration of all data: Xn = 4.01
Test Statistic, high extreme of all data: Tn = 1.79
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/10/2019	0.908	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L

Location: MW-2

Mean of all data: 0.383
Standard Deviation of all data: 0.829
Largest Observation Concentration of all data: Xn = 5.10
Test Statistic, high extreme of all data: Tn = 5.69
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/15/2022	5.10	False		1

Manganese, dissolved, mg/L

Location: MW-2D

Mean of all data: 1.08
Standard Deviation of all data: 0.215
Largest Observation Concentration of all data: Xn = 1.44
Test Statistic, high extreme of all data: Tn = 1.67
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L

Location: MW-3

Mean of all data: 0.831
Standard Deviation of all data: 0.328
Largest Observation Concentration of all data: Xn = 1.41
Test Statistic, high extreme of all data: Tn = 1.75
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.344
Standard Deviation of all data: 0.151
Largest Observation Concentration of all data: Xn = 0.745
Test Statistic, high extreme of all data: Tn = 2.65
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L
Location: MW-5

Mean of all data: 1.33
Standard Deviation of all data: 0.703
Largest Observation Concentration of all data: Xn = 3.38
Test Statistic, high extreme of all data: Tn = 2.92
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L
Location: MW-6

Mean of all data: 2.56
Standard Deviation of all data: 0.530
Largest Observation Concentration of all data: Xn = 3.63
Test Statistic, high extreme of all data: Tn = 2.03
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Manganese, dissolved, mg/L

Location: MW-6D

Mean of all data: 0.216
Standard Deviation of all data: 0.125
Largest Observation Concentration of all data: Xn = 0.600
Test Statistic, high extreme of all data: Tn = 3.08
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/31/2023	0.600	False		1

Manganese, dissolved, mg/L

Location: MW-8

Mean of all data: 0.629
Standard Deviation of all data: 0.128
Largest Observation Concentration of all data: Xn = 0.880
Test Statistic, high extreme of all data: Tn = 1.96
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, dissolved, mg/L

Location: MW-9

Mean of all data: 0.765
Standard Deviation of all data: 0.116
Largest Observation Concentration of all data: Xn = 1.07
Test Statistic, high extreme of all data: Tn = 2.63
T Critical of all data: Tcr = 3.17

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nickel, dissolved, mg/L

Location: MW-10

Mean of all data: 0.00239
Standard Deviation of all data: 0.00159
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 3.54
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2012	0.00800	False		1

Nickel, dissolved, mg/L

Location: MW-11

Mean of all data: 0.00448
Standard Deviation of all data: 0.00290
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.90
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nickel, dissolved, mg/L

Location: MW-11D

Mean of all data: 0.00226
Standard Deviation of all data: 0.00249
Largest Observation Concentration of all data: Xn = 0.0110
Test Statistic, high extreme of all data: Tn = 3.51
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
07/22/2013	0.0110	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nickel, dissolved, mg/L

Location: MW-2

Mean of all data: 0.0118
Standard Deviation of all data: 0.0121
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 3.15
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/27/2007	0.0500	False		1

Nickel, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.00117
Standard Deviation of all data: 0.000857
Largest Observation Concentration of all data: Xn = 0.00400
Test Statistic, high extreme of all data: Tn = 3.30
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/01/2018	0.00400	False		1

Nickel, dissolved, mg/L

Location: MW-3

Mean of all data: 0.0179
Standard Deviation of all data: 0.0167
Largest Observation Concentration of all data: Xn = 0.0800
Test Statistic, high extreme of all data: Tn = 3.71
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/12/1997	0.0800	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nickel, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.00156
Standard Deviation of all data: 0.00128
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 4.26
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/06/2017	0.00700	False		1

Nickel, dissolved, mg/L
Location: MW-5

Mean of all data: 0.00539
Standard Deviation of all data: 0.00793
Largest Observation Concentration of all data: Xn = 0.0329
Test Statistic, high extreme of all data: Tn = 3.47
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/26/2001	0.0329	False		1

Nickel, dissolved, mg/L
Location: MW-6

Mean of all data: 0.0101
Standard Deviation of all data: 0.0123
Largest Observation Concentration of all data: Xn = 0.0470
Test Statistic, high extreme of all data: Tn = 3.00
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nickel, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.00135
Standard Deviation of all data: 0.00100
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.64
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/01/2018	0.00500	False		1

Nickel, dissolved, mg/L
Location: MW-8

Mean of all data: 0.0130
Standard Deviation of all data: 0.0140
Largest Observation Concentration of all data: Xn = 0.117
Test Statistic, high extreme of all data: Tn = 7.43
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/16/1999	0.117	False		1

Nickel, dissolved, mg/L
Location: MW-9

Mean of all data: 0.00733
Standard Deviation of all data: 0.0101
Largest Observation Concentration of all data: Xn = 0.0410
Test Statistic, high extreme of all data: Tn = 3.33
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/27/2007	0.0410	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nitrate nitrogen, dissolved, mg/L

Location: MW-10

Mean of all data: 1.99
Standard Deviation of all data: 3.41
Largest Observation Concentration of all data: Xn = 16.9
Test Statistic, high extreme of all data: Tn = 4.37
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2015	16.9	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-11

Mean of all data: 6.72
Standard Deviation of all data: 10.5
Largest Observation Concentration of all data: Xn = 55.6
Test Statistic, high extreme of all data: Tn = 4.67
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/18/2014	55.6	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-11D

Mean of all data: 2.02
Standard Deviation of all data: 6.62
Largest Observation Concentration of all data: Xn = 44.0
Test Statistic, high extreme of all data: Tn = 6.34
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/07/2011	44.0	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nitrate nitrogen, dissolved, mg/L

Location: MW-2

Mean of all data: 3.87
Standard Deviation of all data: 4.20
Largest Observation Concentration of all data: Xn = 15.0
Test Statistic, high extreme of all data: Tn = 2.65
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Nitrate nitrogen, dissolved, mg/L

Location: MW-2D

Mean of all data: 1.35
Standard Deviation of all data: 2.14
Largest Observation Concentration of all data: Xn = 10.0
Test Statistic, high extreme of all data: Tn = 4.05
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/2015	10.0	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-3

Mean of all data: 3.10
Standard Deviation of all data: 4.46
Largest Observation Concentration of all data: Xn = 14.2
Test Statistic, high extreme of all data: Tn = 2.49
T Critical of all data: Tcr = 2.76

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nitrate nitrogen, dissolved, mg/L

Location: MW-3D

Mean of all data: 1.20
Standard Deviation of all data: 2.07
Largest Observation Concentration of all data: Xn = 11.2
Test Statistic, high extreme of all data: Tn = 4.82
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/18/2014	11.2	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-5

Mean of all data: 1.35
Standard Deviation of all data: 2.15
Largest Observation Concentration of all data: Xn = 11.4
Test Statistic, high extreme of all data: Tn = 4.68
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/10/2019	11.4	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-6

Mean of all data: 1.19
Standard Deviation of all data: 1.98
Largest Observation Concentration of all data: Xn = 10.3
Test Statistic, high extreme of all data: Tn = 4.61
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/15/2022	10.3	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Nitrate nitrogen, dissolved, mg/L

Location: MW-6D

Mean of all data: 1.12
Standard Deviation of all data: 2.37
Largest Observation Concentration of all data: Xn = 14.6
Test Statistic, high extreme of all data: Tn = 5.69
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/18/2014	14.6	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-8

Mean of all data: 2.03
Standard Deviation of all data: 2.62
Largest Observation Concentration of all data: Xn = 10.0
Test Statistic, high extreme of all data: Tn = 3.05
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/27/2014	10.0	False		1

Nitrate nitrogen, dissolved, mg/L

Location: MW-9

Mean of all data: 0.943
Standard Deviation of all data: 1.80
Largest Observation Concentration of all data: Xn = 9.27
Test Statistic, high extreme of all data: Tn = 4.62
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/18/2014	9.27	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Selenium, dissolved, mg/L
Location: MW-10

Mean of all data: 0.00483
Standard Deviation of all data: 0.00367
Largest Observation Concentration of all data: Xn = 0.0130
Test Statistic, high extreme of all data: Tn = 2.23
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L
Location: MW-11

Mean of all data: 0.00504
Standard Deviation of all data: 0.00348
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.43
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.00402
Standard Deviation of all data: 0.00469
Largest Observation Concentration of all data: Xn = 0.0250
Test Statistic, high extreme of all data: Tn = 4.48
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/2015	0.0250	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Selenium, dissolved, mg/L

Location: MW-2

Mean of all data: 0.00485
Standard Deviation of all data: 0.00473
Largest Observation Concentration of all data: Xn = 0.0250
Test Statistic, high extreme of all data: Tn = 4.26
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0250	False		1

Selenium, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.00360
Standard Deviation of all data: 0.00342
Largest Observation Concentration of all data: Xn = 0.00900
Test Statistic, high extreme of all data: Tn = 1.58
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L

Location: MW-3

Mean of all data: 0.00478
Standard Deviation of all data: 0.00388
Largest Observation Concentration of all data: Xn = 0.0160
Test Statistic, high extreme of all data: Tn = 2.89
T Critical of all data: Tcr = 2.76

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/02/2021	0.0160	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Selenium, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.00425
Standard Deviation of all data: 0.00403
Largest Observation Concentration of all data: Xn = 0.0160
Test Statistic, high extreme of all data: Tn = 2.92
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2012	0.0160	False		1

Selenium, dissolved, mg/L
Location: MW-5

Mean of all data: 0.00467
Standard Deviation of all data: 0.00502
Largest Observation Concentration of all data: Xn = 0.0220
Test Statistic, high extreme of all data: Tn = 3.45
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0220	False		1

Selenium, dissolved, mg/L
Location: MW-6

Mean of all data: 0.00388
Standard Deviation of all data: 0.00362
Largest Observation Concentration of all data: Xn = 0.0130
Test Statistic, high extreme of all data: Tn = 2.52
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Selenium, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.00442
Standard Deviation of all data: 0.00355
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 1.57
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00429
Standard Deviation of all data: 0.00360
Largest Observation Concentration of all data: Xn = 0.0130
Test Statistic, high extreme of all data: Tn = 2.42
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Selenium, dissolved, mg/L
Location: MW-9

Mean of all data: 0.00439
Standard Deviation of all data: 0.00438
Largest Observation Concentration of all data: Xn = 0.0180
Test Statistic, high extreme of all data: Tn = 3.11
T Critical of all data: Tcr = 2.92

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	0.0180	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Silver, dissolved, mg/L
Location: MW-10

Mean of all data: 0.000845
Standard Deviation of all data: 0.00130
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 5.50
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/25/2016	0.00800	False		1

Silver, dissolved, mg/L
Location: MW-11

Mean of all data: 0.000895
Standard Deviation of all data: 0.00124
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 4.12
T Critical of all data: Tcr = 2.84

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2016	0.00600	False		1

Silver, dissolved, mg/L
Location: MW-11D

Mean of all data: 0.000743
Standard Deviation of all data: 0.00113
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 5.55
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2016	0.00700	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Silver, dissolved, mg/L
Location: MW-2

Mean of all data: 0.000917
Standard Deviation of all data: 0.00163
Largest Observation Concentration of all data: Xn = 0.0100
Test Statistic, high extreme of all data: Tn = 5.57
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2010	0.0100	False		1

Silver, dissolved, mg/L
Location: MW-2D

Mean of all data: 0.00108
Standard Deviation of all data: 0.00125
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 3.94
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/29/2016	0.00600	False		1

Silver, dissolved, mg/L
Location: MW-3

Mean of all data: 0.00129
Standard Deviation of all data: 0.00161
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 2.92
T Critical of all data: Tcr = 2.76

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2016	0.00600	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Silver, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.00110
Standard Deviation of all data: 0.00146
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 4.03
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
10/25/2016	0.00700	False		1

Silver, dissolved, mg/L
Location: MW-5

Mean of all data: 0.000940
Standard Deviation of all data: 0.00108
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.77
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2016	0.00500	False		1

Silver, dissolved, mg/L
Location: MW-6

Mean of all data: 0.000822
Standard Deviation of all data: 0.00106
Largest Observation Concentration of all data: Xn = 0.00500
Test Statistic, high extreme of all data: Tn = 3.95
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/08/2020	0.00500	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Silver, dissolved, mg/L
Location: MW-6D

Mean of all data: 0.00150
Standard Deviation of all data: 0.00196
Largest Observation Concentration of all data: Xn = 0.00700
Test Statistic, high extreme of all data: Tn = 2.80
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Silver, dissolved, mg/L
Location: MW-8

Mean of all data: 0.00109
Standard Deviation of all data: 0.00143
Largest Observation Concentration of all data: Xn = 0.00600
Test Statistic, high extreme of all data: Tn = 3.45
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2016	0.00600	False		1

Silver, dissolved, mg/L
Location: MW-9

Mean of all data: 0.000906
Standard Deviation of all data: 0.00137
Largest Observation Concentration of all data: Xn = 0.00800
Test Statistic, high extreme of all data: Tn = 5.19
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/22/2016	0.00800	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Sulfate, dissolved, mg/L
Location: MW-10

Mean of all data: 783.
Standard Deviation of all data: 222.
Largest Observation Concentration of all data: Xn = 1100.
Test Statistic, high extreme of all data: Tn = 1.42
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/12/2018	<0.100	True	-1	

Sulfate, dissolved, mg/L
Location: MW-11

Mean of all data: 83.4
Standard Deviation of all data: 67.8
Largest Observation Concentration of all data: Xn = 383.
Test Statistic, high extreme of all data: Tn = 4.42
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/13/2012	383.	False		1

Sulfate, dissolved, mg/L
Location: MW-11D

Mean of all data: 433.
Standard Deviation of all data: 213.
Largest Observation Concentration of all data: Xn = 927.
Test Statistic, high extreme of all data: Tn = 2.32
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Sulfate, dissolved, mg/L
Location: MW-2

Mean of all data: 36.4
Standard Deviation of all data: 44.3
Largest Observation Concentration of all data: Xn = 287.
Test Statistic, high extreme of all data: Tn = 5.65
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/23/2011	287.	False		1

Sulfate, dissolved, mg/L
Location: MW-2D

Mean of all data: 38.8
Standard Deviation of all data: 44.8
Largest Observation Concentration of all data: Xn = 181.
Test Statistic, high extreme of all data: Tn = 3.17
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	181.	False		1

Sulfate, dissolved, mg/L
Location: MW-3

Mean of all data: 68.3
Standard Deviation of all data: 53.2
Largest Observation Concentration of all data: Xn = 230.
Test Statistic, high extreme of all data: Tn = 3.04
T Critical of all data: Tcr = 2.76

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/18/2014	230.	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Sulfate, dissolved, mg/L
Location: MW-3D

Mean of all data: 163.
Standard Deviation of all data: 90.3
Largest Observation Concentration of all data: Xn = 638.
Test Statistic, high extreme of all data: Tn = 5.26
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/23/2011	638.	False		1

Sulfate, dissolved, mg/L
Location: MW-5

Mean of all data: 108.
Standard Deviation of all data: 67.1
Largest Observation Concentration of all data: Xn = 340.
Test Statistic, high extreme of all data: Tn = 3.46
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/10/2014	340.	False		1

Sulfate, dissolved, mg/L
Location: MW-6

Mean of all data: 12.5
Standard Deviation of all data: 11.8
Largest Observation Concentration of all data: Xn = 51.4
Test Statistic, high extreme of all data: Tn = 3.31
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/05/2024	51.4	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Sulfate, dissolved, mg/L
Location: MW-6D

Mean of all data: 251.
Standard Deviation of all data: 78.9
Largest Observation Concentration of all data: Xn = 443.
Test Statistic, high extreme of all data: Tn = 2.43
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Sulfate, dissolved, mg/L
Location: MW-8

Mean of all data: 125.
Standard Deviation of all data: 32.6
Largest Observation Concentration of all data: Xn = 250.
Test Statistic, high extreme of all data: Tn = 3.82
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/14/2021	250.	False		1

Sulfate, dissolved, mg/L
Location: MW-9

Mean of all data: 175.
Standard Deviation of all data: 59.0
Largest Observation Concentration of all data: Xn = 365.
Test Statistic, high extreme of all data: Tn = 3.23
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/05/2012	365.	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Total Dissolved Solids, mg/L
Location: MW-10

Mean of all data: 1570.
Standard Deviation of all data: 256.
Largest Observation Concentration of all data: Xn = 2130.
Test Statistic, high extreme of all data: Tn = 2.18
T Critical of all data: Tcr = 2.87

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Dissolved Solids, mg/L
Location: MW-11

Mean of all data: 759.
Standard Deviation of all data: 383.
Largest Observation Concentration of all data: Xn = 2770.
Test Statistic, high extreme of all data: Tn = 5.25
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
08/23/2017	2770.	False		1

Total Dissolved Solids, mg/L
Location: MW-11D

Mean of all data: 1260.
Standard Deviation of all data: 316.
Largest Observation Concentration of all data: Xn = 1730.
Test Statistic, high extreme of all data: Tn = 1.49
T Critical of all data: Tcr = 2.91

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/10/2019	280.	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Total Dissolved Solids, mg/L

Location: MW-2

Mean of all data: 725.
Standard Deviation of all data: 222.
Largest Observation Concentration of all data: Xn = 1560.
Test Statistic, high extreme of all data: Tn = 3.75
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/24/2005	1560.	False		1

Total Dissolved Solids, mg/L

Location: MW-2D

Mean of all data: 751.
Standard Deviation of all data: 157.
Largest Observation Concentration of all data: Xn = 950.
Test Statistic, high extreme of all data: Tn = 1.27
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Dissolved Solids, mg/L

Location: MW-3

Mean of all data: 728.
Standard Deviation of all data: 136.
Largest Observation Concentration of all data: Xn = 1130.
Test Statistic, high extreme of all data: Tn = 2.92
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/05/2018	290.	False	-1	

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Total Dissolved Solids, mg/L
Location: MW-3D

Mean of all data: 576.
Standard Deviation of all data: 91.1
Largest Observation Concentration of all data: Xn = 772.
Test Statistic, high extreme of all data: Tn = 2.16
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Dissolved Solids, mg/L
Location: MW-5

Mean of all data: 764.
Standard Deviation of all data: 195.
Largest Observation Concentration of all data: Xn = 1320.
Test Statistic, high extreme of all data: Tn = 2.85
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
11/05/2018	50.0	False	-1	

Total Dissolved Solids, mg/L
Location: MW-6

Mean of all data: 504.
Standard Deviation of all data: 100.
Largest Observation Concentration of all data: Xn = 1040.
Test Statistic, high extreme of all data: Tn = 5.34
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
06/30/2004	1040.	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Total Dissolved Solids, mg/L
Location: MW-6D

Mean of all data: 703.
Standard Deviation of all data: 171.
Largest Observation Concentration of all data: Xn = 960.
Test Statistic, high extreme of all data: Tn = 1.51
T Critical of all data: Tcr = 2.89

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Dissolved Solids, mg/L
Location: MW-8

Mean of all data: 735.
Standard Deviation of all data: 131.
Largest Observation Concentration of all data: Xn = 1030.
Test Statistic, high extreme of all data: Tn = 2.26
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Dissolved Solids, mg/L
Location: MW-9

Mean of all data: 911.
Standard Deviation of all data: 183.
Largest Observation Concentration of all data: Xn = 1400.
Test Statistic, high extreme of all data: Tn = 2.67
T Critical of all data: Tcr = 3.17

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L

Location: MW-10

Mean of all data: 0.00614
Standard Deviation of all data: 0.00881
Largest Observation Concentration of all data: Xn = 0.0480
Test Statistic, high extreme of all data: Tn = 4.75
T Critical of all data: Tcr = 2.86

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0480	False		1

Zinc, dissolved, mg/L

Location: MW-11

Mean of all data: 0.00688
Standard Deviation of all data: 0.00923
Largest Observation Concentration of all data: Xn = 0.0490
Test Statistic, high extreme of all data: Tn = 4.56
T Critical of all data: Tcr = 2.85

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0490	False		1

Zinc, dissolved, mg/L

Location: MW-11D

Mean of all data: 0.00672
Standard Deviation of all data: 0.00963
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 4.49
T Critical of all data: Tcr = 2.90

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0500	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L

Location: MW-2

Mean of all data: 0.0133
Standard Deviation of all data: 0.0540
Largest Observation Concentration of all data: Xn = 0.454
Test Statistic, high extreme of all data: Tn = 8.16
T Critical of all data: Tcr = 3.09

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.454	False		1

Zinc, dissolved, mg/L

Location: MW-2D

Mean of all data: 0.00657
Standard Deviation of all data: 0.00853
Largest Observation Concentration of all data: Xn = 0.0480
Test Statistic, high extreme of all data: Tn = 4.86
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0480	False		1

Zinc, dissolved, mg/L

Location: MW-3

Mean of all data: 0.0107
Standard Deviation of all data: 0.0172
Largest Observation Concentration of all data: Xn = 0.108
Test Statistic, high extreme of all data: Tn = 5.67
T Critical of all data: Tcr = 3.01

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/08/2008	0.108	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L
Location: MW-3D

Mean of all data: 0.00599
Standard Deviation of all data: 0.0104
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 4.25
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0500	False		1

Zinc, dissolved, mg/L
Location: MW-5

Mean of all data: 0.00686
Standard Deviation of all data: 0.00967
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 4.46
T Critical of all data: Tcr = 3.14

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/1998	<0.0500	True		1

Zinc, dissolved, mg/L
Location: MW-6

Mean of all data: 0.0148
Standard Deviation of all data: 0.0561
Largest Observation Concentration of all data: Xn = 0.478
Test Statistic, high extreme of all data: Tn = 8.26
T Critical of all data: Tcr = 3.10

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/24/1998	0.478	False		1

Based on Grubbs one-sided outlier test

Venice
Outlier Analysis Results

User Supplied Information

Date Range: 06/27/1996 to 08/05/2024
LT Multiplier: x 0.50
Confidence Level: 95%
Number of Outliers: One Outlier
Transform: None

Zinc, dissolved, mg/L

Location: MW-6D

Mean of all data: 0.00540
Standard Deviation of all data: 0.00937
Largest Observation Concentration of all data: Xn = 0.0420
Test Statistic, high extreme of all data: Tn = 3.91
T Critical of all data: Tcr = 2.88

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
05/18/2015	0.0420	False		1

Zinc, dissolved, mg/L

Location: MW-8

Mean of all data: 0.00711
Standard Deviation of all data: 0.0110
Largest Observation Concentration of all data: Xn = 0.0720
Test Statistic, high extreme of all data: Tn = 5.90
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/17/2011	0.0720	False		1

Zinc, dissolved, mg/L

Location: MW-9

Mean of all data: 0.00671
Standard Deviation of all data: 0.00832
Largest Observation Concentration of all data: Xn = 0.0500
Test Statistic, high extreme of all data: Tn = 5.21
T Critical of all data: Tcr = 3.16

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
12/21/2004	<0.0500	True		1

Based on Grubbs one-sided outlier test

APPENDIX D2
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; $\overline{X}$	$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$ where X_i is the i-th observation.
Standard deviation of observed data; S_x.	$S_x = \sqrt{\frac{1}{(n-1)}\sum_{i=1}^{n}(X_i - \overline{X})^2}$
Test statistics: T_l & T_n	Sort the data into ascending order, then compute the statistics $T_l = (\overline{X} - X_l)/S_x$ $T_n = (X_n - \overline{X})/S_x$ where X_l is the smallest value of the n observations and X_n is the largest value of the n observations.
One-sided test with a (1-α) confidence level that there is a single extreme outlier within the n observations.	Grubbs single, one-sided test of either an extreme low outlier : X_l *is an outlier if* $T_l \geq T_{cr(1-\alpha,n)}$ or an extreme high outlier: X_n *is an outlier if* $T_n \geq T_{cr(1-\alpha,n)}$. The function $T_{cr(1-\alpha,n)}$ is the critical value, given in Grubbs and Beck (1972; Table 1) and USEPA (1989; p. B-11, Table 8) . Note that the critical value assumes that the mean and standard deviation are computed from the sample being tested.

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

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