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DATE
31 January 2025

SUBJECT
2024 Annual Consolidated Report
Grand Tower Energy Center
Closed CCR Residuals Impoundment
1820 Power Plant Rd
Grand Tower, IL 62942

REFERENCE
0761817

Dear Lauren:

Environmental Resources Management (ERM) Inc. is submitting the 2024 Annual Consolidated Report in accordance with 35 Illinois Administrative Code (IAC) §845.550(a)(3) and 35 IAC §845.610(e) for the Grand Tower Energy Center (GTEC) facility located at 1820 Power Plant Rd, Grand Tower, Illinois (the "Site"). The report includes both the 2024 GTEC Annual Groundwater Monitoring Report as well as the 2024 GTEC Annual Inspection Report, which includes the structural assessment of the Site.

If you have any questions, please feel free to contact Randy Homburg at (314) 447-7237.

Sincerely,

Randy Homburg
Managing Consultant

Alan J. Cork, P.E.
Partner, Engineer

Attachments

cc: John Brodhead – GTEC (jbrodhead@grandtowerec.com)



2024 Annual Groundwater Monitoring Report – Grand Tower Energy Center

PREPARED FOR
Grand Tower Energy Center

DATE
30 January 2025

REFERENCE
0599247



2024 Annual Groundwater Monitoring Report – Grand Tower Energy Center

30 January 2025



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EXECUTIVE SUMMARY

In accordance with 35 Illinois Administrative Code (IAC) Section 845.610(e)(4), the following section provides a summary overview of groundwater monitoring activity at the Site during 2024:

- Eight episodes of groundwater sampling were conducted from September 2017 through February 2018 to establish background concentrations at the Site utilizing data from background wells APW-1R and APW-09. The final Groundwater Protection Standards (GWPS) are the higher of the values between those provided in 35 IAC Section 845.600(a) and the calculated background concentrations.
- Assessment of corrective measures began on 16 June 2022, with the commencement of the initial post-closure groundwater sampling event. Groundwater monitoring, monitoring well inspection and monitoring well gauging events were conducted during the first, second, third, and fourth quarters of 2024. Figures 3, 4, 5 and 6 provide a visual delineation of monitoring well locations with exceedances of the GWPS in accordance with 35 IAC Section 845.600(a)1 and 35 IAC Section 845.600(a)2 during all four quarters of 2024, respectively.
- During 2024 there were exceedances of the GWPS during one or more quarters. These exceedances are summarized as follows:
 - Sulfate: APW-02
 - Arsenic: APW-02, APW-06D, APW-10S
 - Boron: APW-02, APW-03, APW-05R, APW-06D, APW-06S
 - Calcium: APW-02, APW-03, APW-05R, APW-06D, APW-06S, APW-07, APW-10D, APW-10S
 - Turbidity: APW-01R, APW-02, APW-04, APW-05R, APW-06D, APW-07, APW-08, APW-10D, APW-10S
 - Lithium: APW-02, APW-05R, APW-06S
 - Molybdenum: APW-02, APW-05R, APW-06S
- The GTEC coal combustion residuals (CCR) impoundment is currently in Corrective Action Monitoring (CAM). The groundwater sampling results will be evaluated annually to determine if statistically significant increases or decreases have occurred after cap and closure occurred in 2020 in accordance with 35 IAC Section 845.640(f). The statistical evaluation of the first eleven CAM groundwater sampling events indicated that arsenic, boron, lithium, molybdenum, and sulfate exceed the calculated background concentrations and the IEPA GWPS established in 35 IAC Section 845.600 in monitoring wells on the site.
- In accordance with 35 IAC Section 845.550(a) an Annual Groundwater Monitoring and Corrective Action Report will be submitted for the preceding calendar year no later than 31 January of the current calendar year.
- A potentiometric surface map for all quarters of 2024, as required by 35 IAC Section 845.650(b)(2), are included as Figures 7, 8, 9, and 10.



1. INTRODUCTION

Environmental Resources Management (ERM) Inc. is submitting the 2024 Annual Groundwater Monitoring Report in accordance with 35 Illinois Administrative Code (IAC) Section 845.550(a)(3) and 35 IAC Section 845.610(e) for the Grand Tower Energy Center (GTEC) facility located at 1820 Power Plant Rd, Grand Tower, Illinois (the “Site”). A site location map is provided as Figure 1. The location of all Site monitoring wells is provided as Figure 2. This report summarizes the results and findings of the GTEC quarterly post-closure groundwater sampling events conducted during 2024.

2. BACKGROUND

GTEC historically operated as a merchant facility, which sold energy into the Midcontinent Independent System Operator (MISO) distribution system and has been idled since late 2020. The immediate project site, south of the idled power generation facility, consists of an approximately 21-acre area consisting of an impoundment and associated drainage basin. The GTEC CCR impoundment was capped and closed in 2020 and is subject to USEPA 40 CFR 257 and IEPA 35 IAC 845, as applicable. Approximately 235,000 cubic yards of CCR materials are present in the closed impoundment. These materials have been excavated, consolidated, and covered by a 40-mil LLDPE liner, cover soil, and geotextile liner which covers a 14-acre footprint within the Site.

The 2024 groundwater sampling activities were performed in accordance with the post-closure groundwater monitoring program presented within the Grand Tower Operating Permit Application submitted to the IEPA on 28 October 2021 and further modified according to the Consolidated IEPA Comments dated 17 March 2022 received via email. The purpose of the sampling was to initiate the five-year period of quarterly groundwater monitoring for the evaluation of the concentration and areal distribution of impacts related to the closed CCR impoundment in Site groundwater.

The parameters detected in the groundwater are associated with the closed CCR impoundment. This report provides a comprehensive overview of field activities, laboratory analysis, and documentation of any other site-related activities as required throughout the 2024 sampling events.

3. KEY ACTIONS COMPLETED DURING 2024

The following Site activities were completed quarterly during 2024 and performed in accordance with the post-closure groundwater monitoring program:

- Quarterly inspection of the final cover system of the CCR Impoundment during January, April, September and October 2024.
- Quarterly inspection of the Site groundwater monitoring wells during January, April, September and October 2024.
- Remote satellite image inspection of the final cover system of the CCR Impoundment during July, August, November and December 2024; and
- Quarterly groundwater monitoring.



3.1 MONITORING WELL INSPECTION AND GAUGING

During the first, second, third, and fourth quarters of 2024, monitoring well inspections and gauging events were conducted. The monitoring well inspection forms can be found within Appendix A of this report. The monitoring well protectors and casings were also inspected for damage and/or signs of settling that might impact the integrity of the surface seals. The inspection tasks included gauging total depths as well as static groundwater elevations. Both measurements were referenced from the top of casing (TOC) at each of the Site monitoring wells. Total depth and groundwater level measurements were obtained from the monitoring wells using a water level meter with an accuracy of 0.01 foot. Based upon these measurements, a shallow groundwater contour map for the Site was developed for each quarter of 2024. Figure 2 shows the layout of the site and the monitoring well locations, and Figures 7, 8, 9 and 10 show the quarterly groundwater contours and groundwater flow direction arrows, groundwater elevations at each monitoring well, and the Mississippi River elevation at the time of groundwater level gauging. The groundwater gradient is primarily from east to west towards the Mississippi River except for during times of flooding events that may cause a reverse flow from west to east for a short period of time (Natural Resource Technology, Phase 1 Hydrogeologic Assessment Report, March 2013). During the 2024 quarterly groundwater sampling events, no reverse flow conditions were noted.

3.2 GROUNDWATER MONITORING

The Groundwater Protection Standards (GWPS) for the Site are those provided in 35 IAC Section 845.600(a). Assessment of corrective measures began on 16 June 2022 with the commencement of the initial post-closure groundwater sampling event. The groundwater monitoring well network surrounding the closed CCR impoundment includes APW-01R, APW-02, APW-03, APW-04, APW-05R, APW-06D, APW-06S, APW-07, APW-08, APW-09, APW-10D, and APW-10S. APW-01R and APW-09 serve as background wells.

Monitoring Event	Sampling Dates	Number of Wells Sampled
First Quarter 2024	1/09/2024 – 1/11/2024	12
Second Quarter 2024	4/30/2024 - 5/1/2024	12
Third Quarter 2024	9/4/2024 - 9/6/2024	12
Fourth Quarter 2024	10/15/2024 - 10/17/2024	12

The monitoring wells were purged prior to sampling using a submersible pump according to USEPA low flow purging and sampling procedures (“Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells” revised September 19, 2017). The pump intake was placed within the screened interval of each monitoring well sampled and stabilization measurements were collected using a calibrated YSI Professional Plus meter for the first, second, and third quarter and a YSI ProDSS meter for the fourth quarter. These meters obtained measurements for the collection of pH, specific conductivity, temperature, dissolved oxygen, and oxidation reduction potential (ORP) readings. Turbidity readings were also collected from each monitoring well using a Hach 2100Q Turbidimeter. Well purging continued until stabilization of each field parameter was achieved according to USEPA guidelines for low-flow sampling. Once the field parameters stabilized, the YSI meter was disconnected, and groundwater samples were collected for analysis using the same dedicated polyethylene tubing that was used



to purge the well. Field parameter measurements collected during each sampling event were recorded on field data forms. Copies of the field data forms are included in Appendix B.

The groundwater samples collected were placed in laboratory-provided sample containers for analysis by Pace Analytical located in Mt. Juliet, TN which is an IEPA-approved laboratory. Samples were transported under chain-of-custody procedures in laboratory-provided coolers containing ice to the laboratory for analytical testing. The laboratory analytical reporting for all four sampling events conducted in 2024 are included in Appendix C.

The IEPA on 28 October 2021, the IEPA evaluates the efficacy of corrective actions for closed CCR impoundments through the comparison of the groundwater analytical results to the GWPS contained in the 35 IAC Section 845.600. As required by 35 IAC Section 845.600, the following groundwater contaminants of concern (COCs) were monitored during 2024:

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Chloride
- Chromium
- Cobalt
- Fluoride
- Lead
- Lithium
- Mercury
- Molybdenum
- pH
- Selenium
- Sulfate
- Thallium
- TDS
- Radium 226/228
- Calcium
- Turbidity

3.2.1 GROUNDWATER ANALYTICAL RESULTS

The analytical results for the four post-closure groundwater sampling events conducted during 2024 are presented within the attached Table 1.

During 2024 there were exceedances of the GWPS during one or more quarters. These exceedances are summarized as follows:

GWPS COC	Exceedance Location			
	Q1 2024	Q2 2024	Q3 2024	Q4 2024
Sulfate	APW-02	APW-02	-	-
Arsenic	APW-02, APW-06D, APW-10S	APW-02, APW-06D, APW-10S	APW-02, APW-06D, APW-10S	APW-02, APW-06D, APW-10S
Boron	-	APW-02, APW-03, APW-05R, APW-06D, APW-06S	APW-02, APW-03, APW-05R, APW-06D, APW-06S	APW-02, APW-03, APW-05R, APW-06D, APW-06S
Calcium	APW-02, APW-03, APW-05R, APW-06D, APW-07, APW-10D, APW-10S	APW-02, APW-03, APW-05R, APW-06D, APW-06S, APW-07, APW-10D, APW-10S	APW-02, APW-03, APW-04, APW-6D, APW-06S, APW-07, APW-10S	APW-02, APW-03, APW-05R, APW-06D, APW-06S, APW-07, APW-10D, APW-10S
Turbidity	APW-01R, APW-02, APW-04, APW-05R, APW-06D, APW-08	APW-01R, APW-02, APW-04, APW-06D, APW-08, APW-10D	APW-01R, APW-02, APW-04, APW-05R, APW-06D, APW-07, APW-08	APW-02, APW-04, APW-05R, APW-08, APW-10D, APW-10S
Lithium	APW-02, APW-05R, APW-06S	APW-02, APW-06S	APW-02	APW-02
Molybdenum	APW-02, APW-05R ¹ , APW-06S	APW-02, APW-05R, APW-06S	APW-02, APW-05R, APW-06S	APW-02, APW-05R, APW-06S

¹During Q1, the duplicate sample collected at APW-05R (DUP-01) exceeded the GWPS for lithium; however, the normal sample at APW-05R was below the GWPS during the first quarter 2024 sampling event.



It should be noted that boron analysis was inadvertently left off the analyte list by the analytical laboratory for all samples collected during first quarter 2024. Once this was noted, ERM made an inquiry to the laboratory to determine if there was adequate sample volume remaining and if the samples were still within hold time; however, they were no longer within hold time. Therefore, there are no boron analytical results for the first quarter 2024 sampling event. Through conversations with the analytical laboratory, the omission of boron has been rectified for future sampling events.

APW-10S, located approximately one-half mile south of the closed CCR impoundment historically has exhibited elevated arsenic concentrations. However, the occurrence of arsenic in this well is not considered to be related to the closed CCR impoundment due to its distance and location hydraulically cross-gradient in relation to the Site. Additionally, the monitoring wells located between the closed CCR impoundment (APW-03, APW-07, APW-08, and APW-09) and APW-10D have not historically exhibited arsenic concentrations above the GWPS.

4. STATISTICAL ANALYSIS

This report documents the calculation of site-specific background concentrations for groundwater at the GTEC property located in Grand Tower, Illinois pursuant to Title 35, Section 845.640(f) of the IAC. Site-specific background concentrations were calculated in accordance with United States Environmental Protection Agency Unified Guidance (USEPA, 2009) and the Interstate Technology & Regulatory Council guidance on Groundwater Statistics for Monitoring and Compliance (ITRC, 2013).

Twenty-five analytes were evaluated in this report: antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chloride, chromium, cobalt, dissolved solids, fluoride, iron, lead, lithium, manganese, mercury, molybdenum, nickel, pH, radium-226/228, selenium, sulfate, thallium, and turbidity. The background dataset contains a total of 48 samples collected from 3 wells (APW-01R, APW-04, and APW-09), which are hydraulically upgradient from the coal combustion waste ash basin. Concentrations from the 9 downgradient wells (APW-02, APW-03, APW-05/05R, APW-06D, APW-06S, APW-07, APW-08, APW-10D, and APW-10S) were compared against the calculated background concentrations to identify potential exceedances.

4.1 DATA PROCESSING STEPS

Several steps were taken when preparing the dataset to ensure that it was appropriate for statistical analysis. The dataset was first reviewed to identify any potential errors or omissions. No duplicate samples were present in the dataset, so duplicate processing steps were not required for this analysis. Since metals in the earliest background samples were only measured for the “total” fraction, “dissolved” fraction results were excluded from the analysis.

Non-detect (ND) samples were handled in accordance with the “15% and 50% Non-Detect Rule” described in USEPA Unified Guidance (USEPA, 2009, p. 15-24). Simple substitution (i.e., replacing NDs with the reporting limit) was limited to well/constituent groups where $\leq 15\%$ of samples were NDs. In cases where $> 15\%$ but $< 50\%$ of results were NDs, the Kaplan-Meier censored estimation method was used to calculate adjusted background mean and standard deviation

estimates. Non-parametric techniques were used for groups with greater than 50% NDs. Figure D1 in Appendix D2 shows a summary of analyte detections by location.

Data processing and exploratory data analysis were performed using the R programming language (R Core Team, 2023). Data were transformed into a format that is compatible with ProUCL Version 5.2 (USEPA, 2022) for subsequent analysis. Input and output files from the ProUCL analysis are included in Appendix D3.

4.2 EXPLORATORY DATA ANALYSIS

When calculating background groundwater concentrations, assumptions are made about the underlying dataset. For example, some statistical methods assume that a dataset is normally distributed or that concentrations are stationary with respect to time and space. It is important to verify whether these assumptions are valid by examining the dataset through exploratory data analysis (EDA). The EDA process commonly involves inspecting the dataset in a variety of ways, including the generation of figures and tables to summarize data properties. The following analyses were performed for this evaluation prior to the calculation of background concentrations: generation of summary statistics, outlier identification, goodness-of-fit testing, temporal trend analysis, and spatial variability testing. These EDA steps were performed on both the upgradient/background and downgradient wells.

4.2.1 DESCRIPTIVE STATISTICS

Descriptive statistics provide a high-level overview of the dataset properties. A summary table showing sample counts as well as minimum, maximum, median, mean, and standard deviation values for each well/constituent pair and for the pooled upgradient dataset is presented in Table D1 in Appendix D1. Kaplan-Meier estimates for the mean and standard deviation are provided for groups with 50-85% detected values.

Three analytes were not detected in any of the upgradient wells: beryllium, cadmium, and mercury. One analyte was not detected in any of the downgradient wells: thallium. Nine analytes were detected in 100% of upgradient and downgradient samples: barium, calcium, dissolved solids, iron, lithium, manganese, pH, radium-226/228, and turbidity.

4.2.2 OUTLIER EVALUATION

The presence of outliers may lead to biased background concentrations since outliers can influence the mean concentration and/or increase the amount of variance in the background dataset. Three different methods were used to identify potential outliers in the dataset, including visual methods (probability plots [Figure D2, Appendix D2] and box plots [Figure D3, Appendix D3]) and statistical tests (Tukey's outlier test¹). Outlier tests were only run on detected values for well/constituent pairs with at least 4 detected values. Upgradient wells were also combined into a single dataset for each constituent and outlier testing was performed on detected values from the pooled dataset. Table D2 in Appendix D1 shows samples that were identified as potential statistical outliers by these tests.

¹ Tukey's outlier test was performed using a fence value of >3x the interquartile range (IQR).

USEPA recommends that outliers not be excluded from the dataset unless there is compelling evidence to do so, per the following excerpt from the Unified Guidance (USEPA, 2009, p. 5-5):

“The Unified Guidance recommends that testing of outliers be performed on background data, but they generally not be removed unless some basis for a likely error or discrepancy can be identified. Such possible errors or discrepancies could include data recording errors, unusual sampling and laboratory procedures or conditions, inconsistent sample turbidity, and values significantly outside the historical ranges of background data.”

One sample from well APW-09 collected on February 8th, 2018, was notably different from other samples in the dataset. The laboratory report for this sample indicates that the sample was contaminated during analysis, so this sample was excluded from further statistical evaluations. All other samples flagged by Tukey’s outlier test were determined to be indicative of natural variability that is observable in most environmental datasets. Therefore, these samples were included in subsequent analyses.

4.2.3 GOODNESS-OF-FIT DISTRIBUTION TESTING

Goodness-of-fit testing was performed on detected values using ProUCL V5.2 for all groups with at least three detections (see Appendix D3). Four different goodness-of-fit tests were employed when identifying data distributions: Shapiro-Wilk and Lilliefors (performed with $\alpha = 0.01$ for normal or $\alpha = 0.10$ for lognormal distributions), or Anderson-Darling and Kolmogorov-Smirnov (performed with $\alpha = 0.05$ for gamma distributions). Results from goodness-of-fit distribution testing are shown in Tables D3 and D4 in Appendix D1.

4.2.4 TREND ANALYSIS

Mann-Kendall trend tests were performed for each well/constituent pair with at least 5 detected values and 50% detections to check for temporal stability in the dataset. Trend tests were performed with a 95% confidence level. Non-detect values were replaced with half of the minimum reporting limit for each group for trend analyses. Time series figures are presented in Figure D4 in Appendix D2. Trend analysis results are summarized in Figure D5 in Appendix D2. Background concentrations were calculated with de-trended data for groups with statistically significant trends to address any potential influence from temporal trends (Appendix D3²).

4.2.5 EVALUATION OF SPATIAL VARIABILITY

Upgradient datasets were evaluated to determine whether significant spatial variability was present in background locations. Only upgradient wells were included in the spatial variability analysis. Analysis of Variance (ANOVA) is a common method for assessing differences between groups (e.g., concentrations for a specific constituent at different wells). Two key assumptions of ANOVA are that data are normally distributed and variance among the groups is approximately

² De-trending was performed by calculating an ordinary least squares regression model on the time series data for each well where significant trends were observed, predicting the modeled value at the latest time point, then adding the regression residuals to the latest predicted point.

equal. In cases where these assumptions are not valid, the non-parametric Kruskal-Wallis test can be used instead of ANOVA.

Based on ANOVA or Kruskal-Wallis testing, fourteen of the twenty-five analytes in the background dataset had statistically significant different concentrations amongst the three upgradient wells: arsenic, barium, boron, calcium, chloride, dissolved solids, fluoride, lithium, molybdenum, nickel, pH, selenium, sulfate, and turbidity. However, concentrations for these analytes fell within the same range for each of the upgradient wells. Therefore, data from the three upgradient wells were pooled into a single background dataset when calculating interwell background statistics (Section 4.3).

4.3 ESTABLISHING BACKGROUND CONCENTRATIONS

Upper tolerance limits (UTLs) were calculated for each analyte to define the background concentrations. A confidence level of 95% and coverage of 95% was used for all parametric calculations. The maximum reporting limit was set as the background concentration for analytes with 100% NDs. Final background concentrations are summarized in Table D3 in Appendix D1.

4.4 DOWNGRADIANT WELL SCREENING

Downgradient wells were compared against background concentrations to identify potential exceedances. For this comparison, a 95% confidence interval around the mean was calculated for each analyte at each downgradient well (Table D4, Appendix D1). Upper Confidence Limits (UCLs) were calculated for locations with sufficient data³ using the statistical software ProUCL v5.2. Lower confidence limits (LCLs) were then derived by calculating the difference between the UCL and the mean concentrations and subtracting that difference from the mean (USEPA, 2022, Section 2.1). If the resulting LCL fell below zero, it was set equal to the minimum concentration.

The LCL was then compared to the background concentrations (Table D3, Appendix D1) and the Groundwater Protection Standards (GWPS) established in 35 IAC Section 845.600 of the Illinois Administrative Code. An exceedance was noted for groups where the LCL exceeded background concentrations and/or GWPS. This approach is consistent with USEPA Unified Guidance (USEPA, 2009, p. 7-25). Results from this comparison are shown in Figure D6, located in Appendix D2, and are summarized below:

³ Data was sufficient if a location had a minimum of two detections and three samples.

COCs that Exceed Background, No IEPA GWPS	
COCs	Monitoring Well(s)
Calcium	APW-02, APW-03, APW-07, APW-10S
Nickel	APW-02
Turbidity	APW-02
COCs that Exceed Background and IEPA GWPS	
COCs	Monitoring Well(s)
Arsenic	APW-02, APW-06D, APW-10S
Boron	APW-02, APW-03, APW-05R, APW-06D, APW-06S
Lithium	APW-02
Molybdenum	APW-02, APW-05R, APW-06S
Sulfate	APW-02

5. CONCLUSION

Based upon the results of 2024 groundwater sampling events and monitoring well inspections, the following observations and conclusions have been made:

- Similar to the groundwater sampling results obtained during the eight pre-closure sampling events in 2017 to 2018, arsenic and sulfate continue to be detected at well locations downgradient of the closed CCR impoundment.
- Boron has historically been the key indicator for corrective action and continued monitoring of groundwater at the Site. Incorporating data from the eight rounds of pre-closure groundwater sampling conducted during 2017 and 2018, as well as the eleven post groundwater monitoring events, boron continues to demonstrate a decreasing trend at APW-05R and has been below the GWPS of 2 mg/L at APW-04 during all sampling events since post-closure groundwater monitoring began in second quarter 2022, with the exception of the fourth quarter of 2022.
- Statistical analysis indicates that arsenic, boron, lithium, molybdenum, and sulfate exceed the calculated background concentrations and the IEPA GWPS established in 35 IAC Section 845.600 in monitoring wells on the site.
- Groundwater monitoring wells will be sampled on a quarterly basis during the 2025 calendar year.
- At the end of the current five-year monitoring and reporting post-closure time frame, a groundwater performance monitoring report will be submitted to IEPA to either demonstrate restoration of groundwater quality to Class I standards or present a continued groundwater monitoring plan for an additional five years. In addition, the results will be compared to the modelled concentrations to evaluate if a decreasing trend, as defined through modelling, is occurring at the predicted rate. Significant changes from the model results will lead to additional calibration and assessment of future expected rates of decrease for the COCs.

6. REFERENCES

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APPENDIX A 2024 MONITORING WELL INSPECTION
FORMS

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-01R Date: 1/9/2024
Total Depth (Actual): 58.30 (BTOC) Time: 1:22 PM
Total Depth (Measured): 58.28 (BTOC) Collection Order: 5
Depth to Water (Measured): 35.36 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: Yes
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Large hole, 3ft southeast of monitoring well.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-02 Date: 1/9/2024
Total Depth (Actual): 58.30 (BTOC) Time: 12:58 PM
Total Depth (Measured): 58.37 (BTOC) Collection Order: 4
Depth to Water (Measured): 34.26 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-03 Date: 1/9/2024
Total Depth (Actual): 59.90 (BTOC) Time: 2:20 PM
Total Depth (Measured): 59.50 (BTOC) Collection Order: 12
Depth to Water (Measured): 34.56 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-04 Date: 1/9/2024
Total Depth (Actual): 60.27 (BTOC) Time: 1:43 PM
Total Depth (Measured): 60.25 (BTOC) Collection Order: 7
Depth to Water (Measured): 36.30 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: No
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-05R Date: 1/9/2024
Total Depth (Actual): 62.98 (BTOC) Time: 12:51 PM
Total Depth (Measured): 62.90 (BTOC) Collection Order: 3
Depth to Water (Measured): 33.24 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06D Date: 1/9/2024
Total Depth (Actual): 155.10 (BTOC) Time: 12:20 PM
Total Depth (Measured): 154.75 (BTOC) Collection Order: 2
Depth to Water (Measured): 32.49 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06S Date: 1/9/2024
Total Depth (Actual): 63.88 (BTOC) Time: 12:11 PM
Total Depth (Measured): 63.81 (BTOC) Collection Order: 1
Depth to Water (Measured): 32.30 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-07 Date: 1/9/2024
Total Depth (Actual): 62.39 (BTOC) Time: 2:06 PM
Total Depth (Measured): 63.23 (BTOC) Collection Order: 10
Depth to Water (Measured): 29.64 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-08 Date: 1/9/2024
Total Depth (Actual): 62.36 (BTOC) Time: 2:11 PM
Total Depth (Measured): 62.00 (BTOC) Collection Order: 11
Depth to Water (Measured): 37.56 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-09 Date: 1/9/2024
Total Depth (Actual): 63.18 (BTOC) Time: 1:32 PM
Total Depth (Measured): 63.20 (BTOC) Collection Order: 6
Depth to Water (Measured): 35.54 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10D Date: 1/9/2024
Total Depth (Actual): 98.09 (BTOC) Time: 1:56 PM
Total Depth (Measured): 98.11 (BTOC) Collection Order: 9
Depth to Water (Measured): 28.31 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10S Date: 1/9/2024
Total Depth (Actual): 62.55 (BTOC) Time: 1:53 PM
Total Depth (Measured): 62.75 (BTOC) Collection Order: 8
Depth to Water (Measured): 28.73 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-01R Date: 4/30/2024
Total Depth (Actual): 58.30 (BTOC) Time: 10:29 AM
Total Depth (Measured): 58.26 (BTOC) Collection Order: 6
Depth to Water (Measured): 23.20 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Large hole, 3ft southeast of monitoring well.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-02 Date: 4/30/2024
Total Depth (Actual): 58.30 (BTOC) Time: 9:46 AM
Total Depth (Measured): 58.27 (BTOC) Collection Order: 4
Depth to Water (Measured): 20.15 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-03 Date: 4/30/2024
Total Depth (Actual): 59.90 (BTOC) Time: 11:25 AM
Total Depth (Measured): 59.50 (BTOC) Collection Order: 12
Depth to Water (Measured): 22.32 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-04 Date: 4/30/2024
Total Depth (Actual): 60.27 (BTOC) Time: 10:44 AM
Total Depth (Measured): 60.27 (BTOC) Collection Order: 7
Depth to Water (Measured): 24.82 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: 2 ballards are very lose.

Well Surface Seal: INTACT

Is surrounding area sloped away from well: y
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-05R Date: 4/30/2024
Total Depth (Actual): 62.98 (BTOC) Time: 9:39 AM
Total Depth (Measured): 62.92 (BTOC) Collection Order: 3
Depth to Water (Measured): 17.54 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: No ballards present.

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: n
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06D Date: 4/30/2024
Total Depth (Actual): 155.10 (BTOC) Time: 9:33 AM
Total Depth (Measured): 156.56 (BTOC) Collection Order: 2
Depth to Water (Measured): 19.27 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: Yes

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06S Date: 4/30/2024
Total Depth (Actual): 63.88 (BTOC) Time: 9:27 AM
Total Depth (Measured): 63.90 (BTOC) Collection Order: 1
Depth to Water (Measured): 17.34 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: No
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: Yes

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-07 Date: 4/30/2024
Total Depth (Actual): 62.39 (BTOC) Time: 11:11 AM
Total Depth (Measured): 63.28 (BTOC) Collection Order: 10
Depth to Water (Measured): 15.93 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-08 Date: 4/30/2024
Total Depth (Actual): 62.36 (BTOC) Time: 11:17 AM
Total Depth (Measured): 62.03 (BTOC) Collection Order: 11
Depth to Water (Measured): 20.36 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-09 Date: 4/30/2024
Total Depth (Actual): 63.18 (BTOC) Time: 9:56 AM
Total Depth (Measured): 63.18 (BTOC) Collection Order: 5
Depth to Water (Measured): 25.10 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10D Date: 4/30/2024
Total Depth (Actual): 98.09 (BTOC) Time: 11:02 AM
Total Depth (Measured): 98.14 (BTOC) Collection Order: 9
Depth to Water (Measured): 17.14 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10S Date: 4/30/2024
Total Depth (Actual): 62.55 (BTOC) Time: 10:58 AM
Total Depth (Measured): 62.72 (BTOC) Collection Order: 8
Depth to Water (Measured): 13.23 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-01R Date: 9/4/2024
Total Depth (Actual): 58.30 (BTOC) Time: 12:59 PM
Total Depth (Measured): 59.20 (BTOC) Collection Order: 5
Depth to Water (Measured): 30.67 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Large hole, 3ft southeast of monitoring well.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-02 Date: 9/4/2024
Total Depth (Actual): 58.75 (BTOC) Time: 12:37 PM
Total Depth (Measured): 59.30 (BTOC) Collection Order: 4
Depth to Water (Measured): 30.90 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-03 Date: 9/4/2024
Total Depth (Actual): 54.65 (BTOC) Time: 1:57 PM
Total Depth (Measured): 60.80 (BTOC) Collection Order: 12
Depth to Water (Measured): 29.95 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-04 Date: 9/4/2024
Total Depth (Actual): 60.40 (BTOC) Time: 1:25 PM
Total Depth (Measured): 61.30 (BTOC) Collection Order: 7
Depth to Water (Measured): 31.41 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: 2 ballards are very lose.

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-05R Date: 9/4/2024
Total Depth (Actual): 56.90 (BTOC) Time: 12:14 PM
Total Depth (Measured): 63.50 (BTOC) Collection Order: 3
Depth to Water (Measured): 30.40 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: No ballards present.

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06D Date: 9/4 - 9/5/2024
Total Depth (Actual): 152.57 (BTOC) Time: 12:01 PM
Total Depth (Measured): 158.05 (BTOC) Collection Order: 2
Depth to Water (Measured): 28.50 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: No
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand. Wasp nest in protector lid, removed on
9/4 and finished inspection on 9/5.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06S Date: 9/4/2024
Total Depth (Actual): 63.98 (BTOC) Time: 11:58 AM
Total Depth (Measured): 64.62 (BTOC) Collection Order: 1
Depth to Water (Measured): 29.77 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: No
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-07 Date: 9/4/2024
Total Depth (Actual): 63.35 (BTOC) Time: 1:43 PM
Total Depth (Measured): 64.45 (BTOC) Collection Order: 10
Depth to Water (Measured): 26.10 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well was pressurized.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-08 Date: 9/4/2024
Total Depth (Actual): 61.89 (BTOC) Time: 1:51 PM
Total Depth (Measured): 63.34 (BTOC) Collection Order: 11
Depth to Water (Measured): 26.55 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-09 Date: 9/4/2024
Total Depth (Actual): 63.40 (BTOC) Time: 1:09 PM
Total Depth (Measured): 64.18 (BTOC) Collection Order: 6
Depth to Water (Measured): 30.35 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10D Date: 9/4/2024
Total Depth (Actual): 98.19 (BTOC) Time: 1:32 AM
Total Depth (Measured): 100.05 (BTOC) Collection Order: 9
Depth to Water (Measured): 23.00 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10S Date: 9/4/2024
Total Depth (Actual): 62.84 (BTOC) Time: 1:31 PM
Total Depth (Measured): 63.65 (BTOC) Collection Order: 8
Depth to Water (Measured): 26.25 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-01R Date: 10/15/2024
Total Depth (Actual): 58.30 (BTOC) Time: 11:30 AM
Total Depth (Measured): 59.03 (BTOC) Collection Order: 8
Depth to Water (Measured): 35.69 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Large hole, 3ft southeast of monitoring well.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-02 Date: 10/15/2024
Total Depth (Actual): 58.75 (BTOC) Time: 12:00 PM
Total Depth (Measured): 59.10 (BTOC) Collection Order: 11
Depth to Water (Measured): 36.30 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-03 Date: 10/15/2024
Total Depth (Actual): 54.65 (BTOC) Time: 11:00 AM
Total Depth (Measured): 60.27 (BTOC) Collection Order: 5
Depth to Water (Measured): 34.67 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: Yes
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: No
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-04 Date: 10/15/2024
Total Depth (Actual): 60.40 (BTOC) Time: 11:10 AM
Total Depth (Measured): 60.77 (BTOC) Collection Order: 6
Depth to Water (Measured): 36.21 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: 2 ballards are very lose.

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: No
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-05R Date: 10/15/2024
Total Depth (Actual): 56.90 (BTOC) Time: 12:05 PM
Total Depth (Measured): 63.50 (BTOC) Collection Order: 12
Depth to Water (Measured): 34.50 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: No ballards present.

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06D Date: 10/15/2024
Total Depth (Actual): 152.57 (BTOC) Time: 11:48 AM
Total Depth (Measured): 157.56 (BTOC) Collection Order: 9
Depth to Water (Measured): 33.29 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-06S Date: 10/15/2024
Total Depth (Actual): 63.98 (BTOC) Time: 11:52 AM
Total Depth (Measured): 64.80 (BTOC) Collection Order: 10
Depth to Water (Measured): 33.36 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: No
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well protector surrounded by sand.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-07 Date: 10/15/2024
Total Depth (Actual): 63.35 (BTOC) Time: 10:40 AM
Total Depth (Measured): 64.28 (BTOC) Collection Order: 3
Depth to Water (Measured): 30.35 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well was pressurized.

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-08 Date: 10/15/2024
Total Depth (Actual): 61.89 (BTOC) Time: 10:50 AM
Total Depth (Measured): 62.70 (BTOC) Collection Order: 4
Depth to Water (Measured): 31.13 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-09 Date: 10/15/2024
Total Depth (Actual): 63.40 (BTOC) Time: 11:20 AM
Total Depth (Measured): 64.05 (BTOC) Collection Order: 7
Depth to Water (Measured): 35.13 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10D Date: 10/15/2024
Total Depth (Actual): 98.19 (BTOC) Time: 10:20 AM
Total Depth (Measured): 99.26 (BTOC) Collection Order: 1
Depth to Water (Measured): 27.24 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: Yes
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:

Well Inspection Worksheet

Grand Tower Energy Center

Grand Tower, IL

Well ID: APW-10S Date: 10/14/2024
Total Depth (Actual): 62.84 (BTOC) Time: 10:30 AM
Total Depth (Measured): 62.73 (BTOC) Collection Order: 2
Depth to Water (Measured): 28.95 (BTOC)

Is well screen occluded more than 10%? No
If Yes, list steps for redevelopment: _____

LNAPL Present: No
If Yes, measured thickness = _____
DNAPL Present: No
If Yes, measured thickness = _____

Well Completion Type:

Condition of protector: INTACT Yes
Well ID present and readable: Yes
Locks intact: Yes
Weep hole present: No
Water present in protector: No
Are well "markers" (i.e.bumper posts) needed at this location: No
If yes, are current well "markers" adequate around well: _____
Comments: _____

Well Surface Seal: INTACT

Is surrounding area sloped away from well: No
Any observed ponding: No
Is surface run-off flow evident around well: No

Well Casing Condition: INTACT

Size of well (diameter) = 2 inches
Marking point present: Yes
Well cap in place: Yes
Comments: _____

General Comments:



APPENDIX B FIELD DATA FORMS



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-03
Well Permit No:

Date: 2024/01/11

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 54.5 (ft)	Reference Elevation 365.79 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 34.46 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 59.5 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 481.1 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 4.09 (gal) / 5 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
14:08	34.5	330	0	14	7.32	720	NM	2.87	40.2	248	NM	CLOUDY, NO ODOR
14:13	34.5	500	0.5	14	7.28	750	NM	0.98	18.4	204	NM	CLOUDY, NO ODOR
14:18	34.5	500	1.25	14.6	7.28	751	NM	0.52	-10.2	80.1	NM	CLOUDY, SLIGHT ROTTEN-EGG LIKE ODOR
14:23	34.5	500	2.25	14.6	7.28	750	NM	0.4	-16.8	28.8	NM	CLEAR, SLIGHT ROTTEN-EGG LIKE ODOR
14:28	34.5	500	3	14.7	7.28	748	NM	0.26	-21.4	17.7	NM	CLEAR, SLIGHT ROTTEN-EGG LIKE ODOR
14:33	34.5	500	3.5	14.7	7.28	747	NM	0.16	-22.7	12	NM	CLEAR, SLIGHT ROTTEN-EGG LIKE ODOR
14:38	34.5	500	4	14.6	7.28	746	NM	0.15	-22.9	7.52	NM	CLEAR, SLIGHT ROTTEN-EGG LIKE ODOR
14:43	34.5	500	4.5	14.6	7.28	746	NM	0.13	-22.9	7.13	NM	CLEAR, SLIGHT ROTTEN-EGG LIKE ODOR
14:48	34.5	500	5	14.6	7.27	746	NM	0.13	-22.9	7.12	NM	CLEAR, SLIGHT ROTTEN-EGG LIKE ODOR

Sample ID(s): APW-03-WG-20240111	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
		Marshall Arendell 	01/29/2024 18:51
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-04
Well Permit No:

Date: 2024/01/10

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 55.25 (ft)	Reference Elevation 367.44 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 36.36 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 60.25 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 364.3 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 3.9 (gal) / 1.75 (gal)	Well Construction PVC

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
16:35	36.36	400	0	9.6	7.24	504	NM	4.01	52.2	30.6	NM	CLEAR, NO ODOR
16:40	36.36	400	0.5	11.5	7.22	560	NM	2.21	57.4	118	NM	TURBID, BROWN, NO ODOR
16:45	36.36	350	0.75	11.2	7.2	563	NM	2.33	64.4	58.4	NM	CLOUDY, BROWN, NO ODOR
16:50	36.36	350	1	11.3	7.2	566	NM	2.28	71	38.6	NM	CLOUDY, BROWN, NO ODOR
16:55	36.36	350	1.25	11.6	7.2	566	NM	2.26	76.1	31.4	NM	CLOUDY, BROWN, NO ODOR
17:00	36.36	350	1.5	11.5	7.2	565	NM	2.25	79.4	31.1	NM	CLOUDY, BROWN, NO ODOR
17:05	36.36	350	1.75	11.5	7.2	565	NM	2.22	79.7	29.8	NM	CLOUDY, BROWN, NO ODOR

Sample ID(s): APW-04-WG-20240110	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 01/29/2024 19:17
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-05R
Well Permit No:

Date: 2024/01/10

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.9 (ft)	Reference Elevation ()
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 33.33 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 62.9 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 387.5 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / - ()
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 4.83 (gal) / 5.5 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
12:05	33.37	250	0	12.5	7.42	895	NM	2.44	-63	32.9	NM	CLOUDY, NO ODOR
12:10	33.4	400	0.5	14.5	7.38	944	NM	0.3	-103	673	NM	TURBID, ROTTEN-EGG LIKE ODOR
12:15	33.4	400	1	14.8	7.37	942	NM	0.14	-124.3	359	NM	TURBID, ROTTEN-EGG LIKE ODOR
12:20	33.4	400	1.5	14.7	7.35	941	NM	0.12	-129.5	227	NM	TURBID, ROTTEN-EGG LIKE ODOR
12:25	33.4	400	2	14.9	7.38	943	NM	0.11	-134.8	133	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
12:30	33.4	400	2.5	15.1	7.37	942	NM	0.08	-136.4	110	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
12:35	33.4	400	3	15.1	7.38	943	NM	0.07	-137.6	84.9	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
12:40	33.4	400	3.5	15.2	7.37	944	NM	0.06	-140.3	60.6	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
12:45	33.4	400	4	15.3	7.37	945	NM	0.06	-142.7	44.4	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
12:50	33.4	400	4.5	15.2	7.37	946	NM	0.05	-144.9	42.8	NM	CLEAR, ROTTEN-EGG LIKE ODOR
12:55	33.4	400	5	15.3	7.37	944	NM	0.05	-145.3	39.3	NM	CLEAR, ROTTEN-EGG LIKE ODOR
13:00	33.4	400	5.5	15.4	7.37	945	NM	0.05	-146.1	38.9	NM	CLEAR, ROTTEN-EGG LIKE ODOR

Sample ID(s): APW-05R-WG-20240110,DUP-01-WG-20240110	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 01/31/2024 16:41
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-06D
Well Permit No:

Date: 2024/01/10

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 149.75 (ft)	Reference Elevation 363.69 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 32.54 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 154.75 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 417.9 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 140 - 150 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 19.94 (gal) / 3 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
10:55	32.6	225	0	14.3	7.34	755	NM	7.31	-75.5	195	NM	TURBID, ROTTEN-EGG LIKE ODOR
11:00	32.6	450	0.5	14.5	7.33	756	NM	4.32	-86.5	84.9	NM	TURBID, ROTTEN-EGG LIKE ODOR
11:05	32.6	450	1	14.6	7.33	756	NM	0.55	-91.5	50.6	NM	TURBID, ROTTEN-EGG LIKE ODOR
11:10	32.6	450	1.5	14.7	7.32	752	NM	0.15	-102.4	27.1	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:15	32.6	450	2	14.8	7.32	752	NM	0.13	-103.7	19.6	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:20	32.6	450	2.5	14.8	7.33	753	NM	0.13	-105	18.4	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:25	32.6	450	3	14.6	7.32	753	NM	0.13	-106	18.2	NM	CLOUDY, ROTTEN-EGG LIKE ODOR

Sample ID(s): APW-06D-WG-20240110	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell 	01/29/2024 20:23



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-06S
Well Permit No:

Date: 2024/01/10

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.81 (ft)	Reference Elevation 363.51 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 32.47 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.81 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 300 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 5.11 (gal) / 3.5 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
09:30	32.63	300	0	13.6	7.19	820	NM	0.37	-17.9	97.3	NM	TURBID, NO ODOR
09:35	32.63	300	0.5	13.7	7.27	792	NM	0.31	-32.1	40.7	NM	TURBID, NO ODOR
09:40	32.63	300	0.75	13.8	7.2	838	NM	0.21	-60.7	24	NM	TURBID, NO ODOR
09:45	32.63	300	1.25	14	7.2	880	NM	0.16	-82.6	8.55	NM	CLEAR, NO ODOR
09:50	32.63	300	1.75	14.3	7.2	879	NM	0.12	-102.4	5.65	NM	CLEAR, NO ODOR
09:55	32.63	300	2	14.2	7.21	875	NM	0.11	-112	5.35	NM	CLEAR, NO ODOR
10:00	32.63	300	2.5	14.1	7.2	877	NM	0.08	-119.7	3.77	NM	CLEAR, NO ODOR
10:05	32.63	300	3	14	7.21	878	NM	0.07	-125.4	4.1	NM	CLEAR, NO ODOR
10:10	32.63	300	3.5	13.9	7.2	877	NM	0.06	-128.2	3.32	NM	CLEAR, NO ODOR

Sample ID(s): APW-06S-WG-20240110	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 01/29/2024 20:35
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-07
Well Permit No:

Date: 2024/01/11

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.23 (ft)	Reference Elevation 360.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 29.7 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.23 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 411.1 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 5.47 (gal) / 3.75 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
11:10	29.74	450	0	13.9	6.82	1181	NM	1.24	-15.8	126	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:15	29.74	450	0.5	14.3	6.85	1219	NM	0.32	-52.8	114	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:20	29.74	400	1	14.6	6.84	1223	NM	0.15	-67.6	94.5	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:25	29.74	400	1.5	14.6	6.84	1223	NM	0.1	73.4	55.2	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:30	29.74	400	2	14.5	6.84	1226	NM	0.08	-77.4	37.8	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:35	29.74	400	2.5	14.4	6.82	1226	NM	0.06	-80.7	22.3	NM	CLOUDY, ROTTEN-EGG LIKE ODOR
11:40	29.74	400	2.75	14.3	6.85	1226	NM	0.06	-82.8	8.26	NM	CLEAR, ROTTEN-EGG LIKE ODOR
11:45	29.74	400	3.25	14.2	6.85	1226	NM	0.04	-84.3	4.46	NM	CLEAR, ROTTEN-EGG LIKE ODOR
11:50	29.74	400	3.75	14.2	6.85	1225	NM	0.04	-85.9	4.36	NM	CLEAR, ROTTEN-EGG LIKE ODOR

Sample ID(s): APW-07-WG-20240111	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
		Marshall Arendell 	01/29/2024 21:31
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-08
Well Permit No:

Date: 2024/01/11

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57 (ft)	Reference Elevation 362.71 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 31.54 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 62 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 475 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 4.97 (gal) / 6.5 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
12:32	31.58	200	0	15.1	7.31	569.8	NM	1.66	-20.2	1000	NM	TURBID, BROWN, NO ODOR
12:37	31.58	500	0.75	15.6	7.22	571.3	NM	0.21	-15	1000	NM	TURBID, BROWN, NO ODOR
12:42	31.58	500	1.25	15.7	7.21	571	NM	0.2	-14	765	NM	TURBID, BROWN, NO ODOR
12:47	31.58	500	1.75	15.7	7.2	571.9	NM	0.13	-14.4	441	NM	TURBID, BROWN, NO ODOR
12:52	31.58	500	2.5	15.8	7.2	573.9	NM	0.08	-16	217	NM	TURBID, BROWN, NO ODOR
12:57	31.58	500	3.25	15.8	7.2	573.1	NM	0.07	-16.8	156	NM	CLOUDY, NO ODOR
13:02	31.58	500	3.75	15.7	7.2	572.9	NM	0.06	-17.5	90.5	NM	CLOUDY, NO ODOR
13:07	31.58	500	4.5	15.9	7.2	571.4	NM	0.05	-17.7	61.1	NM	CLOUDY, NO ODOR
13:12	31.58	500	5	15.9	7.2	571.2	NM	0.05	-17.3	43.3	NM	CLOUDY, NO ODOR
13:17	31.58	500	5.5	15.9	7.2	572.6	NM	0.04	-16.4	23.7	NM	CLOUDY, NO ODOR
13:22	31.58	500	6	15.9	7.2	571.6	NM	0.03	-16	22.4	NM	CLEAR, NO ODOR
13:27	31.58	500	6.5	15.9	7.2	571.5	NM	0.03	-16	23.1	NM	CLEAR, NO ODOR

Sample ID(s): APW-08-WG-20240111	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 01/29/2024 21:47
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-09
Well Permit No:

Date: 2024/01/11

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.2 (ft)	Reference Elevation 366.84 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 35.6 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.2 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 4.5 (gal) / 7.5 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
15:17	35.6	500	0	13.8	7.46	509.4	NM	1.83	1.1	144	NM	CLOUDY, NO ODORS
15:22	35.6	500	1	14.9	7.38	538.6	NM	0.74	9.4	140	NM	CLEAR, NO ODORS
15:27	35.6	500	2	15	7.37	539.2	NM	0.53	9.6	85.3	NM	CLEAR, NO ODORS
15:32	35.6	500	3	15	7.37	538.7	NM	0.42	9.2	47	NM	CLEAR, NO ODORS
15:37	35.6	500	4	14.9	7.37	538.9	NM	0.36	8.9	41.5	NM	CLEAR, NO ODORS
15:42	35.6	500	5	15	7.36	538.8	NM	0.33	8.7	28.8	NM	CLEAR, NO ODORS
15:47	35.6	500	5.5	15	7.36	538.3	NM	0.32	8.6	22	NM	CLEAR, NO ODORS
15:52	35.6	500	6	15	7.33	541	NM	0.3	9	18.3	NM	CLEAR, NO ODORS
15:57	35.6	500	6.5	15	7.33	540.7	NM	0.31	8.5	13.6	NM	CLEAR, NO ODORS
16:02	35.6	500	7	15	7.36	540.7	NM	0.3	8.7	13.2	NM	CLEAR, NO ODORS
16:07	35.6	500	7.5	15	7.36	540.7	NM	0.29	8.7	13.4	NM	CLEAR, NO ODORS

Sample ID(s): APW-09-WG-20240111,DUP-02-WG-20240111	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 01/29/2024 22:07
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-10D
Well Permit No:


Date: 2024/01/11

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 93.11 (ft)	Reference Elevation 359.41 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 28.3 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 98.11 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 86 - 96 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 11.39 (gal) / 9 (gal)	Well Construction PVC

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
09:40	28.32	500	0	12.4	7.32	582.8	NM	3.02	-77.6	84.5	NM	CLOUDY, NO ODOR
09:45	28.32	500	0.5	14.1	7.09	628.5	NM	1	-53.3	1000	NM	CLOUDY, NO ODOR
09:50	28.32	500	1	14.7	7.05	672	NM	0.25	-43.8	620	NM	CLOUDY, NO ODOR
09:55	28.32	500	1.5	14.9	7.05	683	NM	0.16	-37.1	406	NM	CLOUDY, NO ODOR
10:00	28.32	500	2	15	7.05	691	NM	0.14	-33.6	237	NM	CLOUDY, NO ODOR
10:05	28.32	500	3	15	7.05	692	NM	0.12	-30.8	144	NM	CLOUDY, NO ODOR
10:10	28.32	500	4	15.1	7.05	693	NM	0.12	-26.4	53.4	NM	CLOUDY, NO ODOR
10:15	28.32	500	5	15.1	7.05	697	NM	0.1	-25.1	41.8	NM	CLOUDY, NO ODOR
10:20	28.32	500	6	15.1	7.05	697	NM	0.08	-21.6	22.6	NM	CLOUDY, NO ODOR
10:25	28.32	500	7	15.1	7.04	696	NM	0.07	-18.5	6.21	NM	CLEAR, NO ODOR
10:30	28.32	500	8	15.1	7.04	694	NM	0.06	-16.4	5.72	NM	CLEAR, NO ODOR
10:35	28.32	500	9	15.1	7.04	698	NM	0.08	-17.6	4.76	NM	CLEAR, NO ODOR

Sample ID(s): APW-10D-WG-20240111	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell 	01/29/2024 22:36



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-10S
Well Permit No:

Date: 2024/01/11

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.75 (ft)	Reference Elevation 359.47 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 28.85 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 62.75 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 377.8 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 5.53 (gal) / 4 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
08:36	29.13	400	0	12.5	7.09	1250	NM	2.29	-107.6	1000	NM	TURBID, GREY, ROTTEN-EGG LIKE ODOR
08:41	29.13	350	0.5	13.2	7.05	1269	NM	0.31	-106.1	1000	NM	TURBID, GREY, ROTTEN-EGG LIKE ODOR
08:46	29.13	350	1	13.6	7.04	1266	NM	0.24	-112.8	196	NM	TURBID, GREY, STRONG ROTTEN-EGG LIKE ODOR
08:51	29.13	350	1.5	13.8	7.04	1274	NM	0.15	-119.8	247	NM	CLOUDY, STRONG ROTTEN-EGG LIKE ODOR
08:56	29.13	350	2	13.8	7.03	1276	NM	0.12	-125.3	60.5	NM	CLOUDY, STRONG ROTTEN-EGG LIKE ODOR
09:01	29.13	400	2.5	14.8	7.03	1272	NM	0.09	-129.3	20.6	NM	CLOUDY, STRONG ROTTEN-EGG LIKE ODOR
09:06	29.13	400	3	14.7	7.01	1267	NM	0.08	-131.6	7.89	NM	CLEAR, STRONG ROTTEN-EGG LIKE ODOR
09:11	29.13	400	3.5	14.5	7.01	1273	NM	0.07	-133.8	5.54	NM	CLEAR, STRONG ROTTEN-EGG LIKE ODOR
09:16	29.13	400	4	14.6	7.02	1274	NM	0.06	-135.3	3.78	NM	CLEAR, STRONG ROTTEN-EGG LIKE ODOR

Sample ID(s): APW-10S-WG-20240111	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 01/29/2024 23:20
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-01R
Well Permit No:


Date: 2024/01/10

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 53.28 (ft)	Reference Elevation 366.82 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 35.43 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 58.28 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 410 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 48.3 - 58.3 ()
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 3.73 (gal) / 3.75 (gal)	Well Construction PVC

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
15:15	35.43	500	0	13.2	6.13	399	NM	3.64	12.6	567	NM	TURBID, BROWN, NO ODOR
15:20	35.43	400	0.25	13.2	6.17	426	NM	1.3	49	348	NM	TURBID, BROWN, NO ODOR
15:25	35.43	400	0.5	13.3	6.25	453	NM	1.23	56.1	263	NM	TURBID, BROWN, NO ODOR
15:30	35.43	400	0.75	13.7	6.36	487	NM	1.25	56.5	178	NM	TURBID, BROWN, NO ODOR
15:35	35.43	400	1.25	13.5	6.4	502	NM	1.25	56	133	NM	TURBID, BROWN, NO ODOR
15:40	35.43	400	1.75	13.2	6.43	512	NM	1.22	54.9	97.2	NM	TURBID, BROWN, NO ODOR
15:45	35.43	400	2.25	13.2	6.46	520	NM	1.21	54.7	62.1	NM	TURBID, BROWN, NO ODOR
15:50	35.43	400	2.75	13.3	6.5	536	NM	1.21	56	27.2	NM	CLEAR, NO ODOR
15:55	35.43	400	3.25	13.4	6.51	542	NM	1.22	56.4	26.7	NM	CLEAR, NO ODOR
16:00	35.43	400	3.75	13.5	6.52	545	NM	1.23	56.7	25.6	NM	CLEAR, NO ODOR

Sample ID(s): APW-01R-WG-20240110	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
		Marshall Arendell 	01/29/2024 18:00
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-02
Well Permit No:

Date: 2024/01/10

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 53.37 (ft)	Reference Elevation 364.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 33.61 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 58.37 (ft)
Project Name 20240108-GWMonitor	Average Purge Rate 234.4 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 47.2 - 57.2 ()
Sampler Marshall Arendell & Joshua Richards	Volume of Water in Well / Total Volume Purged 4.04 (gal) / 1.4 (gal)	Well Construction PVC

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
13:55	34.33	400	0	12.5	7.22	1068	NM	6.53	-17.7	97.6	NM	CLEAR, NO ODOR
14:00	37.5	375	0.5	14.2	7.2	1080	NM	1.02	-85.5	169	NM	CLOUDY, NO ODOR
14:05	39.06	350	0.75	13.8	7.19	1085	NM	1.05	-87.7	138	NM	CLOUDY, NO ODOR
14:10	39.13	150	1	13.2	7.19	1082	NM	0.26	-85.3	134	NM	CLOUDY, NO ODOR
14:15	39.31	150	1.1	12.7	7.19	1077	NM	0.15	-94.3	77.6	NM	CLOUDY, NO ODOR
14:20	39.56	150	1.2	12.6	7.2	1074	NM	0.14	-97.5	109	NM	CLEAR, NO ODOR
14:25	39.65	150	1.3	12.2	7.2	1075	NM	0.14	-102.4	107	NM	CLEAR, NO ODOR
14:30	39.71	150	1.4	12	7.2	1079	NM	0.13	-104.3	104	NM	CLEAR, NO ODOR

Sample ID(s): APW-02-WG-20240110	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
		Marshall Arendell 	01/29/2024 18:37
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-01R
Well Permit No:

Date: 2024/05/01
Sunny 83 Deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 52.26 (')	Reference Elevation 366.82 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 18.74 (') / None
Project Number	Sample Equipment NA	Total Well Depth 58.26 (')
Project Name 20240429-GWMonitor	Average Purge Rate 356.3 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 48.3 - 58.3 (')
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 18.48 (gal) / 3.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (')	Flow Rate (mL/min)	Purge Volume (')	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
17:08	18.74	350	0	19.9	6.46	320.7	NM	3.59	104.3	27.2	NM	Clear, no odor
17:13	18.74	400	0.5	19	6.61	610	NM	0.95	64.4	401	NM	Turbid brown, no odor
17:18	18.74	350	1	17.6	6.66	620	NM	0.92	52.6	231	NM	Turbid brown, no odor
17:23	18.74	350	1.5	17.5	6.7	624	NM	0.91	42.4	170	NM	Cloudy, no odor
17:28	18.74	350	2	17.5	6.71	629	NM	0.9	33.9	109	NM	Cloudy, no odor
17:33	18.74	350	2.5	17.5	6.73	632	NM	0.94	29.9	76.5	NM	Clear, no odor
17:38	18.74	350	3	17.5	6.74	633	NM	0.96	28.9	74.6	NM	Clear, no odor
17:43	18.74	350	3.5	17.4	6.74	633	NM	0.95	29.6	71.3	NM	Clear, no odor

Sample ID(s): APW-01R-WG-20240501	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:26
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-04
Well Permit No:


Date: 2024/05/01
Sunny, 80 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 55.27 (')	Reference Elevation 367.44 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 20.9 (') / None
Project Number	Sample Equipment NA	Total Well Depth 60.27 (')
Project Name 20240429-GWMonitor	Average Purge Rate 337.5 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 (')
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 21.08 (gal) / 5.5 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (')	Flow Rate (mL/min)	Purge Volume (')	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
15:52	20.9	700	0	17.3	7.03	577	NM	0.61	59.4	8.29	NM	Clear, no odor
15:57	20.9	300	0.5	18	7.1	575.1	NM	0.17	49.7	575	NM	Turbid brown, no odor
16:02	20.9	350	1	17.9	7.19	573.8	NM	0.15	42.8	495	NM	Turbid brown, no odor
16:07	20.9	300	1.5	18.3	7.2	570.8	NM	0.13	37	383	NM	Turbid brown, no odor
16:12	20.9	300	2	18	7.2	570.3	NM	0.1	32.6	254	NM	Turbid brown, no odor
16:17	20.9	300	2.5	18.1	7.2	568.4	NM	0.07	29.4	173	NM	Cloudy, no odor
16:22	20.9	300	3	18.3	7.2	567.2	NM	0.07	26.9	124	NM	Cloudy, no odor
16:27	20.9	300	3.5	18	7.21	568.3	NM	0.06	24.7	71.9	NM	Clear, no odor
16:32	20.9	300	4	18	7.21	568.5	NM	0.06	22.7	49.6	NM	Clear, no odor
16:37	20.9	300	4.5	17.8	7.21	567.2	NM	0.06	21	91.1	NM	Clear, no odor
16:42	20.9	300	5	17.7	7.21	567.2	NM	0.06	20.3	93.8	NM	Clear, no odor
16:47	20.9	300	5.5	17.9	7.22	566.3	NM	0.06	19.4	91.7	NM	Clear, no odor

Sample ID(s): APW-04-WG-20240501	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:30
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-05R
Well Permit No:

Date: 2024/05/01
Sunny 75 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.92 ()	Reference Elevation ()
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 12 () / None
Project Number	Sample Equipment NA	Total Well Depth 62.92 ()
Project Name 20240429-GWMonitor	Average Purge Rate 431.3 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / - ()
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 27.26 (gal) / 3.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
09:26	12.02	500	0	15.8	7.29	917	NM	1.97	25.4	184	NM	Cloudy, no odor
09:31	12.02	500	0.75	16.1	7.41	928	NM	0.49	-72.3	246	NM	Cloudy, no odor
09:36	12.02	400	1.25	16.3	7.42	933	NM	0.5	-97.9	70.1	NM	Clear, no odor
09:41	12.02	300	1.75	16.5	7.42	934	NM	0.52	-106.5	22.8	NM	Clear, no odor
09:46	12.02	250	2	16.6	7.41	936	NM	0.57	-111.5	18	NM	Clear, no odor
09:51	12.02	500	2.5	16.7	7.41	933	NM	0.14	-116.5	7.88	NM	Clear, no odor
09:56	12.02	500	3	16.9	7.43	936	NM	0.08	-124.6	8.92	NM	Clear, no odor
10:05	12.02	500	3.5	16.9	7.43	936	NM	0.08	-125.6	8.02	NM	Clear, no odor

Sample ID(s): APW-05R-WG-20240501,DUP-01-WG-20240501	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:31
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-06D
Well Permit No:


Date: 2024/05/01
Sunny 70 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 151.56 ()	Reference Elevation 363.69 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 15.11 () / None
Project Number	Sample Equipment NA	Total Well Depth 156.56 ()
Project Name 20240429-GWMonitor	Average Purge Rate 456.3 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 140 - 150 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 75.2 (gal) / 3.5 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
08:17	15.11	400	0	16.8	7.3	733	NM	8.22	7.8	65.8	NM	Clear, slight organic like odor
08:22	15.11	250	0.5	16.4	7.3	712	NM	2.51	-48.3	381	NM	Turbid gray, slight organic like odor
08:27	15.11	500	1	15.9	7.29	712	NM	0.25	-72.9	39.4	NM	Clear, slight organic like odor
08:32	15.11	500	1.5	15.6	7.29	718	NM	0.16	-84	24.1	NM	Clear, no odor
08:37	15.11	500	2	16	7.28	721	NM	0.13	-89.9	30.9	NM	Clear, no odor
08:42	15.11	500	2.5	16.1	7.29	722	NM	0.11	-94.1	37.7	NM	Clear, no odor
08:47	15.11	500	3	16.1	7.3	724	NM	0.11	-96.6	36.3	NM	Clear, no odor
08:52	15.11	500	3.5	16.1	7.3	725	NM	0.11	-97.3	35.8	NM	Clear, no odor

Sample ID(s): APW-06D-WG-20240501	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Clay Sansoucie 	05/05/2024 17:33



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-06S
Well Permit No:


Date: 2024/05/01
Sunny 70 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.9 (')	Reference Elevation 363.51 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 12.32 (') / None
Project Number	Sample Equipment NA	Total Well Depth 63.9 (')
Project Name 20240429-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 27.62 (gal) / 2 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (')	Flow Rate (mL/min)	Purge Volume (')	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
07:30	12.5	500	0	15.7	7.15	861	NM	4.3	-44.9	17.8	NM	Clear, no odor
07:35	12.5	500	0.5	15.6	7.13	890	NM	0.42	-95.6	8.22	NM	Clear, slight organic like odor
07:40	12.5	500	1	15.6	7.15	879	NM	0.24	-107.8	6.38	NM	Clear, slight organic like odor
07:45	12.5	500	1.5	15.5	7.15	877	NM	0.2	-115.8	4.43	NM	Clear, slight organic like odor
07:50	12.5	500	2	15.6	7.16	876	NM	0.2	-117.5	3.81	NM	Clear, slight organic like odor

Sample ID(s): APW-06S-WG-20240501	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:34
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-07
Well Permit No:

Date: 2024/04/30
Sunny 80 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.28 ()	Reference Elevation 360.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 15.27 () / None
Project Number	Sample Equipment NA	Total Well Depth 63.28 ()
Project Name 20240429-GWMonitor	Average Purge Rate 464.3 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 25.71 (gal) / 3 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
14:08	15.4	500	0	16.2	6.67	1148	NM	1.98	-48.4	137	NM	Clear, no odor
14:13	15.4	250	0.5	16.6	6.77	1144	NM	1.37	-64.4	79.1	NM	Clear, no odor
14:18	15.4	500	1	15.9	6.8	1145	NM	0.7	-70.9	34.2	NM	Clear, no odor
14:23	15.4	500	1.5	16.1	6.82	1143	NM	0.53	-75.8	12.6	NM	Clear, no odor
14:26	15.4	500	2	16.2	6.82	1142	NM	0.44	-78.1	7.04	NM	Clear, no odor
14:31	15.4	500	2.5	16.1	6.82	1144	NM	0.37	-79.6	3.77	NM	Clear, no odor
14:36	15.4	500	3	16.2	6.81	1145	NM	0.35	-80.5	3.34	NM	Clear, no odor

Sample ID(s): APW-07-WG-20240430	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:34
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-09
Well Permit No:

Date: 2024/04/30
Sunny 80 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.18 ()	Reference Elevation 366.84 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 24.02 () / None
Project Number	Sample Equipment NA	Total Well Depth 63.18 ()
Project Name 20240429-GWMonitor	Average Purge Rate 390.6 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 20.97 (gal) / 3.75 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
17:02	24.02	500	0	18.2	7.33	526.3	NM	3.09	77.6	138	NM	Clear, no odor
17:12	24.02	400	0.75	17.1	7.31	545.9	NM	0.17	58.4	347	NM	Cloudy, no odor
17:17	24.02	350	1.25	16.8	7.35	546.3	NM	0.08	49	170	NM	Cloudy, no odor
17:22	24.02	375	1.75	16.7	7.35	545.7	NM	0.07	43.5	38.7	NM	Clear, no odor
17:27	24.02	375	2.25	16.6	7.35	545.6	NM	0.05	38.9	14.8	NM	Clear, no odor
17:32	24.02	375	2.75	16.4	7.35	545.8	NM	0.05	34.8	9.21	NM	Clear, no odor
17:37	24.02	375	3.25	16.4	7.36	545.6	NM	0.05	30.6	7.9	NM	Clear, no odor
17:42	24.02	375	3.75	16.3	7.32	545.6	NM	0.05	30.7	5.69	NM	Clear, no odor

Sample ID(s): APW-09-WG-20240430,DUP-02-WG-20240430	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:36
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-10S
Well Permit No:

Date: 2024/04/30
Sunny 80 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.72 (')	Reference Elevation 359.47 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 12.08 (') / None
Project Number	Sample Equipment NA	Total Well Depth 62.72 (')
Project Name 20240429-GWMonitor	Average Purge Rate 371.9 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 27.11 (gal) / 3.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (')	Flow Rate (mL/min)	Purge Volume (')	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
15:06	12.48	400	0	16.6	7	1216	NM	0.48	-61.1	365	NM	Turbid gray, no odor
15:11	12.21	175	0.5	16.8	6.97	1215	NM	0.14	-112	1000	NM	Turbid gray, organic like odor
15:16	12.27	400	1	16.3	6.99	1215	NM	0.14	-125.8	457	NM	Turbid gray, organic like odor
15:21	12.27	400	1.5	16.3	6.99	1217	NM	0.12	-131.4	136	NM	Cloudy, organic like odor
15:26	12.27	400	2	16.3	6.98	1217	NM	0.11	-134.4	38.4	NM	Clear, organic like odor
15:31	12.27	400	2.5	16.2	6.98	1218	NM	0.08	-136.9	17.9	NM	Clear, organic like odor
15:36	12.27	400	3	16.3	6.98	1217	NM	0.08	-138.8	16.8	NM	Clear, organic like odor
15:41	12.27	400	3.5	16.3	6.98	1219	NM	0.08	-139.4	17.1	NM	Clear, organic like odor

Sample ID(s): APW-10S-WG-20240430	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:38
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-03
Well Permit No:


Date: 2024/04/30
Sunny 72 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 54.5 ()	Reference Elevation 365.79 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 22.32 () / None
Project Number	Sample Equipment NA	Total Well Depth 59.5 ()
Project Name 20240429-GWMonitor	Average Purge Rate 398.7 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler clay sansoucie / Marshall arendell	Volume of Water in Well / Total Volume Purged 19.91 (gal) / 3.5 ()	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
11:49	22.32	350	0	15.9	8.13	702	NM	2.44	99.9	26.9	NM	Clear, no odor
11:54	22.32	400	0.5	15.4	7.69	770	NM	0.24	-28.8	28.5	NM	Clear, no odor
11:59	22.32	371.2	1	15.5	7.69	778	NM	0.16	-81.7	20.9	NM	
12:04	22.32	400	1.5	15.5	7.71	776	NM	0.11	-98	10.2	NM	Clear, no odor
12:09	22.32	470	2.5	15.4	7.73	773	NM	0.1	-105.1	4.87	NM	Clear, no odor
12:14	22.32	400	3	15.4	7.71	771	NM	0.08	-111	2.67	NM	Clear, no odor
12:19	22.32	400	3.5	15.3	7.73	769	NM	0.08	-113.6	2.53	NM	Clear, no odor

Sample ID(s): APW-03-WG-20240430	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:27
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-02
Well Permit No:

Date: 2024/05/01
Sunny 75 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.27 (')	Reference Elevation 364.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 13.16 (') / None
Project Number	Sample Equipment NA	Total Well Depth 63.27 (')
Project Name 20240429-GWMonitor	Average Purge Rate 159.1 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 47.2 - 57.2 (')
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 24.15 (gal) / 1.3 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (')	Flow Rate (mL/min)	Purge Volume (')	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
10:52	14.96	250	0	21.3	7.04	1051	NM	2.25	51.2	26.8	NM	Clear, no odor
10:57	15.4	150	0.25	21.5	7.23	1027	NM	1.06	-69.1	796	NM	Turbid gray, no odor
11:02	17.24	150	0.5	22.3	7.2	1028	NM	1.1	-93.4	340	NM	Turbid gray, no odor
11:07	17.98	150	0.6	22.7	7.19	1026	NM	0.97	-97.2	303	NM	Turbid gray, no odor
11:12	18.44	150	0.7	23	7.18	1026	NM	0.98	-98.3	185	NM	Cloudy, no odor
11:17	18.87	150	0.8	23.1	7.17	1025	NM	1.09	-97.6	116	NM	Cloudy, no odor
11:22	19.27	150	0.9	23.4	7.17	1024	NM	0.98	-99.7	90.6	NM	Clear, no odor
11:27	19.55	150	1	24.1	7.16	1023	NM	0.87	-101.8	112	NM	Clear, no odor
11:32	19.79	150	1.1	24.7	7.23	1025	NM	0.8	-103.7	72.7	NM	Clear, no odor
11:37	20.02	150	1.2	24.7	7.34	1029	NM	0.79	-106.2	67.8	NM	Clear, no odor
11:42	20.19	150	1.3	24.7	7.25	1030	NM	0.79	-107	66.1	NM	Clear, no odor

Sample ID(s): APW-02-WG-20240501	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:26
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-08
Well Permit No:

Date: 2024/04/30
Sunny 80 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.03 ()	Reference Elevation 362.71 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 20.08 () / None
Project Number	Sample Equipment NA	Total Well Depth 62.03 ()
Project Name 20240429-GWMonitor	Average Purge Rate 386.1 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 22.46 (gal) / 4 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
12:57	20.08	350	0	21.9	7.54	541	NM	3.49	77.5	577	NM	Opaque, no odor
13:02	20.08	325	0.5	19.6	7.18	546.1	NM	0.1	-46.5	1000	NM	Turbid brown, no odor
13:07	20.08	400	1	18.8	7.21	540.8	NM	0.1	-43	873	NM	Turbid brown, no odor
13:12	20.08	400	1.5	18.8	7.24	540.6	NM	0.07	-40	535	NM	Turbid brown, no odor
13:17	20.08	400	2	18.7	7.27	533.4	NM	0.06	-37.4	314	NM	Turbid brown, no odor
13:22	20.08	400	2.5	18.6	7.26	532.8	NM	0.07	-36.4	207	NM	Cloudy, no odor
13:27	20.08	400	3	18.5	7.27	533	NM	0.05	-33.9	150	NM	Cloudy, no odor
13:32	20.08	400	3.5	18.7	7.25	531.7	NM	0.05	-32.3	147	NM	Cloudy, no odor
13:37	20.08	400	4	18.8	7.25	533.2	NM	0.05	-31.8	136	NM	Cloudy, no odor

Sample ID(s): APW-08-WG-20240430	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:35
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-10D
Well Permit No:

Date: 2024/04/30
Sunny 80 deg

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 93.14 ()	Reference Elevation 359.41 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 16.44 () / None
Project Number	Sample Equipment NA	Total Well Depth 98.14 ()
Project Name 20240429-GWMonitor	Average Purge Rate 428.6 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 86 - 96 (ft)
Sampler Clay Sansoucie/Marshall Arendell	Volume of Water in Well / Total Volume Purged 43.74 (gal) / 3.25 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW ()	Flow Rate (mL/min)	Purge Volume ()	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (uS/cm) ±3%	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(ppm) ±10%	Comments
16:01	16.44	600	0	17.1	7.12	624	NM	8.44	28	758	NM	Turbid gray, no odor
16:06	16.44	400	0.75	16.7	6.95	645	NM	0.3	7.3	NM	NM	Turbid gray, no odor
16:11	16.41	400	1.25	16.5	6.98	645	NM	0.2	3.1	551	NM	Turbid gray, no odor
16:16	16.4	400	1.75	16.5	6.98	647	NM	0.18	4.2	310	NM	Turbid gray, no odor
16:21	16.4	400	2.25	16.5	6.98	648	NM	0.13	5	200	NM	Cloudy, no odor
16:26	16.35	400	2.75	16.5	6.98	650	NM	0.12	6.3	207	NM	Cloudy, no odor
16:31	16.34	400	3.25	16.6	6.98	652	NM	0.12	6.3	198	NM	Cloudy, no odor

Sample ID(s): APW-10D-WG-20240430	Additional Comments	SAMPLER NAME AND SIGNATURE Clay Sansoucie 	Date Time 05/05/2024 17:37
Analysis:			



Low Flow Groundwater Sampling Field Data Form	Well ID: APW-01R Well Permit No:	Date: 2024/09/05
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Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 54.2 (ft)	Reference Elevation 366.82 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 30.8 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 59.2 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 48.3 - 58.3 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 4.63 (gal) / 4.5 (gal)	Well Construction

Well Head Vapor Measurements
 PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
15:22	30.8	450	0	18.7	6.27	0.3	NM	3.21	101.2	455	NM	TURBID, NO ODORS
15:27	30.8	450	0.5	16.8	6.34	0.3	NM	2.1	98.7	434	NM	TURBID, NO ODORS
15:32	30.8	450	1	16.6	6.49	0.3	NM	1.66	101.1	209	NM	TURBID, NO ODORS
15:37	30.8	450	1.5	16.7	6.6	0.3	NM	1.57	102.7	103	NM	CLOUDY, NO ODORS
15:42	30.8	450	2	16.6	6.6	0.3	NM	1.6	104.4	58.5	NM	CLOUDY, NO ODORS
15:47	30.8	450	2.5	16.3	6.64	0.3	NM	1.57	105.9	48.4	NM	CLOUDY, NO ODORS
15:52	30.8	450	3	16.5	6.65	0.3	NM	1.53	107.8	26.4	NM	CLEAR, NO ODORS
15:57	30.8	450	3.5	16.3	6.59	0.3	NM	1.52	110.2	19.6	NM	CLEAR, NO ODORS
16:02	30.8	450	4	16.3	6.54	0.3	NM	1.52	112.2	18.6	NM	CLEAR, NO ODORS
16:07	30.8	450	4.5	16.3	6.55	0.3	NM	1.51	113.6	19.2	NM	CLEAR, NO ODORS

Sample ID(s): APW-01R-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 18:00



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-02
Well Permit No:

Date: 2024/09/05

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 54.3 (ft)	Reference Elevation 364.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 28.5 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 59.3 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 193.8 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 47.2 - 57.2 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.03 (gal) / 1.3 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
10:05	31	250	0	18.7	7.07	0.6	NM	3	80.1	65.8	NM	CLEAR, NO ODOR
10:10	33.25	250	0.25	19.2	7.1	0.5	NM	2.72	38.7	1000	NM	TURBID, BROWN, NO ODOR
10:15	34.41	200	0.5	19.6	7.09	0.5	NM	2.48	31.6	416	NM	CLOUDY, NO ODORS
10:20	35.03	200	0.75	20.5	7.1	0.5	NM	2.28	26	307	NM	CLOUDY, NO ODORS
10:25	35.57	200	1	20.7	7.11	0.5	NM	1.66	27.5	410	NM	CLOUDY, NO ODORS
10:30	35.94	150	1.1	21.4	7.1	0.5	NM	1.43	33.4	177	NM	CLOUDY, NO ODORS
10:35	36.18	150	1.2	21.7	7.1	0.5	NM	1.36	39.1	171	NM	CLOUDY, NO ODORS
10:40	36.59	150	1.3	21.9	7.1	0.5	NM	1.28	40.5	174	NM	CLOUDY, NO ODORS

Sample ID(s): APW-02-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 19:46



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-03
Well Permit No:

Date: 2024/09/04

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 55.8 (ft)	Reference Elevation 365.79 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 29.95 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 60.8 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.03 (gal) / 2.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
14:25	29.95	450	0	16.2	7.47	0.7	NM	2.59	83.2	54.8	NM	CLEAR, NO ODORS
14:30	29.95	450	0.5	15.4	7.85	0.7	NM	0.52	7.9	10.7	NM	CLEAR, NO ODORS
14:35	29.95	450	1	15.5	7.86	0.6	NM	0.37	10.1	4.32	NM	CLEAR, NO ODORS
14:40	29.95	450	1.5	15.6	7.87	0.6	NM	0.3	11.6	2.87	NM	CLEAR, NO ODORS
14:45	29.95	450	2	15.4	7.87	0.6	NM	0.25	16.9	2.14	NM	CLEAR, NO ODORS
14:50	29.95	450	2.5	15.3	7.88	0.6	NM	0.22	16.3	1.94	NM	CLEAR, NO ODORS

Sample ID(s): APW-03-WG-20240904	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 19:54



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-04
Well Permit No:

Date: 2024/09/04

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 56.3 (ft)	Reference Elevation 367.44 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 31.41 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 61.3 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 4.88 (gal) / 3 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
17:40	31.41	500	0	18	7.09	0.4	NM	1.27	111.4	230	NM	CLOUDY, NO ODORS
17:45	31.41	500	0.5	17.6	7.16	0.4	NM	0.5	106	110	NM	CLOUDY, NO ODORS
17:50	31.41	500	1	17.6	7.17	0.4	NM	0.21	108.7	57.1	NM	CLOUDY, NO ODORS
17:55	31.41	500	1.5	17.5	7.17	0.4	NM	0.14	110.7	43.1	NM	CLOUDY, NO ODORS
18:00	31.41	500	2	17.4	7.17	0.4	NM	0.11	112.1	33.6	NM	CLOUDY, NO ODORS
18:05	31.41	500	2.5	17.5	7.17	0.4	NM	0.1	112.9	30.6	NM	CLOUDY, NO ODORS
18:10	31.41	500	3	17.5	7.17	0.4	NM	0.09	113.4	30.2	NM	CLOUDY, NO ODORS

Sample ID(s): APW-04-WG-20240904	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 20:06



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-05R
Well Permit No:

Date: 2024/09/05

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 58.5 (ft)	Reference Elevation ()
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 30.5 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.5 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / - ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.39 (gal) / 4.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
11:43	30.5	450	0	17.9	7.48	0.4	NM	2.01	114.1	805	NM	TURBID, LIGHT BROWN, NO ODORS
11:48	30.5	450	0.5	17.3	7.4	0.4	NM	1.05	78.7	579	NM	TURBID, LIGHT BROWN, NO ODORS
11:53	30.5	450	1	17.4	7.44	0.4	NM	0.74	62.7	413	NM	TURBID, LIGHT BROWN, NO ODORS
11:58	30.5	450	1.5	17.3	7.5	0.4	NM	0.52	52.1	301	NM	TURBID, LIGHT BROWN, NO ODORS
12:03	30.5	450	2	17.3	7.5	0.4	NM	0.24	45.5	160	NM	CLOUDY, LIGHT BROWN, NO ODORS
12:08	30.5	450	2.5	17.3	7.5	0.4	NM	0.26	40.2	94.8	NM	CLOUDY, LIGHT BROWN, NO ODORS
12:13	30.5	450	3	17.4	7.52	0.4	NM	0.21	35.6	67.1	NM	CLEAR, NO ODORS
12:18	30.5	450	3.5	17.4	7.5	0.4	NM	0.2	33.1	59.5	NM	CLEAR, NO ODORS
12:23	30.5	450	4	17.4	7.53	0.4	NM	0.07	27.7	62.1	NM	CLEAR, NO ODORS
12:28	30.5	450	4.5	17.3	7.53	0.4	NM	0.07	24.4	64.1	NM	CLEAR, NO ODORS

Sample ID(s): APW-05R-WG-20240905,DUP-01-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 21:18



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-06D
Well Permit No:

Date: 2024/09/05

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 153.05 (ft)	Reference Elevation 363.69 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 28.45 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 158.05 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 140 - 150 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 21.15 (gal) / 2.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
08:45	28.47	450	0	15.7	7.25	0.5	NM	4.03	68.1	33.9	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:50	28.47	450	0.5	16.5	7.23	0.5	NM	0.87	55.3	190	NM	CLOUDY, ROTTEN EGG-LIKE ODOR
08:55	28.47	450	1	15.5	7.21	0.5	NM	0.2	48.9	70.6	NM	CLOUDY, ROTTEN EGG-LIKE ODOR
09:00	28.47	450	1.5	15.4	7.21	0.5	NM	0.1	44.1	23.1	NM	CLOUDY, ROTTEN EGG-LIKE ODOR
09:05	28.47	450	2	15.6	7.21	0.5	NM	0.07	38.9	23.2	NM	CLOUDY, ROTTEN EGG-LIKE ODOR
09:10	28.47	450	2.5	15.6	7.21	0.5	NM	0.07	36.9	21.8	NM	CLOUDY, ROTTEN EGG-LIKE ODOR

Sample ID(s): APW-06D-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 20:24



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-06S
Well Permit No:

Date: 2024/09/05

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 59.62 (ft)	Reference Elevation 363.51 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 29.77 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 64.62 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.69 (gal) / 2.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
07:52	30.09	450	0	16.1	7.12	0.5	NM	0.89	94.6	258	NM	CLOUDY, NO ODORS
07:57	30.1	450	0.5	14.6	7.05	0.5	NM	0.16	37.8	9.61	NM	CLEAR, NO ODORS
08:02	30.1	450	1	14.6	7.06	0.5	NM	0.13	18.8	7.83	NM	CLEAR, NO ODORS
08:07	30.1	450	1.5	14.6	7.06	0.5	NM	0.13	10.2	9.3	NM	CLEAR, NO ODORS
08:12	30.1	450	2	14.6	7.07	0.5	NM	0.12	4	7.5	NM	CLEAR, NO ODORS
08:17	30.1	450	2.5	14.6	7.07	0.5	NM	0.11	0.4	5.09	NM	CLEAR, NO ODORS

Sample ID(s): APW-06S-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 20:45



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-07
Well Permit No:

Date: 2024/09/04

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 59.45 (ft)	Reference Elevation 360.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 25.96 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 64.45 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 6.28 (gal) / 2 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
16:35	26.14	450	0	19.5	6.83	0.6	NM	1.64	101.4	105	NM	CLOUDY, ROTTEN EGG-LIKE ODOR
16:40	26.19	450	0.5	15.6	6.76	0.5	NM	0.1	48.8	33.3	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:45	26.19	450	1	15.7	6.76	0.5	NM	0.07	35.8	9.31	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:50	26.19	450	1.5	15.6	6.75	0.5	NM	0.07	29.9	7.16	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:55	26.19	450	2	15.7	6.75	0.5	NM	0.09	26.3	5.27	NM	CLEAR, ROTTEN EGG-LIKE ODOR

Sample ID(s): APW-07-WG-20240904	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 20:57



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-08
Well Permit No:

Date: 2024/09/04

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 58.34 (ft)	Reference Elevation 362.71 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 26.55 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.34 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 450 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 6 (gal) / 2.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
15:48	26.47	450	0	17.3	7	0.5	NM	1.28	99.9	1000	NM	TURBID, BROWN, NO ODORS
15:53	26.47	450	0.5	16.6	6.99	0.5	NM	0.23	93.9	379	NM	CLOUDY, BROWN, NO ODORS
15:58	26.47	450	1	16.6	6.97	0.4	NM	0.09	98.5	222	NM	CLOUDY, BROWN, NO ODORS
16:03	26.47	450	1.5	16.7	6.97	0.4	NM	0.07	102.7	104	NM	CLOUDY, BROWN, NO ODORS
16:08	26.47	450	2	16.7	6.95	0.4	NM	0.05	104.6	101	NM	CLOUDY, BROWN, NO ODORS
16:13	26.47	450	2.5	16.7	6.95	0.4	NM	0.07	106.4	97.4	NM	CLOUDY, BROWN, NO ODORS

Sample ID(s): APW-08-WG-20240904	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 21:04



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-09
Well Permit No:

Date: 2024/09/06

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 59.18 (ft)	Reference Elevation 366.84 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 30.57 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 64.18 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.49 (gal) / 3 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
08:20	30.57	500	0	17	7.35	0.3	NM	0.73	128.7	246	NM	CLOUDY, NO ODORS
08:25	30.57	500	0.5	15.5	7.17	0.3	NM	0.21	125.3	129	NM	CLOUDY, NO ODORS
08:30	30.57	500	1	15.4	7.15	0.3	NM	0.19	127.1	55	NM	CLEAR, NO ODORS
08:35	30.57	500	1.5	15.2	7.13	0.3	NM	0.15	128.5	16.7	NM	CLEAR, NO ODORS
08:40	30.57	500	2	15.3	7.12	0.3	NM	0.1	129.1	15.2	NM	CLEAR, NO ODORS
08:45	30.57	500	2.5	15.3	7.12	0.3	NM	0.08	129.7	14.1	NM	CLEAR, NO ODORS
08:50	30.57	500	3	15.3	7.11	0.3	NM	0.07	130.4	13.8	NM	CLEAR, NO ODORS

Sample ID(s): APW-09-WG-20240906,DUP-02-WG-20240906	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell 	09/11/2024 21:16



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-10D
Well Permit No:

Date: 2024/09/05

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 95.05 (ft)	Reference Elevation 359.41 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 23.1 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 100.05 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 86 - 96 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 12.56 (gal) / 4.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
13:25	23.1	500	0	19.9	7.22	0.4	NM	2.2	122.6	61.4	NM	CLOUDY, NO ODORS
13:30	23.1	500	0.5	18.2	7.15	0.4	NM	0.26	117.9	1000	NM	TURBID, WHITE, NO ODORS
13:35	23.1	500	1	16	7.1	0.3	NM	0.11	123.9	484	NM	TURBID, WHITE, NO ODORS
13:40	23.1	500	1.5	15.8	7.13	0.3	NM	0.08	128.3	237	NM	TURBID, WHITE, NO ODORS
13:45	23.1	500	2	15.8	7.13	0.3	NM	0.07	131.1	48.1	NM	CLOUDY, NO ODORS
13:50	23.1	500	2.5	15.8	7.04	0.3	NM	0.07	132.3	18.4	NM	CLEAR, NO ODORS
13:55	23.1	500	3	15.8	7.03	0.3	NM	0.06	133.1	11.2	NM	CLEAR, NO ODORS
14:00	23.1	500	3.5	15.8	7.02	0.3	NM	0.06	133.3	7.19	NM	CLEAR, NO ODORS
14:05	23.1	500	4	15.8	7.03	0.3	NM	0.06	133.7	6.05	NM	CLEAR, NO ODORS
14:10	23.1	500	4.5	15.8	7.03	0.3	NM	0.05	133.6	5.56	NM	CLEAR, NO ODORS

Sample ID(s): APW-10D-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 21:29



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-10S
Well Permit No:

Date: 2024/09/05

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low Flow / 58.65 (ft)	Reference Elevation 359.47 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 26.09 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.65 (ft)
Project Name 20240429-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 6.13 (gal) / 2.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
14:29	26.65	500	0	16.1	6.81	0.5	NM	0.46	77.1	204	NM	CLOUDY, NO ODORS
14:34	26.79	500	0.5	15.7	6.77	0.5	NM	0.21	19.3	68.6	NM	CLOUDY, NO ODORS
14:39	26.84	500	1	15.7	6.72	0.4	NM	0.17	-3.9	23.5	NM	CLEAR, NO ODORS
14:44	26.84	500	1.5	15.7	6.73	0.4	NM	0.14	-15.6	8.98	NM	CLEAR, NO ODORS
14:49	26.9	500	2	15.6	6.75	0.4	NM	0.13	-20.2	9.33	NM	CLEAR, NO ODORS
14:54	26.9	500	2.5	15.6	6.75	0.4	NM	0.13	-22.9	9.12	NM	CLEAR, NO ODORS

Sample ID(s): APW-10S-WG-20240905	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell	09/11/2024 21:51



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-01R
Well Permit No:


Date: 2024/10/15

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 54.03 (ft)	Reference Elevation 366.82 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 35.75 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 59.03 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 48.3 - 58.3 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 3.8 (gal) / 3 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
17:45	35.75	500	0	15	6.4	366	NM	2.36	22.3	309	NM	TRANSLUCENT, NO ODOR
17:50	35.7	500	0.25	15.7	6.43	480	NM	2.61	30.8	200	NM	TRANSLUCENT, NO ODOR
17:55	35.7	500	0.5	15.8	6.49	521	NM	3.5	30.1	95.3	NM	TRANSLUCENT, NO ODOR
18:00	35.7	500	1	15.9	6.5	539	NM	4.45	29.5	34.7	NM	TRANSLUCENT, NO ODOR
18:05	35.7	500	1.5	16	6.52	543	NM	5.87	29.8	23.5	NM	TRANSLUCENT, NO ODOR
18:10	35.7	500	2	16.1	6.52	542	NM	5.87	29.6	17.5	NM	TRANSLUCENT, NO ODOR
18:15	35.7	500	2.5	16.1	6.52	545	NM	5.84	29.7	16.9	NM	TRANSLUCENT, NO ODOR
18:20	35.7	500	3	16.2	6.52	547	NM	5.81	29.8	16.8	NM	TRANSLUCENT, NO ODOR

Sample ID(s): APW-01R-WG-20241015	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 15:38
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-02
Well Permit No:

Date: 2024/10/15

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 54.03 (ft)	Reference Elevation 364.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 34.4 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 59.03 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 200 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 47.2 - 57.2 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 4.02 (gal) / 1.1 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
12:53	39	200	0	15.5	7.23	1025	NM	4.23	53.8	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
12:58	40.1	200	0.25	16.5	7.19	1034	NM	2.07	-11	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
13:03	40.25	200	0.5	16.8	7.16	1029	NM	2.32	-27.1	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
13:08	40.65	200	0.6	17.6	7.15	1026	NM	2.14	-37	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
13:13	42.4	200	0.7	17.2	7.14	1023	NM	2.23	-51.8	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
13:18	45.4	200	0.8	17.7	7.14	1011	NM	2.27	-50.4	545	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
13:23	47.8	200	0.9	18.5	7.13	1015	NM	2.16	-51.6	665	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
13:28	48.65	200	1	17.6	7.16	1019	NM	2.05	-52.7	673	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
13:33	50.1	200	1.1	18.8	7.18	1024	NM	2.01	-61.6	663	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR

Sample ID(s): APW-02-WG-20241015	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 15:39
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-03
Well Permit No:


Date: 2024/10/16

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 55.27 (ft)	Reference Elevation 365.79 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 34.8 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 60.27 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 4.16 (gal) / 4 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
14:10	34.75	500	0	15.3	7.77	730	NM	1.14	23.4	43.1	NM	TRANSLUCENT, GREY, NO ODOR
14:15	34.75	500	0.25	16.2	7.96	753	NM	0.23	-7.5	23.9	NM	CLEAR, NO ODOR
14:20	34.75	500	0.5	17.1	7.99	757	NM	0.16	-49	17.9	NM	CLEAR, NO ODOR
14:25	34.75	500	1	16.8	7.99	754	NM	0.16	-67.8	13.9	NM	CLEAR, NO ODOR
14:30	34.75	500	1.5	16.8	7.98	756	NM	0.16	-89.4	11.8	NM	CLEAR, NO ODOR
14:35	34.75	500	2	16.8	7.99	753	NM	0.14	-105.9	8.67	NM	CLEAR, NO ODOR
14:40	34.75	500	2.5	17	7.98	756	NM	0.11	-117.1	6.37	NM	CLEAR, NO ODOR
14:45	34.75	500	3	17.1	7.99	754	NM	0.13	-125.1	4.98	NM	CLEAR, NO ODOR
14:50	34.75	500	3.5	17	7.98	755	NM	0.14	-130.9	4.84	NM	CLEAR, NO ODOR
14:55	34.75	500	4	17	8	753	NM	0.15	-134	4.48	NM	CLEAR, NO ODOR

Sample ID(s): APW-03-WG-20241016	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:32
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-04
Well Permit No:

Date: 2024/10/17

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 55.77 (ft)	Reference Elevation 367.44 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 36.35 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 60.77 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 460 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 45.7 - 55.7 ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 3.99 (gal) / 1.5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
08:20	36.4	300	0	14.7	7.29	559	NM	1.02	-37.5	1000	NM	OPAQUE, BROWN, NO ODOR
08:25	36.4	500	0.25	16	7.18	578	NM	0.41	-27.6	235	NM	TRANSLUCENT, BROWN, NO ODOR
08:30	36.4	500	0.5	15.8	7.16	597	NM	0.39	-20.3	96.3	NM	CLEAR, NO ODOR
08:35	36.4	500	1	15.8	7.14	604	NM	0.49	-17.7	98.9	NM	CLEAR, NO ODOR
08:40	36.4	500	1.5	15.8	7.15	606	NM	0.43	-15.7	91.4	NM	CLEAR, NO ODOR

Sample ID(s): APW-04-WG-20241017	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:33
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-05R
Well Permit No:

Date: 2024/10/16

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 58.5 (ft)	Reference Elevation ()
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 34.65 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 63.5 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / - ()
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 4.71 (gal) / 5 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
11:25	34.65	500	0	16.3	7.33	474	NM	0.67	41.3	156	NM	TRANSLUCENT, ROTTEN EGG-LIKE ODOR
11:30	34.65	500	0.25	16.7	7.36	469	NM	0.32	34.9	310	NM	TRANSLUCENT, ROTTEN EGG-LIKE ODOR
11:35	34.7	500	0.5	17	7.34	452	NM	0.21	40.3	109	NM	TRANSLUCENT, NO ODOR
11:40	34.7	500	1	16.7	7.33	455	NM	0.21	43.8	76.5	NM	TRANSLUCENT, NO ODOR
11:45	34.7	500	1.5	17	7.32	395	NM	0.23	46.8	60.9	NM	CLEAR, NO ODOR
11:50	34.7	500	2	17.1	7.33	321	NM	0.29	47.4	54.2	NM	CLEAR, NO ODOR
11:55	34.7	500	2.5	17.2	7.32	346	NM	0.27	44.3	42.9	NM	CLEAR, NO ODOR
12:00	34.7	500	3	17.6	7.32	847	NM	0.2	10.1	61.5	NM	CLEAR, NO ODOR
12:05	34.7	500	3.5	17.5	7.33	845	NM	0.15	-34.3	37	NM	CLEAR, NO ODOR
12:10	34.7	500	4	17.2	7.32	841	NM	0.13	-96.9	26.2	NM	CLEAR, NO ODOR
12:15	34.7	500	4.5	17.3	7.33	840	NM	0.13	-101.2	24.3	NM	CLEAR, NO ODOR
12:20	34.7	500	5	17.3	7.34	828	NM	0.11	-101.6	23.4	NM	CLEAR, NO ODOR

Sample ID(s): APW-05R-WG-20241016,DUP-01-WG-20241016	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:37
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-06D
Well Permit No:


Date: 2024/10/16

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 152.56 (ft)	Reference Elevation 363.69 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 33.4 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 157.56 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 455 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 140 - 150 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 20.26 (gal) / 4 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
08:25	33.4	500	0	13.2	7.3	756	NM	4.27	-19.2	15.1	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:30	33.4	450	0.25	13.9	7.26	779	NM	1.31	-29.9	85.7	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:35	33.4	450	0.5	14.3	7.24	785	NM	0.7	-37.4	76.4	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:40	33.4	450	1	14.7	7.24	787	NM	0.66	-46.6	44.9	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:45	33.4	450	1.5	14.6	7.24	787	NM	0.69	-50.4	28.5	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:50	33.4	450	2	14.4	7.25	784	NM	0.5	-53.8	18.7	NM	CLEAR, ROTTEN EGG-LIKE ODOR
08:55	33.4	450	2.5	14.6	7.24	789	NM	0.39	-55.2	20.3	NM	CLEAR, ROTTEN EGG-LIKE ODOR
09:00	33.4	450	3	15.1	7.24	789	NM	0.32	-61.7	9.91	NM	CLEAR, SLIGHT ROTTEN EGG-LIKE ODOR
09:05	33.4	450	3.5	15	7.24	788	NM	0.27	-65.8	8.83	NM	CLEAR, SLIGHT ROTTEN EGG-LIKE ODOR
09:10	33.4	450	4	15.2	7.24	788	NM	0.24	-70.6	8.39	NM	CLEAR, SLIGHT ROTTEN EGG-LIKE ODOR

Sample ID(s): APW-06D-WG-20241016	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:35
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-06S
Well Permit No:

Date: 2024/10/15

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 59.8 (ft)	Reference Elevation 363.51 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 33.53 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 64.8 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 414.3 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.1 (gal) / 2 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
10:00	33.65	300	0	15.1	7.12	857	NM	1.37	-43.9	211	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
10:05	33.8	300	0.25	14.8	7.1	888	NM	1.06	-62.1	79.5	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
10:10	33.85	300	0.5	15.3	7.09	882	NM	0.93	-70.7	27.8	NM	CLEAR, ROTTEN EGG-LIKE ODOR
10:15	33.85	500	0.75	15.4	7.09	883	NM	0.48	-85.2	13.8	NM	CLEAR, ROTTEN EGG-LIKE ODOR
10:20	33.85	500	1	15.3	7.1	885	NM	0.18	-95.9	5.19	NM	CLEAR, ROTTEN EGG-LIKE ODOR
10:25	33.85	500	1.5	15.5	7.1	883	NM	0.17	-102.3	4.08	NM	CLEAR, NO ODOR
10:30	33.85	500	2	15.5	7.1	883	NM	0.15	-105.4	5.72	NM	CLEAR, NO ODOR

Sample ID(s): APW-06S-WG-20241016	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:36
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-07
Well Permit No:


Date: 2024/10/16

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 59.28 (ft)	Reference Elevation 360.61 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 30.58 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 64.28 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.5 (gal) / 3.5 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
17:05	30.58	500	0	15.1	6.7	1218	NM	0.3	-8.3	39.1	NM	CLEAR, NO ODOR
17:10	30.58	500	0.5	16.2	6.72	1211	NM	0.49	-31.4	38.6	NM	CLEAR, NO ODOR
17:15	30.58	500	1	16.2	6.74	1209	NM	0.26	-43.7	27.7	NM	CLEAR, NO ODOR
17:20	30.58	500	1.5	16.1	6.72	1209	NM	0.2	-51.5	17.9	NM	CLEAR, NO ODOR
17:25	30.58	500	2	16.3	6.73	1208	NM	0.19	-55.8	14.2	NM	CLEAR, NO ODOR
17:30	30.58	500	2.5	16.5	6.71	1209	NM	0.18	-59.9	9.51	NM	CLEAR, NO ODOR
17:35	30.58	500	3	16.5	6.73	1205	NM	0.17	-63.1	6.54	NM	CLEAR, NO ODOR
17:40	30.58	500	3.5	16.5	6.73	1205	NM	0.15	-64.4	6.88	NM	CLEAR, NO ODOR

Sample ID(s): APW-07-WG-20241016	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell 	10/22/2024 21:39



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-08
Well Permit No:


Date: 2024/10/16

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.7 (ft)	Reference Elevation 362.71 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 31.25 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 62.7 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 500 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.13 (gal) / 5.5 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
15:30	31.25	500	0	16.4	7.03	643	NM	1.79	1.9	1000	NM	OPAQUE, TAN, NO ODOR
15:35	31.25	500	1	17	6.99	657	NM	0.83	-10.6	521	NM	OPAQUE, TAN, NO ODOR
15:40	31.25	500	1.5	16.9	6.98	657	NM	0.39	-11.8	338	NM	OPAQUE, TAN, NO ODOR
15:45	31.25	500	2	17	6.98	658	NM	0.64	-14.9	243	NM	OPAQUE, TAN, NO ODOR
15:50	31.25	500	2.5	17	6.97	656	NM	0.35	-15.9	155	NM	TRANSLUCENT, TAN, NO ODOR
15:55	31.25	500	3	17.1	6.98	655	NM	0.25	-14.1	126	NM	TRANSLUCENT, TAN, NO ODOR
16:00	31.25	500	3.5	17	6.96	654	NM	0.24	-16	77	NM	TRANSLUCENT, TAN, NO ODOR
16:05	31.25	500	4	17.1	6.99	654	NM	0.21	-16.3	64.6	NM	TRANSLUCENT, TAN, NO ODOR
16:10	31.25	500	4.5	16.9	6.97	651	NM	0.19	-16	51.1	NM	TRANSLUCENT, TAN, NO ODOR
16:15	31.25	500	5	16.8	6.97	648	NM	0.25	-15.9	48.4	NM	CLEAR, NO ODOR
16:20	31.25	500	5.5	16.9	6.97	645	NM	0.22	-16	47.5	NM	CLEAR, NO ODOR

Sample ID(s): APW-08-WG-20241016	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:40
Analysis:			



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-09
Well Permit No:

Date: 2024/10/17

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 59.05 (ft)	Reference Elevation 366.84 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 35.26 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 64.05 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 400 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell, bre houska, emma portell	Volume of Water in Well / Total Volume Purged 4.7 (gal) / 3.5 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
09:10	35.26	400	0	12.1	7.48	535	NM	5.67	6.4	222	NM	CLOUDY, NO ODOR
09:15	35.26	400	0.5	14.9	7.3	551	NM	2.15	-5.1	103	NM	CLOUDY, NO ODOR
09:20	35.26	400	1	15	7.28	553.9	NM	0.83	-5.3	39.9	NM	CLEAR, NO ODOR
09:25	35.26	400	1.5	15	7.27	554	NM	0.5	-5.8	20.9	NM	CLEAR, NO ODOR
09:30	35.26	400	2	15.1	7.27	553.9	NM	0.4	-6.4	17.9	NM	CLEAR, NO ODOR
09:35	35.26	400	2.5	15.2	7.27	554	NM	0.29	-7.7	16.5	NM	CLEAR, NO ODOR
09:40	35.26	400	3	15.3	7.27	553.5	NM	0.38	-8.4	15.3	NM	CLEAR, NO ODOR
09:45	35.26	400	3.5	15.9	7.27	554.2	NM	0.35	-9.4	13.9	NM	CLEAR, NO ODOR

Sample ID(s): APW-09-WG-20241017,DUP-02-WG-20241017	Additional Comments	SAMPLER NAME AND SIGNATURE	Date Time
Analysis:		Marshall Arendell 	10/22/2024 21:41



Low Flow Groundwater Sampling Field Data Form

Well ID: APW-10D
Well Permit No:


Date: 2024/10/15

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 94.26 (ft)	Reference Elevation 359.41 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 27.25 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 99.26 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 318.2 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 86 - 96 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 11.75 (gal) / 2.5 (gal)	Well Construction

Well Head Vapor Measurements

PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
14:40	27.28	500	0	15	7.09	676	NM	1.9	34.6	154	NM	TRANSLUCENT, NO ODOR
14:45	27.25	250	0.25	15.2	7.09	679	NM	0.7	16.5	418	NM	OPAQUE, GREY, , NO ODOR
14:50	27.25	250	0.5	15.3	7.07	684	NM	0.52	12.8	213	NM	TRANSLUCENT, GREY, NO ODOR
14:55	27.25	250	0.75	15.4	7.05	687	NM	0.51	9.5	172	NM	TRANSLUCENT, GREY, NO ODOR
15:00	27.25	250	1	15.4	7.05	691	NM	1.07	7.3	152	NM	TRANSLUCENT, GREY, NO ODOR
15:05	27.25	250	1.25	15.4	7.04	694	NM	0.78	5.8	107	NM	TRANSLUCENT, GREY, NO ODOR
15:10	27.25	350	1.5	15.4	7.04	695	NM	0.67	4.8	92.5	NM	TRANSLUCENT, GREY, NO ODOR
15:15	27.25	350	1.75	15.4	7.03	698	NM	0.5	3.7	75.5	NM	TRANSLUCENT, GREY, NO ODOR
15:20	27.25	350	2	15.4	7.03	700	NM	0.49	2.9	49.1	NM	TRANSLUCENT, GREY, NO ODOR
15:25	27.25	350	2.25	15.4	7.03	699	NM	0.47	2.2	43.5	NM	CLEAR, NO ODOR
15:30	27.25	350	2.5	15.4	7.02	700	NM	0.49	2.1	45.3	NM	CLEAR, NO ODOR

Sample ID(s): APW-10D-WG-20241015	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:42
Analysis:			



Low Flow Groundwater Sampling Field Data Form


Well ID: APW-10S
Well Permit No:

Date: 2024/10/15

Site ID GTEC-GRAND-TOWER	Purge Method / Pump Intake Depth Low_Flow / 57.73 (ft)	Reference Elevation 359.47 (ft)
Site Address 1820 Power Plant Road, Grand Tower, US-IL	Purge Equipment NA	Depth to Water / Free Product 28.95 (ft) / None
Project Number 0599247	Sample Equipment NA	Total Well Depth 62.73 (ft)
Project Name 20241015-GWMonitor	Average Purge Rate 475 (mL/min)	Well Diameter / Well Screen Interval 2 (in) / 50 - 60 (ft)
Sampler marshall arendell	Volume of Water in Well / Total Volume Purged 5.51 (gal) / 2.25 (gal)	Well Construction

Well Head Vapor Measurements
PID: NA; FID: NA; CO: NA; CO2: NA; O2: NA; CH4: NA; H2S: NA

Time	DTW (ft)	Flow Rate (mL/min)	Purge Volume (gal)	Temperature (C) ±3%	pH ±0.1pH units	Specific Conductivity (uS/cm) ±3%	Total Conductivity (NA)	Dissolved Oxygen (mg/L) ±10%	ORP (mV) ±10 mV	Turbidity (NTU) ±10%	Total Dissolved Solids(NA)	Comments
16:10	29.1	250	0	16	6.96	1274	NM	1.2	-62	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
16:15	29.3	500	0.25	16.9	6.94	1276	NM	1.05	-73.5	1000	NM	OPAQUE, GREY, ROTTEN EGG-LIKE ODOR
16:20	29.3	500	0.5	16.7	6.95	1268	NM	0.59	-106.7	154	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
16:25	29.5	500	0.75	16.5	6.95	1258	NM	0.53	-111.9	142	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
16:30	29.5	500	1	16.1	6.95	1253	NM	0.46	-115	219	NM	TRANSLUCENT, GREY, ROTTEN EGG-LIKE ODOR
16:35	29.45	500	1.25	16.4	6.94	1261	NM	0.42	-119.2	64.3	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:40	29.45	500	1.5	16.3	6.95	1264	NM	0.34	-122.7	38.8	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:45	29.55	500	1.75	16.1	6.95	1272	NM	0.3	-125.7	21.2	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:50	29.55	500	2	16.1	6.95	1260	NM	0.25	-128.3	20.8	NM	CLEAR, ROTTEN EGG-LIKE ODOR
16:55	29.55	500	2.25	16.1	6.94	1275	NM	0.23	-128.8	20.4	NM	CLEAR, ROTTEN EGG-LIKE ODOR

Sample ID(s): APW-10S-WG-20241015	Additional Comments	SAMPLER NAME AND SIGNATURE Marshall Arendell 	Date Time 10/22/2024 21:45
Analysis:			



APPENDIX C LABORATORY ANALYTICAL

ERM - St. Louis, MO

Sample Delivery Group: L1696247
Samples Received: 01/13/2024
Project Number: 0599247
Description: Grand Tower Energy Center Groundwater 1Q24 Sampling
Report To: Randy Homburg
1968 Craig Road, Suite 100
Saint Louis, MO 63146

Entire Report Reviewed By:



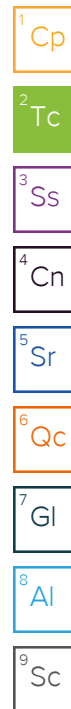
Jeff Carr
Project Manager

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Pace Analytical National12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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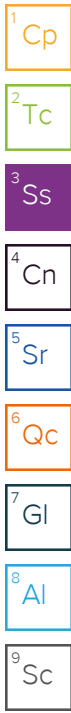


SAMPLE SUMMARY

APW-03-WG-20240111 L1696247-01 GW

Collected by: Marshall A
 Collected date/time: 01/11/24 14:50
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/13/24 22:56	01/13/24 22:56	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 20:59	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:03	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 12:16	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:16	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:01	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:09	LD	Mt. Juliet, TN



APW-08-WG-20240111 L1696247-02 GW

Collected by: Marshall A
 Collected date/time: 01/11/24 13:30
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/13/24 23:27	01/13/24 23:27	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:02	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:12	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 12:19	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:20	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:04	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:12	LD	Mt. Juliet, TN

APW-07-WG-20240111 L1696247-03 GW

Collected by: Marshall A
 Collected date/time: 01/11/24 11:55
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 00:15	01/14/24 00:15	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:04	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:14	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 12:58	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:23	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	5	01/18/24 15:05	01/28/24 19:06	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:07	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:15	LD	Mt. Juliet, TN

APW-10S-WG-20240111 L1696247-04 GW

Collected by: Marshall A
 Collected date/time: 01/11/24 10:40
 Received date/time: 01/13/24 09:00

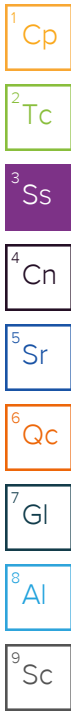
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 00:47	01/14/24 00:47	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:07	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:17	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:01	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:26	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	5	01/18/24 15:05	01/28/24 19:16	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:10	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:18	LD	Mt. Juliet, TN

SAMPLE SUMMARY

APW-10D-WG-20240111 L1696247-05 GW

Collected by: Marshall A
 Collected date/time: 01/11/24 09:20
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 01:03	01/14/24 01:03	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:09	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:19	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:05	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:37	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	5	01/18/24 15:05	01/28/24 19:19	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:14	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:28	LD	Mt. Juliet, TN



APW-06S-WG-20240110 L1696247-06 GW

Collected by: Marshall A
 Collected date/time: 01/10/24 10:15
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 01:19	01/14/24 01:19	GEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	10	01/14/24 01:35	01/14/24 01:35	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:12	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:22	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 11:56	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:03	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:17	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:32	LD	Mt. Juliet, TN

APW-06D-WG-20240110 L1696247-07 GW

Collected by: Marshall A
 Collected date/time: 01/10/24 11:30
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 01:51	01/14/24 01:51	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:14	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:24	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:08	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:40	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:20	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:35	LD	Mt. Juliet, TN

APW-05R-WG-20240110 L1696247-08 GW

Collected by: Marshall A
 Collected date/time: 01/10/24 13:05
 Received date/time: 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2206960	1	01/13/24 18:28	01/14/24 12:40	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 02:22	01/14/24 02:22	GEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	10	01/14/24 02:38	01/14/24 02:38	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206975	1	01/17/24 11:40	01/17/24 21:22	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:27	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:11	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:43	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 18:24	LD	Mt. Juliet, TN

SAMPLE SUMMARY

APW-05R-WG-20240110 L1696247-08 GW

Collected by Marshall A Collected date/time 01/10/24 13:05 Received date/time 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:56	LD	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

APW-09-WG-20240111 L1696247-09 GW

Collected by Marshall A Collected date/time 01/11/24 16:10 Received date/time 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 03:26	01/14/24 03:26	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 16:45	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:29	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:14	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:47	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:24	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:38	LD	Mt. Juliet, TN

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

APW-02-WG-20240111 L1696247-10 GW

Collected by Marshall A Collected date/time 01/11/24 17:35 Received date/time 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 03:42	01/14/24 03:42	GEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	10	01/14/24 03:58	01/14/24 03:58	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 16:47	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2206981	1	01/14/24 12:28	01/14/24 20:31	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:18	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:50	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:27	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:41	LD	Mt. Juliet, TN

9 Sc

APW-01R-WG-20240110 L1696247-11 GW

Collected by Marshall A Collected date/time 01/10/24 16:05 Received date/time 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 04:14	01/14/24 04:14	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 16:50	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2206982	1	01/14/24 11:46	01/14/24 20:43	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:21	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:53	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:30	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:45	LD	Mt. Juliet, TN

APW-04-WG-20240110 L1696247-12 GW

Collected by Marshall A Collected date/time 01/10/24 17:10 Received date/time 01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 04:30	01/14/24 04:30	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN

SAMPLE SUMMARY

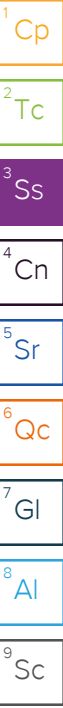
APW-04-WG-20240110 L1696247-12 GW

Collected by
Marshall A

Collected date/time
01/10/24 17:10

Received date/time
01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 16:52	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2206982	1	01/14/24 11:46	01/14/24 20:51	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:24	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:56	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:46	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:48	LD	Mt. Juliet, TN



EB-01-WG-20240110 L1696247-13 GW

Collected by
Marshall A

Collected date/time
01/10/24 12:00

Received date/time
01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 05:17	01/14/24 05:17	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 16:54	NDL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:50	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:51	LD	Mt. Juliet, TN

DUP-01-WG-20240110 L1696247-14 GW

Collected by
Marshall A

Collected date/time
01/10/24 00:01

Received date/time
01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 05:33	01/14/24 05:33	GEB	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	10	01/14/24 05:49	01/14/24 05:49	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 17:01	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2206982	1	01/14/24 11:46	01/14/24 20:53	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 13:57	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 18:59	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:53	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:54	LD	Mt. Juliet, TN

DUP-02-WG-20240111 L1696247-15 GW

Collected by
Marshall A

Collected date/time
01/11/24 00:02

Received date/time
01/13/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2207687	1	01/16/24 15:13	01/17/24 10:19	DLS	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2206862	1	01/14/24 06:37	01/14/24 06:37	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2206905	1	01/19/24 16:30	01/19/24 16:30	EPW	Mt. Juliet, TN
Mercury by Method 7470A	WG2206976	1	01/17/24 13:34	01/18/24 16:37	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2206982	1	01/14/24 11:46	01/14/24 20:56	LAS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/27/24 14:00	SJM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2207294	1	01/18/24 15:05	01/28/24 19:03	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 19:56	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG2208511	1	01/18/24 12:25	01/28/24 20:58	LD	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Jeff Carr
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	489		10.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	8.04		1.00	1	01/13/2024 22:56	WG2206862
Fluoride	0.202		0.150	1	01/13/2024 22:56	WG2206862
Sulfate	80.1		5.00	1	01/13/2024 22:56	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.40	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

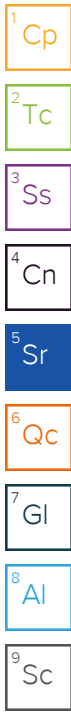
L1696247-01 WG2206905: 7.4 at 18.8C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 20:59	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:03	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:01	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 12:16	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:01	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294
Barium	0.123		0.00200	1	01/28/2024 19:01	WG2208511
Barium,Dissolved	0.122		0.00200	1	01/27/2024 12:16	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 19:01	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 19:01	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 12:16	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:01	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:01	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294
Iron	0.367		0.100	1	01/28/2024 19:01	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 12:16	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:01	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294
Lithium	0.0316		0.00200	1	01/28/2024 20:09	WG2208511
Lithium,Dissolved	0.0281		0.00200	1	01/28/2024 18:16	WG2207294
Manganese	0.435		0.00500	1	01/28/2024 19:01	WG2208511
Manganese,Dissolved	0.438		0.00500	1	01/27/2024 12:16	WG2207294
Molybdenum	0.0262		0.00500	1	01/28/2024 19:01	WG2208511
Molybdenum,Dissolved	0.0274		0.00500	1	01/27/2024 12:16	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:01	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:01	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 12:16	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	370		10.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	10.6		1.00	1	01/13/2024 23:27	WG2206862
Fluoride	0.232		0.150	1	01/13/2024 23:27	WG2206862
Sulfate	24.7		5.00	1	01/13/2024 23:27	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.68	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

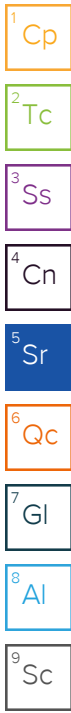
L1696247-02 WG2206905: 7.68 at 18.3C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:02	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:12	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:04	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 12:19	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:04	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 12:19	WG2207294
Barium	0.170		0.00200	1	01/28/2024 19:04	WG2208511
Barium,Dissolved	0.170		0.00200	1	01/27/2024 12:19	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 19:04	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 12:19	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 19:04	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 12:19	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:04	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 12:19	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:04	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 12:19	WG2207294
Iron	0.440		0.100	1	01/28/2024 19:04	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 12:19	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:04	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 12:19	WG2207294
Lithium	0.0142		0.00200	1	01/28/2024 20:12	WG2208511
Lithium,Dissolved	0.0134		0.00200	1	01/28/2024 18:20	WG2207294
Manganese	0.0435		0.00500	1	01/28/2024 19:04	WG2208511
Manganese,Dissolved	0.0443		0.00500	1	01/27/2024 12:19	WG2207294
Molybdenum	ND		0.00500	1	01/28/2024 19:04	WG2208511
Molybdenum,Dissolved	ND		0.00500	1	01/27/2024 12:19	WG2207294
Selenium	0.0169		0.00200	1	01/28/2024 19:04	WG2208511
Selenium,Dissolved	0.0173		0.00200	1	01/27/2024 12:19	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:04	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 12:19	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	734		20.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	11.5		1.00	1	01/14/2024 00:15	WG2206862
Fluoride	0.172		0.150	1	01/14/2024 00:15	WG2206862
Sulfate	68.8		5.00	1	01/14/2024 00:15	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.31	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

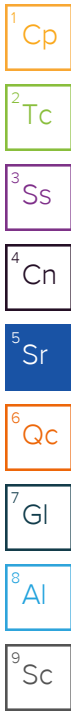
L1696247-03 WG2206905: 7.31 at 18C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:04	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:14	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:07	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 12:58	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:07	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294
Barium	0.360		0.00200	1	01/28/2024 19:07	WG2208511
Barium,Dissolved	0.256		0.0100	5	01/28/2024 19:06	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:15	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:15	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 12:58	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:07	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:07	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294
Iron	18.9		0.100	1	01/28/2024 19:07	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 12:58	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:07	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294
Lithium	0.0190		0.00200	1	01/28/2024 20:15	WG2208511
Lithium,Dissolved	0.0176		0.00200	1	01/28/2024 18:23	WG2207294
Manganese	1.19		0.00500	1	01/28/2024 19:07	WG2208511
Manganese,Dissolved	1.16		0.00500	1	01/27/2024 12:58	WG2207294
Molybdenum	ND		0.00500	1	01/28/2024 19:07	WG2208511
Molybdenum,Dissolved	ND		0.00500	1	01/27/2024 12:58	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:07	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:07	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 12:58	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	692		20.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	17.2		1.00	1	01/14/2024 00:47	WG2206862
Fluoride	ND		0.150	1	01/14/2024 00:47	WG2206862
Sulfate	ND		5.00	1	01/14/2024 00:47	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.58	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

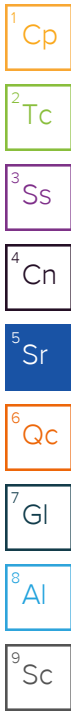
L1696247-04 WG2206905: 7.58 at 18C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:07	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:17	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:10	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:01	WG2207294
Arsenic	0.196		0.00200	1	01/28/2024 19:10	WG2208511
Arsenic,Dissolved	0.0628		0.00200	1	01/27/2024 13:01	WG2207294
Barium	0.597		0.00200	1	01/28/2024 19:10	WG2208511
Barium,Dissolved	0.288		0.0100	5	01/28/2024 19:16	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 19:10	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:01	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 19:10	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:01	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:10	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:01	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:10	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:01	WG2207294
Iron	17.2		0.100	1	01/28/2024 19:10	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:01	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:10	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:01	WG2207294
Lithium	0.0328		0.00200	1	01/28/2024 20:18	WG2208511
Lithium,Dissolved	0.0302		0.00200	1	01/28/2024 18:26	WG2207294
Manganese	0.174		0.00500	1	01/28/2024 19:10	WG2208511
Manganese,Dissolved	0.155		0.00500	1	01/27/2024 13:01	WG2207294
Molybdenum	ND		0.00500	1	01/28/2024 19:10	WG2208511
Molybdenum,Dissolved	ND		0.00500	1	01/27/2024 13:01	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:10	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 13:01	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:10	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:01	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	436		10.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	15.4		1.00	1	01/14/2024 01:03	WG2206862
Fluoride	ND		0.150	1	01/14/2024 01:03	WG2206862
Sulfate	35.5		5.00	1	01/14/2024 01:03	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.66	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

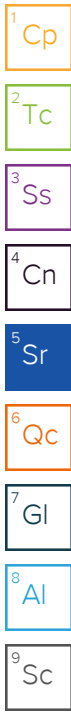
L1696247-05 WG2206905: 7.66 at 18C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:09	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:19	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:14	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:05	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:14	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 13:05	WG2207294
Barium	0.341		0.00200	1	01/28/2024 19:14	WG2208511
Barium,Dissolved	0.336		0.0100	5	01/28/2024 19:19	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 19:14	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:05	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 19:14	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:05	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:14	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:05	WG2207294
Cobalt	0.00261		0.00200	1	01/28/2024 19:14	WG2208511
Cobalt,Dissolved	0.00228		0.00200	1	01/27/2024 13:05	WG2207294
Iron	0.175		0.100	1	01/28/2024 19:14	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:05	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:14	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:05	WG2207294
Lithium	0.0152		0.00200	1	01/28/2024 20:28	WG2208511
Lithium,Dissolved	0.0135		0.00200	1	01/28/2024 18:37	WG2207294
Manganese	0.880		0.00500	1	01/28/2024 19:14	WG2208511
Manganese,Dissolved	0.857		0.00500	1	01/27/2024 13:05	WG2207294
Molybdenum	ND		0.00500	1	01/28/2024 19:14	WG2208511
Molybdenum,Dissolved	ND		0.00500	1	01/27/2024 13:05	WG2207294
Selenium	0.00269		0.00200	1	01/28/2024 19:14	WG2208511
Selenium,Dissolved	0.00274		0.00200	1	01/27/2024 13:05	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:14	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:05	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	644		10.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	21.2		1.00	1	01/14/2024 01:19	WG2206862
Fluoride	0.277		0.150	1	01/14/2024 01:19	WG2206862
Sulfate	240		50.0	10	01/14/2024 01:35	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.67	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

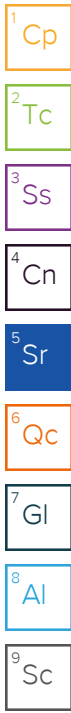
L1696247-06 WG2206905: 7.67 at 18.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:12	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:22	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:17	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 11:56	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:17	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294
Barium	0.204		0.00200	1	01/28/2024 19:17	WG2208511
Barium,Dissolved	0.155		0.00200	1	01/27/2024 11:56	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:32	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:32	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 11:56	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:17	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:17	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294
Iron	9.18		0.100	1	01/28/2024 19:17	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 11:56	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:17	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294
Lithium	0.0421		0.00200	1	01/28/2024 20:32	WG2208511
Lithium,Dissolved	0.0383		0.00200	1	01/28/2024 18:03	WG2207294
Manganese	0.512		0.00500	1	01/28/2024 19:17	WG2208511
Manganese,Dissolved	0.478		0.00500	1	01/27/2024 11:56	WG2207294
Molybdenum	0.255		0.00500	1	01/28/2024 19:17	WG2208511
Molybdenum,Dissolved	0.260		0.00500	1	01/27/2024 11:56	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:17	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:17	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 11:56	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	536		10.0	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	21.2		1.00	1	01/14/2024 01:51	WG2206862
Fluoride	0.212		0.150	1	01/14/2024 01:51	WG2206862
Sulfate	180		5.00	1	01/14/2024 01:51	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.73	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

L1696247-07 WG2206905: 7.73 at 18.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:14	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:24	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:20	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:08	WG2207294
Arsenic	0.0102		0.00200	1	01/28/2024 19:20	WG2208511
Arsenic,Dissolved	0.00451		0.00200	1	01/27/2024 13:08	WG2207294
Barium	0.115		0.00200	1	01/28/2024 19:20	WG2208511
Barium,Dissolved	0.106		0.00200	1	01/27/2024 13:08	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:35	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:08	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:35	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:08	WG2207294
Chromium	0.00861		0.00200	1	01/28/2024 19:20	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:08	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:20	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:08	WG2207294
Iron	3.65		0.100	1	01/28/2024 19:20	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:08	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:20	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:08	WG2207294
Lithium	0.0173		0.00200	1	01/28/2024 20:35	WG2208511
Lithium,Dissolved	0.0161		0.00200	1	01/28/2024 18:40	WG2207294
Manganese	0.622		0.00500	1	01/28/2024 19:20	WG2208511
Manganese,Dissolved	0.611		0.00500	1	01/27/2024 13:08	WG2207294
Molybdenum	0.0605		0.00500	1	01/28/2024 19:20	WG2208511
Molybdenum,Dissolved	0.0617		0.00500	1	01/27/2024 13:08	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:20	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 13:08	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:20	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:08	WG2207294

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	677		13.3	1	01/14/2024 12:40	WG2206960

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	16.9		1.00	1	01/14/2024 02:22	WG2206862
Fluoride	0.298		0.150	1	01/14/2024 02:22	WG2206862
Sulfate	306		50.0	10	01/14/2024 02:38	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.42	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

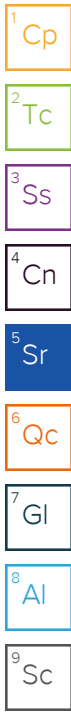
L1696247-08 WG2206905: 7.42 at 18.2C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/17/2024 21:22	WG2206975
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:27	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 18:24	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:11	WG2207294
Arsenic	0.00220		0.00200	1	01/28/2024 18:24	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294
Barium	0.151		0.00200	1	01/28/2024 18:24	WG2208511
Barium,Dissolved	0.113		0.00200	1	01/27/2024 13:11	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 18:24	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 18:24	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:11	WG2207294
Chromium	ND		0.00200	1	01/28/2024 18:24	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 18:24	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294
Iron	5.89		0.100	1	01/28/2024 18:24	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:11	WG2207294
Lead	ND		0.00200	1	01/28/2024 18:24	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294
Lithium	0.0388		0.00200	1	01/28/2024 19:56	WG2208511
Lithium,Dissolved	0.0377		0.00200	1	01/28/2024 18:43	WG2207294
Manganese	0.554	<u>V</u>	0.00500	1	01/28/2024 18:24	WG2208511
Manganese,Dissolved	0.548		0.00500	1	01/27/2024 13:11	WG2207294
Molybdenum	0.227		0.00500	1	01/28/2024 18:24	WG2208511
Molybdenum,Dissolved	0.235		0.00500	1	01/27/2024 13:11	WG2207294
Selenium	ND		0.00200	1	01/28/2024 18:24	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294
Thallium	ND		0.00200	1	01/28/2024 18:24	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:11	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	354		10.0	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	12.1		1.00	1	01/14/2024 03:26	WG2206862
Fluoride	0.197		0.150	1	01/14/2024 03:26	WG2206862
Sulfate	35.3		5.00	1	01/14/2024 03:26	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.03	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

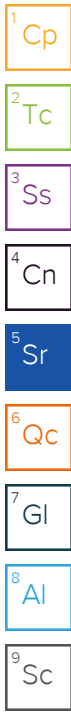
L1696247-09 WG2206905: 8.03 at 18.2C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 16:45	WG2206976
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:29	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:24	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:14	WG2207294
Arsenic	0.00235		0.00200	1	01/28/2024 19:24	WG2208511
Arsenic,Dissolved	0.00216		0.00200	1	01/27/2024 13:14	WG2207294
Barium	0.138		0.00200	1	01/28/2024 19:24	WG2208511
Barium,Dissolved	0.118		0.00200	1	01/27/2024 13:14	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:38	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:14	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 19:24	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:14	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:24	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:14	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:24	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:14	WG2207294
Iron	0.179		0.100	1	01/28/2024 19:24	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:14	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:24	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:14	WG2207294
Lithium	0.0139		0.00200	1	01/28/2024 20:38	WG2208511
Lithium,Dissolved	0.0129		0.00200	1	01/28/2024 18:47	WG2207294
Manganese	0.124		0.00500	1	01/28/2024 19:24	WG2208511
Manganese,Dissolved	ND		0.00500	1	01/27/2024 13:14	WG2207294
Molybdenum	0.0163		0.00500	1	01/28/2024 19:24	WG2208511
Molybdenum,Dissolved	0.0186		0.00500	1	01/27/2024 13:14	WG2207294
Selenium	0.0225		0.00200	1	01/28/2024 19:24	WG2208511
Selenium,Dissolved	0.0220		0.00200	1	01/27/2024 13:14	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:24	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:14	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	820		13.3	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	7.78		1.00	1	01/14/2024 03:42	WG2206862
Fluoride	0.230		0.150	1	01/14/2024 03:42	WG2206862
Sulfate	411		50.0	10	01/14/2024 03:58	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.52	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

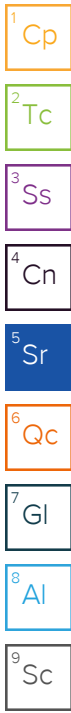
L1696247-10 WG2206905: 7.52 at 18.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 16:47	WG2206976
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:31	WG2206981

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:27	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:18	WG2207294
Arsenic	0.0112		0.00200	1	01/28/2024 19:27	WG2208511
Arsenic,Dissolved	0.00409		0.00200	1	01/27/2024 13:18	WG2207294
Barium	0.155		0.00200	1	01/28/2024 19:27	WG2208511
Barium,Dissolved	0.131		0.00200	1	01/27/2024 13:18	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:41	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:18	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:41	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:18	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:27	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:18	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:27	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:18	WG2207294
Iron	7.63		0.100	1	01/28/2024 19:27	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:18	WG2207294
Lead	0.00235		0.00200	1	01/28/2024 19:27	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:18	WG2207294
Lithium	0.0416		0.00200	1	01/28/2024 20:41	WG2208511
Lithium,Dissolved	0.0396		0.00200	1	01/28/2024 18:50	WG2207294
Manganese	0.669		0.00500	1	01/28/2024 19:27	WG2208511
Manganese,Dissolved	0.616		0.00500	1	01/27/2024 13:18	WG2207294
Molybdenum	0.158		0.00500	1	01/28/2024 19:27	WG2208511
Molybdenum,Dissolved	0.157		0.00500	1	01/27/2024 13:18	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:27	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 13:18	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:27	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:18	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	385		10.0	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	9.07		1.00	1	01/14/2024 04:14	WG2206862
Fluoride	0.183		0.150	1	01/14/2024 04:14	WG2206862
Sulfate	68.9		5.00	1	01/14/2024 04:14	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.19	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

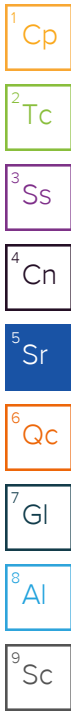
L1696247-11 WG2206905: 7.19 at 18.2C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 16:50	WG2206976
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:43	WG2206982

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:30	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:21	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:30	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 13:21	WG2207294
Barium	0.169		0.00200	1	01/28/2024 19:30	WG2208511
Barium,Dissolved	0.159		0.00200	1	01/27/2024 13:21	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:45	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:21	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:45	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:21	WG2207294
Chromium	0.00248		0.00200	1	01/28/2024 19:30	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:21	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:30	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:21	WG2207294
Iron	0.405		0.100	1	01/28/2024 19:30	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:21	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:30	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:21	WG2207294
Lithium	0.0153		0.00200	1	01/28/2024 20:45	WG2208511
Lithium,Dissolved	0.0140		0.00200	1	01/28/2024 18:53	WG2207294
Manganese	0.0791		0.00500	1	01/28/2024 19:30	WG2208511
Manganese,Dissolved	0.0362		0.00500	1	01/27/2024 13:21	WG2207294
Molybdenum	ND		0.00500	1	01/28/2024 19:30	WG2208511
Molybdenum,Dissolved	0.00523		0.00500	1	01/27/2024 13:21	WG2207294
Selenium	0.00514		0.00200	1	01/28/2024 19:30	WG2208511
Selenium,Dissolved	0.00435		0.00200	1	01/27/2024 13:21	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:30	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:21	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	418		10.0	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	9.21		1.00	1	01/14/2024 04:30	WG2206862
Fluoride	0.170		0.150	1	01/14/2024 04:30	WG2206862
Sulfate	50.9	J6	5.00	1	01/14/2024 04:30	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.17	T8	1	01/19/2024 16:30	WG2206905

Sample Narrative:

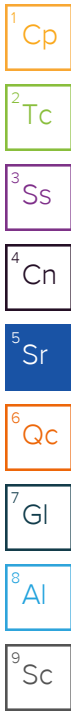
L1696247-12 WG2206905: 8.17 at 19.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 16:52	WG2206976
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:51	WG2206982

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:46	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:24	WG2207294
Arsenic	ND		0.00200	1	01/28/2024 19:46	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 13:24	WG2207294
Barium	0.139		0.00200	1	01/28/2024 19:46	WG2208511
Barium,Dissolved	0.130		0.00200	1	01/27/2024 13:24	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:48	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:24	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:48	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:24	WG2207294
Chromium	0.00267		0.00200	1	01/28/2024 19:46	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:24	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:46	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:24	WG2207294
Iron	0.709		0.100	1	01/28/2024 19:46	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:24	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:46	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:24	WG2207294
Lithium	0.0290		0.00200	1	01/28/2024 20:48	WG2208511
Lithium,Dissolved	0.0266		0.00200	1	01/28/2024 18:56	WG2207294
Manganese	0.210		0.00500	1	01/28/2024 19:46	WG2208511
Manganese,Dissolved	0.171		0.00500	1	01/27/2024 13:24	WG2207294
Molybdenum	0.0332		0.00500	1	01/28/2024 19:46	WG2208511
Molybdenum,Dissolved	0.0370		0.00500	1	01/27/2024 13:24	WG2207294
Selenium	0.0105		0.00200	1	01/28/2024 19:46	WG2208511
Selenium,Dissolved	0.00962		0.00200	1	01/27/2024 13:24	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:46	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:24	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	ND		10.0	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	ND		1.00	1	01/14/2024 05:17	WG2206862
Fluoride	ND		0.150	1	01/14/2024 05:17	WG2206862
Sulfate	ND		5.00	1	01/14/2024 05:17	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	5.63	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

L1696247-13 WG2206905: 5.63 at 18.5C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 16:54	WG2206976

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:50	WG2208511
Arsenic	ND		0.00200	1	01/28/2024 19:50	WG2208511
Barium	ND		0.00200	1	01/28/2024 19:50	WG2208511
Beryllium	ND		0.00200	1	01/28/2024 20:51	WG2208511
Cadmium	ND		0.00100	1	01/28/2024 20:51	WG2208511
Chromium	ND		0.00200	1	01/28/2024 19:50	WG2208511
Cobalt	ND		0.00200	1	01/28/2024 19:50	WG2208511
Iron	ND		0.100	1	01/28/2024 19:50	WG2208511
Lead	ND		0.00200	1	01/28/2024 19:50	WG2208511
Lithium	ND		0.00200	1	01/28/2024 20:51	WG2208511
Manganese	ND		0.00500	1	01/28/2024 19:50	WG2208511
Molybdenum	ND		0.00500	1	01/28/2024 19:50	WG2208511
Selenium	ND		0.00200	1	01/28/2024 19:50	WG2208511
Thallium	ND		0.00200	1	01/28/2024 19:50	WG2208511

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	691		13.3	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	17.0		1.00	1	01/14/2024 05:33	WG2206862
Fluoride	0.317		0.150	1	01/14/2024 05:33	WG2206862
Sulfate	305		50.0	10	01/14/2024 05:49	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.82	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

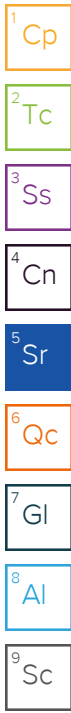
L1696247-14 WG2206905: 7.82 at 18.2C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 17:01	WG2206976
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:53	WG2206982

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:53	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 13:57	WG2207294
Arsenic	0.00228		0.00200	1	01/28/2024 19:53	WG2208511
Arsenic,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294
Barium	0.153		0.00200	1	01/28/2024 19:53	WG2208511
Barium,Dissolved	0.114		0.00200	1	01/27/2024 13:57	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:54	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:54	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 13:57	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:53	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:53	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294
Iron	5.91		0.100	1	01/28/2024 19:53	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 13:57	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:53	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294
Lithium	0.0404		0.00200	1	01/28/2024 20:54	WG2208511
Lithium,Dissolved	0.0390		0.00200	1	01/28/2024 18:59	WG2207294
Manganese	0.553		0.00500	1	01/28/2024 19:53	WG2208511
Manganese,Dissolved	0.537		0.00500	1	01/27/2024 13:57	WG2207294
Molybdenum	0.231		0.00500	1	01/28/2024 19:53	WG2208511
Molybdenum,Dissolved	0.235		0.00500	1	01/27/2024 13:57	WG2207294
Selenium	ND		0.00200	1	01/28/2024 19:53	WG2208511
Selenium,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:53	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 13:57	WG2207294



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	361		10.0	1	01/17/2024 10:19	WG2207687

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	12.1		1.00	1	01/14/2024 06:37	WG2206862
Fluoride	0.186		0.150	1	01/14/2024 06:37	WG2206862
Sulfate	35.4		5.00	1	01/14/2024 06:37	WG2206862

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.10	<u>T8</u>	1	01/19/2024 16:30	WG2206905

Sample Narrative:

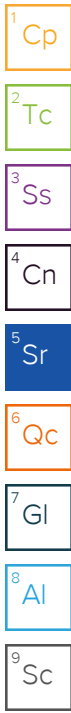
L1696247-15 WG2206905: 8.1 at 18C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	01/18/2024 16:37	WG2206976
Mercury,Dissolved	ND		0.000200	1	01/14/2024 20:56	WG2206982

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	01/28/2024 19:56	WG2208511
Antimony,Dissolved	ND		0.00400	1	01/27/2024 14:00	WG2207294
Arsenic	0.00214		0.00200	1	01/28/2024 19:56	WG2208511
Arsenic,Dissolved	0.00206		0.00200	1	01/27/2024 14:00	WG2207294
Barium	0.136		0.00200	1	01/28/2024 19:56	WG2208511
Barium,Dissolved	0.120		0.00200	1	01/27/2024 14:00	WG2207294
Beryllium	ND		0.00200	1	01/28/2024 20:58	WG2208511
Beryllium,Dissolved	ND		0.00200	1	01/27/2024 14:00	WG2207294
Cadmium	ND		0.00100	1	01/28/2024 20:58	WG2208511
Cadmium,Dissolved	ND		0.00100	1	01/27/2024 14:00	WG2207294
Chromium	ND		0.00200	1	01/28/2024 19:56	WG2208511
Chromium,Dissolved	ND		0.00200	1	01/27/2024 14:00	WG2207294
Cobalt	ND		0.00200	1	01/28/2024 19:56	WG2208511
Cobalt,Dissolved	ND		0.00200	1	01/27/2024 14:00	WG2207294
Iron	0.210		0.100	1	01/28/2024 19:56	WG2208511
Iron,Dissolved	ND		0.100	1	01/27/2024 14:00	WG2207294
Lead	ND		0.00200	1	01/28/2024 19:56	WG2208511
Lead,Dissolved	ND		0.00200	1	01/27/2024 14:00	WG2207294
Lithium	0.0143		0.00200	1	01/28/2024 20:58	WG2208511
Lithium,Dissolved	0.0142		0.00200	1	01/28/2024 19:03	WG2207294
Manganese	0.119		0.00500	1	01/28/2024 19:56	WG2208511
Manganese,Dissolved	ND		0.00500	1	01/27/2024 14:00	WG2207294
Molybdenum	0.0157		0.00500	1	01/28/2024 19:56	WG2208511
Molybdenum,Dissolved	0.0188		0.00500	1	01/27/2024 14:00	WG2207294
Selenium	0.0222		0.00200	1	01/28/2024 19:56	WG2208511
Selenium,Dissolved	0.0216		0.00200	1	01/27/2024 14:00	WG2207294
Thallium	ND		0.00200	1	01/28/2024 19:56	WG2208511
Thallium,Dissolved	ND		0.00200	1	01/27/2024 14:00	WG2207294



Method Blank (MB)

(MB) R4024377-1 01/14/24 12:40

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		10.0	10.0

1 Cp

2 Tc

3 Ss

L1695971-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1695971-06 01/14/24 12:40 • (DUP) R4024377-3 01/14/24 12:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	212	218	1	2.79		5

4 Cn

5 Sr

L1695971-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1695971-07 01/14/24 12:40 • (DUP) R4024377-4 01/14/24 12:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	289	292	1	1.03		5

6 Qc

7 Gl

8 Al

Laboratory Control Sample (LCS)

(LCS) R4024377-2 01/14/24 12:40

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Dissolved Solids	8800	8480	96.4	85.0-115	

9 Sc

Method Blank (MB)

(MB) R4024333-1 01/17/24 10:19

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		10.0	10.0

1 Cp

2 Tc

3 Ss

L1696123-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1696123-02 01/17/24 10:19 • (DUP) R4024333-3 01/17/24 10:19

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	483	500	1	3.46		5

4 Cn

5 Sr

6 Qc

L1696123-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1696123-03 01/17/24 10:19 • (DUP) R4024333-4 01/17/24 10:19

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	420	439	1	4.42		5

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS)

(LCS) R4024333-2 01/17/24 10:19

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Dissolved Solids	8800	8620	98.0	85.0-115	

Method Blank (MB)

(MB) R4023539-1 01/13/24 09:15

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.379	1.00
Fluoride	U		0.0640	0.150
Sulfate	U		0.594	5.00

L1696237-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1696237-04 01/13/24 21:04 • (DUP) R4023539-3 01/13/24 21:20

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	27.9	27.9	1	0.0918		15
Fluoride	ND	ND	1	0.000		15
Sulfate	ND	ND	1	5.73		15

L1696247-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1696247-12 01/14/24 04:30 • (DUP) R4023539-6 01/14/24 04:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	9.21	9.20	1	0.169		15
Fluoride	0.170	0.160	1	5.70		15
Sulfate	50.9	51.0	1	0.123		15

Laboratory Control Sample (LCS)

(LCS) R4023539-2 01/13/24 09:31

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Chloride	40.0	39.7	99.2	80.0-120	
Fluoride	8.00	8.29	104	80.0-120	
Sulfate	40.0	39.4	98.4	80.0-120	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1696237-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696237-04 01/13/24 21:04 • (MS) R4023539-4 01/13/24 21:36 • (MSD) R4023539-5 01/13/24 21:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	27.9	62.5	61.9	86.5	85.0	1	80.0-120			0.973	15
Fluoride	8.00	ND	7.79	7.64	97.3	95.5	1	80.0-120			1.86	15
Sulfate	40.0	ND	39.2	38.4	94.7	92.7	1	80.0-120			2.05	15

L1696247-12 Original Sample (OS) • Matrix Spike (MS)

(OS) L1696247-12 01/14/24 04:30 • (MS) R4023539-7 01/14/24 05:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40.0	9.21	46.5	93.2	1	80.0-120	
Fluoride	8.00	0.170	7.67	93.8	1	80.0-120	
Sulfate	40.0	50.9	80.2	73.3	1	80.0-120	<u>J6</u>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1696197-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1696197-02 01/19/24 16:30 • (DUP) R4024424-2 01/19/24 16:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.83	7.85	1	0.255		1

Sample Narrative:

OS: 7.83 at 18.5C
DUP: 7.85 at 18.8C

L1696255-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1696255-01 01/19/24 16:30 • (DUP) R4024424-3 01/19/24 16:30

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.81	7.83	1	0.256		1

Sample Narrative:

OS: 7.81 at 18C
DUP: 7.83 at 18.2C

Laboratory Control Sample (LCS)

(LCS) R4024424-1 01/19/24 16:30

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	10.0	100	99.0-101	

Sample Narrative:

LCS: 10.01 at 18.5C



Method Blank (MB)

(MB) R4023739-1 01/17/24 20:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000100	0.000200

¹Cp

²Tc

³Ss

Laboratory Control Sample (LCS)

(LCS) R4023739-2 01/17/24 20:19

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00342	114	80.0-120	

⁴Cn

⁵Sr

L1696236-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696236-01 01/17/24 20:22 • (MS) R4023739-3 01/17/24 20:24 • (MSD) R4023739-4 01/17/24 20:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00295	0.00299	98.2	99.6	1	75.0-125			1.45	20

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4024241-1 01/18/24 16:33

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury	U		0.000100	0.000200

1 Cp

2 Tc

3 Ss

Laboratory Control Sample (LCS)

(LCS) R4024241-2 01/18/24 16:35

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Mercury	0.00300	0.00333	111	80.0-120	

4 Cn

5 Sr

6 Qc

L1696247-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696247-15 01/18/24 16:37 • (MS) R4024241-3 01/18/24 16:40 • (MSD) R4024241-4 01/18/24 16:42

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.00300	ND	0.00331	0.00341	110	114	1	75.0-125			3.24	20

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4023420-1 01/14/24 19:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R4023420-2 01/14/24 19:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury,Dissolved	0.00300	0.00283	94.4	80.0-120	

L1696148-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696148-04 01/14/24 19:29 • (MS) R4023420-3 01/14/24 19:32 • (MSD) R4023420-4 01/14/24 19:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00282	0.00283	94.0	94.5	1	75.0-125			0.541	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4023421-1 01/14/24 20:34

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.000100	0.000200

1 Cp

2 Tc

3 Ss

Laboratory Control Sample (LCS)

(LCS) R4023421-2 01/14/24 20:41

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury,Dissolved	0.00300	0.00283	94.3	80.0-120	

4 Cn

5 Sr

L1696247-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696247-11 01/14/24 20:43 • (MS) R4023421-3 01/14/24 20:46 • (MSD) R4023421-4 01/14/24 20:48

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00282	0.00283	94.1	94.2	1	75.0-125			0.173	20

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4026972-1 01/27/24 11:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony,Dissolved	U		0.00103	0.00400
Arsenic,Dissolved	U		0.000180	0.00200
Barium,Dissolved	U		0.000381	0.00200
Beryllium,Dissolved	U		0.000190	0.00200
Cadmium,Dissolved	U		0.000150	0.00100
Chromium,Dissolved	U		0.00124	0.00200
Cobalt,Dissolved	U		0.0000596	0.00200
Iron,Dissolved	U		0.0281	0.100
Lead,Dissolved	U		0.000849	0.00200
Lithium,Dissolved	U		0.000695	0.00200
Manganese,Dissolved	U		0.000704	0.00500
Molybdenum,Dissolved	0.000471	J	0.000348	0.00500
Selenium,Dissolved	U		0.000300	0.00200
Thallium,Dissolved	U		0.000121	0.00200

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4027056-1 01/28/24 17:57

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Lithium,Dissolved	U		0.000695	0.00200

Laboratory Control Sample (LCS)

(LCS) R4026972-2 01/27/24 11:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony,Dissolved	0.0500	0.0520	104	80.0-120	
Arsenic,Dissolved	0.0500	0.0512	102	80.0-120	
Barium,Dissolved	0.0500	0.0488	97.6	80.0-120	
Beryllium,Dissolved	0.0500	0.0520	104	80.0-120	
Cadmium,Dissolved	0.0500	0.0522	104	80.0-120	
Chromium,Dissolved	0.0500	0.0524	105	80.0-120	
Cobalt,Dissolved	0.0500	0.0525	105	80.0-120	
Iron,Dissolved	1.00	1.06	106	80.0-120	
Lead,Dissolved	0.0500	0.0500	100	80.0-120	
Lithium,Dissolved	0.0500	0.0538	108	80.0-120	
Manganese,Dissolved	0.0500	0.0505	101	80.0-120	
Molybdenum,Dissolved	0.0500	0.0497	99.4	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R4026972-2 01/27/24 11:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Selenium,Dissolved	0.0500	0.0492	98.5	80.0-120	
Thallium,Dissolved	0.0500	0.0496	99.3	80.0-120	

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS)

(LCS) R4027056-2 01/28/24 18:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lithium,Dissolved	0.0500	0.0478	95.6	80.0-120	

L1696247-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696247-06 01/27/24 11:56 • (MS) R4026972-4 01/27/24 12:03 • (MSD) R4026972-5 01/27/24 12:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	ND	0.0506	0.0518	101	104	1	75.0-125			2.48	20
Arsenic,Dissolved	0.0500	ND	0.0514	0.0518	102	103	1	75.0-125			0.739	20
Barium,Dissolved	0.0500	0.155	0.199	0.200	88.2	91.5	1	75.0-125			0.832	20
Beryllium,Dissolved	0.0500	ND	0.0509	0.0504	102	101	1	75.0-125			1.04	20
Cadmium,Dissolved	0.0500	ND	0.0520	0.0526	104	105	1	75.0-125			1.01	20
Chromium,Dissolved	0.0500	ND	0.0516	0.0517	103	103	1	75.0-125			0.163	20
Cobalt,Dissolved	0.0500	ND	0.0525	0.0523	105	104	1	75.0-125			0.392	20
Iron,Dissolved	1.00	ND	1.07	1.05	107	105	1	75.0-125			2.42	20
Lead,Dissolved	0.0500	ND	0.0497	0.0487	99.3	97.4	1	75.0-125			1.95	20
Manganese,Dissolved	0.0500	0.478	0.530	0.529	105	102	1	75.0-125			0.216	20
Molybdenum,Dissolved	0.0500	0.260	0.303	0.310	87.6	99.9	1	75.0-125			2.00	20
Selenium,Dissolved	0.0500	ND	0.0483	0.0490	96.7	98.1	1	75.0-125			1.44	20
Thallium,Dissolved	0.0500	ND	0.0493	0.0489	98.6	97.7	1	75.0-125			0.869	20

L1696247-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696247-06 01/28/24 18:03 • (MS) R4027056-4 01/28/24 18:10 • (MSD) R4027056-5 01/28/24 18:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lithium,Dissolved	0.0500	0.0383	0.0862	0.0890	95.7	101	1	75.0-125			3.23	20

Method Blank (MB)

(MB) R4027054-1 01/28/24 18:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Antimony	U		0.00103	0.00400
Arsenic	U		0.000180	0.00200
Barium	U		0.000381	0.00200
Beryllium	U		0.000190	0.00200
Cadmium	U		0.000150	0.00100
Chromium	U		0.00124	0.00200
Cobalt	U		0.0000596	0.00200
Iron	U		0.0281	0.100
Lead	U		0.000849	0.00200
Manganese	U		0.000704	0.00500
Molybdenum	U		0.000348	0.00500
Selenium	U		0.000300	0.00200
Thallium	0.000143	U	0.000121	0.00200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4027064-1 01/28/24 19:49

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Lithium	U		0.000695	0.00200

Laboratory Control Sample (LCS)

(LCS) R4027054-2 01/28/24 18:21

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Antimony	0.0500	0.0574	115	80.0-120	
Arsenic	0.0500	0.0523	105	80.0-120	
Barium	0.0500	0.0514	103	80.0-120	
Beryllium	0.0500	0.0474	94.8	80.0-120	
Cadmium	0.0500	0.0538	108	80.0-120	
Chromium	0.0500	0.0534	107	80.0-120	
Cobalt	0.0500	0.0542	108	80.0-120	
Iron	1.00	1.07	107	80.0-120	
Lead	0.0500	0.0529	106	80.0-120	
Manganese	0.0500	0.0537	107	80.0-120	
Molybdenum	0.0500	0.0507	101	80.0-120	
Selenium	0.0500	0.0539	108	80.0-120	
Thallium	0.0500	0.0529	106	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R4027064-2 01/28/24 19:52

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Lithium	0.0500	0.0547	109	80.0-120	

L1696247-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696247-08 01/28/24 18:24 • (MS) R4027054-4 01/28/24 18:31 • (MSD) R4027054-5 01/28/24 18:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Antimony	0.0500	ND	0.0570	0.0575	114	115	1	75.0-125			0.920	20
Arsenic	0.0500	0.00220	0.0528	0.0531	101	102	1	75.0-125			0.607	20
Barium	0.0500	0.151	0.197	0.197	93.7	93.6	1	75.0-125			0.0331	20
Beryllium	0.0500	ND	0.0482	0.0485	96.3	97.0	1	75.0-125			0.660	20
Cadmium	0.0500	ND	0.0548	0.0552	110	110	1	75.0-125			0.776	20
Chromium	0.0500	ND	0.0517	0.0511	103	102	1	75.0-125			1.07	20
Cobalt	0.0500	ND	0.0522	0.0516	104	103	1	75.0-125			1.20	20
Iron	1.00	5.89	6.98	6.92	109	103	1	75.0-125			0.857	20
Lead	0.0500	ND	0.0552	0.0554	108	109	1	75.0-125			0.500	20
Manganese	0.0500	0.554	0.604	0.591	99.4	72.3	1	75.0-125		V	2.27	20
Molybdenum	0.0500	0.227	0.278	0.276	102	97.5	1	75.0-125			0.754	20
Selenium	0.0500	ND	0.0533	0.0518	107	104	1	75.0-125			2.80	20
Thallium	0.0500	ND	0.0526	0.0531	105	106	1	75.0-125			0.986	20

L1696247-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1696247-08 01/28/24 19:56 • (MS) R4027064-4 01/28/24 20:02 • (MSD) R4027064-5 01/28/24 20:05

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Lithium	0.0500	0.0388	0.0963	0.0935	115	109	1	75.0-125			3.03	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

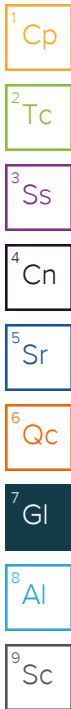
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1,6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl


⁸ Al

⁹ Sc

Company Name/Address:
ERM - St. Louis, MO
 1968 Craig Road, Suite 100
 Saint Louis, MO 63146

Billing Information:
 Accounts Payable Dept.
 1701 Golf Road, Suite 1-1000
 Rolling Meadows, IL 60008-4242

Pres Chk																				
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Chain of Custody Page 1 of 2

 PEOPLE ADVANCING SCIENCE
MT JULIET, TN
 12065 Lebanon Rd Mount Juliet, TN 37122
 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubs/pas-standard-terms.pdf>

Report to:
Randy Homburg

Email To: **Randy.Homburg@erm.com**

Project Description:
Grand Tower Energy Center Groundwater 1Q24

City/State Collected: **Grand Tower, IL**

Please Circle:
 PT MT ET

Phone: **314-682-3980**

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Arendell

Site/Facility ID #

P.O. #

Collected by (signature):

 Immediately
 Packed on Ice N Y

Rush? (Lab MUST Be Notified)
 Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day

Quote #
 Date Results Needed
STP TAT

Sample ID

Comp/Grab

Matrix *

Depth

Date

Time

No. of Cntrs

APW-03-WG-2024	0111	Grab	GW	54.50	1/11/24	1450	5
APW-08-WG-2024	0111		GW	57.00		1330	5
APW-07-WG-2024	0111		GW	58.25		1155	5
APW-105-WG-2024	0111		GW	57.75		1040	5
APW-10D-WG-2024	0111		GW	93.11		0920	5
APW-06S-WG-2024	0110		GW	58.25	1/10/24	1015	5
APW-06D-WG-2024	0110		GW	149.75		1130	5
APW-05R-WG-2024	0110		GW	57.90		1305	5
APW-09-WG-2024	0111		GW	58.20	1/11/24	1610	5
APW-02-WG-2024	0110		GW	53.37	1/10/24	1735	5

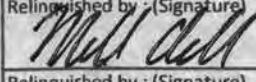
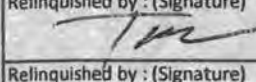
Anions 125mlHDPE-NoPres	Dissolved Metals 250mlHDPE-NoPres	TDS 1L-HDPE NoPres	Total Metals 250mlHDPE-HNO3	pH 125mlHDPE-NoPres																
-------------------------	-----------------------------------	--------------------	-----------------------------	---------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

LAB # **4696247**
E066
 Acctnum: **ERMSCMO**
 Template: **T243415**
 Prelogin: **P1043454**
 PM: **206 - Jeff Carr**
 PB:
 Shipped Via: **FedEX Ground**

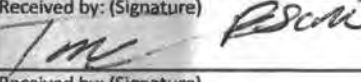

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks:
 pH _____ Temp _____
 Flow _____ Other _____
 Samples returned via:
 UPS FedEx Courier _____
 Tracking # _____

Sample Receipt Checklist
 COC Seal Present/Intact: NP Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 If Applicable
 VOA Zero Headspace: Y N
 Preservation Correct/Checked: Y N
 RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature)

 Relinquished by: (Signature)

 Relinquished by: (Signature)

Date: **1/12/24**
 Time: **10:00**

Received by: (Signature)

 Received by: (Signature)
 Received for lab by: (Signature)


Trip Blank Received: Yes/No
 HCL / MeOH
 TBR
 Temp: _____ °C
 Bottles Received: **74**

PH-10BDH5021 TRC-2352762
 CR6-20221V
 Hold: _____
 Condition: **NCF / OK**

Company Name/Address:

ERM - St. Louis, MO

**1968 Craig Road, Suite 100
Saint Louis, MO 63146**

Billing Information:

**Accounts Payable Dept.
1701 Golf Road, Suite 1-1000
Rolling Meadows, IL 60008-4242**

Pres
Chk

Analysis / Container / Preservative

Chain of Custody Page **2** of **2**

Report to:
Randy Homburg

Email To: **Randy.Homburg@erm.com**

Project Description:
Grand Tower Energy Center Groundwater 1Q24

City/State
Collected: **Grand Tower, IL**

Please Circle:
PT MT ET

Phone: **314-682-3980**

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Amendell

Site/Facility ID #

P.O. #

Collected by (signature):
Marshall Amendell

Rush? (Lab MUST Be Notified)

Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day

Quote #

Date Results Needed

STD TAT

Immediately
Packed on Ice N Y

No.
of
Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	Anions 125mlHDPE-NoPres	Dissolved Metals 250mlHDPE-NoPres	TDS 1L-HDPE NoPres	Total Metals 250mlHDPE-HNO3	pH 125mlHDPE-NoPres							
APW-01R-WG-2024 0110	Grab	GW	53.28	1/10/24	1605	5	X	X	X	X	X							11
APW-04-WG-2024 0110		GW	55.25		1710	5	X	X	X	X	X							12
EB-01-WG-2024 0109		GW	—		1200	5	X	X	X	X	X							13
DUP-01-WG-2024 0110		GW	—		0001	5	X	X	X	X	X							14
DUP-02-WG-2024 0111		GW	—	1/11/24	0002	5	X	X	X	X	X							15

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubs/pas-standard-terms.pdf>

SDG # **21696241**

Table #

Acctnum: **ERMSCMO**
Template: **T243415**
Prelogin: **P1043454**
PM: **206 - Jeff Carr**
PB:

Shipped Via: **FedEX Ground**

Remarks Sample # (lab only)

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Sample Receipt Checklist	
COC Seal Present/Intact:	<input type="checkbox"/> Y <input type="checkbox"/> N
COC Signed/Accurate:	<input type="checkbox"/> Y <input type="checkbox"/> N
Bottles arrive intact:	<input type="checkbox"/> Y <input type="checkbox"/> N
Correct bottles used:	<input type="checkbox"/> Y <input type="checkbox"/> N
Sufficient volume sent:	<input type="checkbox"/> Y <input type="checkbox"/> N
If Applicable	
VOR Zero Headspace:	<input type="checkbox"/> Y <input type="checkbox"/> N
Preservation Correct/Checked:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
RAD Screen <0.5 mR/hr:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N

Samples returned via:
 UPS FedEx Courier

Tracking #

Relinquished by: (Signature) <i>Marshall Amendell</i>	Date: 1/12/24	Time: 10:00	Received by: (Signature) <i>[Signature]</i>	Trip Blank Received: Yes / No HCL / MeqH TBR	Temp: _____ °C Bottles Received: 74	If preservation required by Login: Date/Time
Relinquished by: (Signature) <i>[Signature]</i>	Date:	Time:	Received by: (Signature)			
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>[Signature]</i>	Date: 1-13-24	Time: 0700	Hold: Condition: NCF / OK

<u>Tracking Numbers</u>	<u>Temperature</u>
7129 908 506	TLH8 0.1 x 0 = 0.1
EE05 908 52E	0.1 x 0 = TLH8
7129 908 505	TLH5 0.2 x 0 = 0.2

Name

Date

ERM - St. Louis, MO

Sample Delivery Group: L1732516
Samples Received: 05/03/2024
Project Number: 0599247
Description: Grand Tower Energy Center Groundwater 2Q24 Sampling
Report To: Randy Homburg
1968 Craig Road, Suite 100
Saint Louis, MO 63146

Entire Report Reviewed By:



John Hawkins
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

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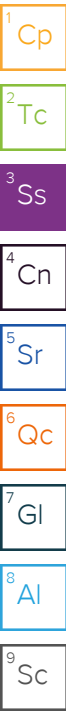
¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

SAMPLE SUMMARY

APW-03-WG-20240430 L1732516-01 Non-Potable Water

Collected by Marshall Avendell Collected date/time 04/30/24 12:20 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294205	1	05/28/24 13:24	05/31/24 18:24	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2290711	1	05/22/24 16:03	05/31/24 18:24	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2290711	1	05/22/24 16:03	05/24/24 22:52	ZRG	Mt. Juliet, TN



APW-08-WG-20240430 L1732516-02 Non-Potable Water

Collected by Marshall Avendell Collected date/time 04/30/24 13:40 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2290711	1	05/22/24 16:03	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2290711	1	05/22/24 16:03	05/24/24 22:52	ZRG	Mt. Juliet, TN

APW-07-WG-20240430 L1732516-03 Non-Potable Water

Collected by Marshall Avendell Collected date/time 04/30/24 14:40 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2290711	1	05/22/24 16:03	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2290711	1	05/22/24 16:03	05/24/24 22:52	ZRG	Mt. Juliet, TN

APW-10S-WG-20240430 L1732516-04 Non-Potable Water

Collected by Marshall Avendell Collected date/time 04/30/24 15:45 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2290711	1	05/22/24 16:03	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2290711	1	05/22/24 16:03	05/24/24 22:52	ZRG	Mt. Juliet, TN

APW-10D-WG-20240430 L1732516-05 Non-Potable Water

Collected by Marshall Avendell Collected date/time 04/30/24 16:35 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

APW-06S-WG-20240501 L1732516-06 Non-Potable Water

Collected by Marshall Avendell Collected date/time 05/01/24 07:55 Received date/time 05/03/24 09:00

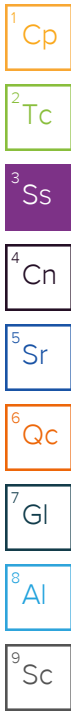
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

SAMPLE SUMMARY

APW-06D-WG-20240501 L1732516-07 Non-Potable Water

Collected by Marshall Avendell Collected date/time 05/01/24 08:55 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN



APW-05R-WG-20240501 L1732516-08 Non-Potable Water

Collected by Marshall Avendell Collected date/time 05/01/24 10:05 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

APW-09-WG-20240430 L1732516-09 Non-Potable Water

Collected by Marshall Avendell Collected date/time 04/30/24 17:45 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

APW-02-WG-20240501 L1732516-10 Non-Potable Water

Collected by Marshall Avendell Collected date/time 05/01/24 11:45 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

APW-01R-WG-20240501 L1732516-11 Non-Potable Water

Collected by Marshall Avendell Collected date/time 05/01/24 17:45 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

APW-04-WG-20240501 L1732516-12 Non-Potable Water

Collected by Marshall Avendell Collected date/time 05/01/24 16:50 Received date/time 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

SAMPLE SUMMARY

EB-01-WG-20240430 L1732516-13 Non-Potable Water

Collected by: Marshall Avendell
 Collected date/time: 04/30/24 09:15
 Received date/time: 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

DUP-01-WG-20240501 L1732516-14 Non-Potable Water

Collected by: Marshall Avendell
 Collected date/time: 05/01/24 00:01
 Received date/time: 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

DUP-02-WG-20240430 L1732516-15 Non-Potable Water

Collected by: Marshall Avendell
 Collected date/time: 04/30/24 00:02
 Received date/time: 05/03/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2294207	1	05/28/24 13:46	05/31/24 22:31	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2292601	1	05/27/24 10:03	05/31/24 22:31	ZRG	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2292601	1	05/27/24 10:03	05/30/24 20:24	ZRG	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



John Hawkins
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.585		0.256	0.358	0.454	0.238	05/31/2024 18:24	WG2294205
(T) Barium	95.5					30.0-143	05/31/2024 18:24	WG2294205
(T) Yttrium	106					30.0-136	05/31/2024 18:24	WG2294205

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.18		0.461	0.618	05/31/2024 18:24	WG2290711

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.594		0.383	0.171	0.419	0.273	05/24/2024 22:52	WG2290711
(T) Barium-133	93.2					30.0-143	05/24/2024 22:52	WG2290711

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	-0.254	<u>U</u>	0.268	0.370	0.510	0.266	05/31/2024 22:31	WG2294207
(T) Barium	95.2					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	106					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.341	<u>J</u>	0.381	0.595	05/31/2024 22:31	WG2290711

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.341		0.271	0.124	0.307	0.214	05/24/2024 22:52	WG2290711
(T) Barium-133	94.4					30.0-143	05/24/2024 22:52	WG2290711

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.803		0.291	0.393	0.522	0.272	05/31/2024 22:31	WG2294207
(T) Barium	96.3					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	97.2					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.42		0.460	0.630	05/31/2024 22:31	WG2290711

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.617		0.356	0.170	0.353	0.237	05/24/2024 22:52	WG2290711
(T) Barium-133	97.4					30.0-143	05/24/2024 22:52	WG2290711

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.234	<u>U</u>	0.289	0.388	0.534	0.277	05/31/2024 22:31	WG2294207
(T) Barium	105					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	102					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.582	<u>J</u>	0.416	0.646	05/31/2024 22:31	WG2290711

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.347	<u>J</u>	0.299	0.133	0.364	0.244	05/24/2024 22:52	WG2290711
(T) Barium-133	94.4					30.0-143	05/24/2024 22:52	WG2290711

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.886		0.294	0.396	0.525	0.274	05/31/2024 22:31	WG2294207
(T) Barium	93.9					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	104					30.0-136	05/31/2024 22:31	WG2294207

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.02		0.355	0.604	05/31/2024 22:31	WG2292601

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.134	J	0.199	0.0831	0.299	0.209	05/30/2024 20:24	WG2292601
(T) Barium-133	90.8					30.0-143	05/30/2024 20:24	WG2292601

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.951		0.345	0.458	0.620	0.323	05/31/2024 22:31	WG2294207
(T) Barium	86.3					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	90.4					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.66		0.481	0.678	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.707		0.335	0.157	0.274	0.190	05/30/2024 20:24	WG2292601
(T) Barium-133	93.1					30.0-143	05/30/2024 20:24	WG2292601

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	1.10		0.285	0.391	0.501	0.263	05/31/2024 22:31	WG2294207
(T) Barium	87.3					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	102					30.0-136	05/31/2024 22:31	WG2294207

- 1
Cp
- 2
Tc
- 3
Ss
- 4
Cn
- 5
Sr
- 6
Qc
- 7
Gl
- 8
Al
- 9
Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.52		0.369	0.524	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.422		0.235	0.115	0.152	0.125	05/30/2024 20:24	WG2292601
(T) Barium-133	95.2					30.0-143	05/30/2024 20:24	WG2292601

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.940		0.271	0.377	0.479	0.252	05/31/2024 22:31	WG2294207
(T) Barium	89.6					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	96.8					30.0-136	05/31/2024 22:31	WG2294207

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.12		0.330	0.534	05/31/2024 22:31	WG2292601

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.180	J	0.189	0.0806	0.236	0.179	05/30/2024 20:24	WG2292601
(T) Barium-133	87.0					30.0-143	05/30/2024 20:24	WG2292601

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.614		0.214	0.318	0.383	0.203	05/31/2024 22:31	WG2294207
(T) Barium	92.0					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	99.8					30.0-136	05/31/2024 22:31	WG2294207

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.866		0.317	0.482	05/31/2024 22:31	WG2292601

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.252	J	0.234	0.0892	0.292	0.200	05/30/2024 20:24	WG2292601
(T) Barium-133	80.4					30.0-143	05/30/2024 20:24	WG2292601

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.966		0.329	0.437	0.588	0.306	05/31/2024 22:31	WG2294207
(T) Barium	88.3					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	95.0					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.29		0.419	0.657	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.326		0.259	0.107	0.293	0.205	05/30/2024 20:24	WG2292601
(T) Barium-133	85.0					30.0-143	05/30/2024 20:24	WG2292601

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.671		0.262	0.373	0.471	0.248	05/31/2024 22:31	WG2294207
(T) Barium	81.5					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	104					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.05		0.394	0.571	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.383		0.294	0.109	0.323	0.229	05/30/2024 20:24	WG2292601
(T) Barium-133	76.1					30.0-143	05/30/2024 20:24	WG2292601

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.451	J	0.288	0.394	0.528	0.277	05/31/2024 22:31	WG2294207
(T) Barium	88.4					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	107					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.597	J	0.398	0.677	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.146	U	0.275	0.105	0.423	0.277	05/30/2024 20:24	WG2292601
(T) Barium-133	88.1					30.0-143	05/30/2024 20:24	WG2292601

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.963		0.278	0.384	0.491	0.258	05/31/2024 22:31	WG2294207
(T) Barium	93.8					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	92.2					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.963		0.306	0.577	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.000	<u>U</u>	0.128	0.0420	0.304	0.222	05/30/2024 20:24	WG2292601
(T) Barium-133	83.1					30.0-143	05/30/2024 20:24	WG2292601

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	1.08		0.284	0.390	0.499	0.262	05/31/2024 22:31	WG2294207
(T) Barium	92.0					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	93.8					30.0-136	05/31/2024 22:31	WG2294207

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.50		0.435	0.616	05/31/2024 22:31	WG2292601

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.427		0.329	0.124	0.361	0.255	05/30/2024 20:24	WG2292601
(T) Barium-133	77.1					30.0-143	05/30/2024 20:24	WG2292601

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.510		0.220	0.327	0.398	0.211	05/31/2024 22:31	WG2294207
(T) Barium	95.4					30.0-143	05/31/2024 22:31	WG2294207
(T) Yttrium	89.3					30.0-136	05/31/2024 22:31	WG2294207

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.572		0.287	0.519	05/31/2024 22:31	WG2292601

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.0618	<u>U</u>	0.185	0.0637	0.333	0.233	05/30/2024 20:24	WG2292601
(T) Barium-133	79.3					30.0-143	05/30/2024 20:24	WG2292601

Method Blank (MB)

(MB) R4077283-1 05/31/24 18:24

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-228	-0.292	<u>U</u>	0.174	0.332	0.175
(T) Barium	90.2		90.2		
(T) Yttrium	93.4		93.4		

L1732516-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1732516-01 05/31/24 18:24 • (DUP) R4077283-5 05/31/24 18:24

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.585	0.256	0.454	0.238	2.39	0.811	1.42	0.742	121	2.12		20	3
(T) Barium	95.5				92.8	92.8							
(T) Yttrium	106				79.4	79.4							

Laboratory Control Sample (LCS)

(LCS) R4077283-2 05/31/24 18:24

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.89	118	80.0-120	
(T) Barium			104		
(T) Yttrium			95.2		

L1733112-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1733112-01 05/31/24 18:24 • (MS) R4077283-3 05/31/24 18:24 • (MSD) R4077283-4 05/31/24 18:24

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	16.7	0.123	20.2	19.1	120	114	1	70.0-130			5.85		20
(T) Barium		88.9			87.5	84.9							
(T) Yttrium		94.0			98.7	101							

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4077288-1 05/31/24 22:31

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-228	0.0238	<u>U</u>	0.161	0.304	0.160
(T) Barium	92.6		92.6		
(T) Yttrium	104		104		

L1732516-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1732516-07 05/31/24 22:31 • (DUP) R4077288-5 05/31/24 22:31

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	1.10	0.285	0.501	0.263	0.850	0.357	0.645	0.337	25.2	0.538		20	3
(T) Barium	87.3				98.9	98.9							
(T) Yttrium	102				102	102							

Laboratory Control Sample (LCS)

(LCS) R4077288-2 05/31/24 22:31

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.02	100	80.0-120	
(T) Barium			91.1		
(T) Yttrium			98.6		

L1732727-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1732727-06 05/31/24 22:31 • (MS) R4077288-3 05/31/24 22:31 • (MSD) R4077288-4 05/31/24 22:31

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	16.7	2.45	18.0	17.8	92.8	91.6	1	70.0-130			1.12		20
(T) Barium		101			105	100							
(T) Yttrium		88.3			96.9	91.7							

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4075765-1 05/24/24 22:51

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-226	0.0477		0.0330	0.0389	0.0257
(T) Barium-133	90.6		90.6		

L1732516-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1732516-01 05/24/24 22:52 • (DUP) R4075765-5 05/24/24 22:51

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.594	0.383	0.419	0.273	0.423	0.326	0.358	0.253	33.5	0.339		20	3
(T) Barium-133	93.2				79.4	79.4							

Laboratory Control Sample (LCS)

(LCS) R4075765-2 05/24/24 22:51

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.00	5.25	105	80.0-120	
(T) Barium-133			87.3		

L1731395-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1731395-03 05/24/24 22:51 • (MS) R4075765-3 05/24/24 22:51 • (MSD) R4075765-4 05/24/24 22:51

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.0	0.747	20.6	21.1	99.2	102	1	75.0-125			2.35		20
(T) Barium-133		90.3			86.5	92.7							

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4077899-5 06/04/24 18:02

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-226	-0.00211	<u>U</u>	0.0269	0.0526	0.0327
(T) Barium-133	80.3		80.3		

L1732516-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1732516-09 05/30/24 20:24 • (DUP) R4077899-4 05/30/24 20:24

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.252	0.234	0.292	0.200	-0.0313	0.322	0.673	0.454	200	0.713	<u>U</u>	20	3
(T) Barium-133	80.4				42.3	42.3							

Laboratory Control Sample (LCS)

(LCS) R4077899-1 05/30/24 20:23

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.00	5.76	115	80.0-120	
(T) Barium-133			78.2		

L1732516-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1732516-13 05/30/24 20:24 • (MS) R4077899-2 05/30/24 20:24 • (MSD) R4077899-3 05/30/24 20:24

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.0	0.000	21.1	19.8	106	99.0	1	75.0-125			6.41		20
(T) Barium-133		83.1			81.7	83.0							

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

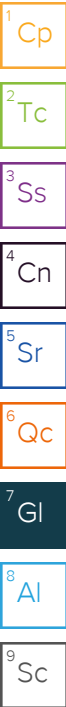
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
U	Below Detectable Limits: Indicates that the analyte was not detected.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1,6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Company Name/Address:
ERM - St. Louis, MO
 1968 Craig Road, Suite 100
 Saint Louis, MO 63146

Billing Information:
 Accounts Payable Dept.
 1701 Golf Road, Suite 1-1000
 Rolling Meadows, IL 60008-4242

Pres
 Chk

Analysis / Container / Preservative



MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubfs/pas-standard-terms.pdf>

Report to:
Randy Homburg

Email To:
 Randy.Homburg@erm.com; Tim.Wilson@erm.co

Project Description:
Grand Tower Energy Center Groundwater 2Q24

City/State Collected:

Please Circle:
 PT MT CT ET

Phone: **314-682-3980**

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Arendell

Site/Facility ID #

P.O. #

Collected by (signature):
Will Dell

Rush? (Lab MUST Be Notified)
 ___ Same Day ___ Five Day
 ___ Next Day ___ 5 Day (Rad Only)
 ___ Two Day ___ 10 Day (Rad Only)
 ___ Three Day

Quote #
 Date Results Needed
STP TAT

Immediately Packed on Ice N ___ Y X

No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
APW-01R-WG-2024 0501	Grab	NPW	53.26	5/1/24	1745	3
APW-04-WG-2024 0501	↓	NPW	53.27	5/1/24	1650	3
EB-01-WG-2024 0430		NPW	NA	4/30/24	0915	3
DUP-01-WG-2024 0501		NPW	L	5/1/24	0001	3
DUP-02-WG-2024 0430		NPW	L	4/30/24	0002	3

RA-226 1L-HDPE-Add-HNO3

RA-228 1L-HDPE-Add-HNO3

SDG # **U732516**
 Table #
 Acctnum: **ERMSCMO**
 Template: **T243472**
 Prelogin: **P1066766**
 PM: **206 - Jeff Carr**
 PB:
 Shipped Via: **FedEX Ground**

Remarks Sample # (lab only)

-11
 -12
 -13
 -14
 -15

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks: pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
 ___ UPS ___ FedEx ___ Courier

Tracking #

Sample Receipt Checklist
 COC Seal Present/Intact: Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
If Applicable
 VOA Zero Headspace: Y N
 Preservation Correct/Checked: Y N
 RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature)
Will Dell

Date: **5/2/24**

Time: **1200**

Received by: (Signature)
Tom

Trip Blank Received: Yes / No
 HCL / MeOH
 TBR

Relinquished by: (Signature)
Tom

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

If preservation required by Login: Date/Time

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)
CRobert

Date: **05-03-24** Time: **0900**

Hold: Condition: **NCF / OK**

47732516

<u>Tracking Numbers</u>	<u>Temperature</u>
7123 3300 5478	1.7+0.1:1.8 TLAV
7123 3300 6467	2.4, D.1:2.5 TLAV
7123 3300 5450	1.0+0.1:1.7 TLAV

Name _____

Date _____

ERM - St. Louis, MO

Sample Delivery Group: L1775404
Samples Received: 09/07/2024
Project Number: 0599247
Description: Grand Tower Energy Center Groundwater 3Q24 Sampling
Report To: Randy Homburg
1968 Craig Road, Suite 100
Saint Louis, MO 63146

Entire Report Reviewed By:



Jeff Carr
Project Manager

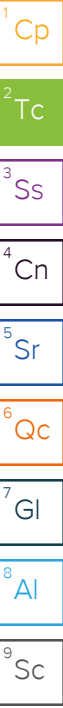
Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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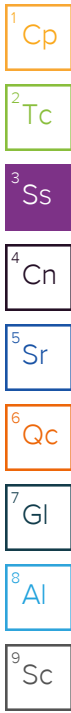


SAMPLE SUMMARY

APW-03-WG-20240904 L1775404-01 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/04/24 15:00
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 18:43	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN



APW-08-WG-20240904 L1775404-02 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/04/24 16:15
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 18:43	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-07-WG-20240904 L1775404-03 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/04/24 17:00
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 18:43	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-10S-WG-20240905 L1775404-04 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 14:55
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 18:43	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-10D-WG-20240905 L1775404-05 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 14:15
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 17:13	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-06S-WG-20240905 L1775404-06 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 08:20
 Received date/time: 09/07/24 09:00

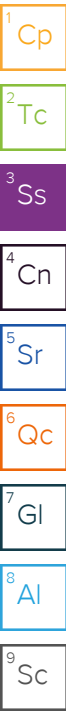
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 17:13	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

SAMPLE SUMMARY

APW-06D-WG-20240905 L1775404-07 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 09:15
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 17:13	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN



APW-05R-WG-20240905 L1775404-08 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 12:30
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2356942	1	09/11/24 17:14	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/20/24 16:03	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-09-WG-20240906 L1775404-09 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/06/24 09:00
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-02-WG-20240905 L1775404-10 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 10:45
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-01R-WG-20240905 L1775404-11 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/05/24 16:10
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2358602	1	09/09/24 10:48	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2358602	1	09/09/24 10:48	09/11/24 13:29	ZRG	Mt. Juliet, TN

APW-04-WG-20240904 L1775404-12 Non-Potable Water

Collected by: Marshall Arendell
 Collected date/time: 09/04/24 18:15
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2360503	1	09/11/24 14:55	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2360503	1	09/11/24 14:55	09/13/24 19:55	ZRG	Mt. Juliet, TN

SAMPLE SUMMARY

EB-01-WG-20240904 L1775404-13 Non-Potable Water

Collected by: Marshell Arendell
 Collected date/time: 09/04/24 11:30
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2360503	1	09/11/24 14:55	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2360503	1	09/11/24 14:55	09/13/24 19:55	ZRG	Mt. Juliet, TN

¹Cp

²Tc

³Ss

DUP-01-WG-20240905 L1775404-14 Non-Potable Water

Collected by: Marshell Arendell
 Collected date/time: 09/05/24 00:01
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2360503	1	09/11/24 14:55	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2360503	1	09/11/24 14:55	09/13/24 19:55	ZRG	Mt. Juliet, TN

⁴Cn

⁵Sr

⁶Qc

DUP-02-WG-20240906 L1775404-15 Non-Potable Water

Collected by: Marshell Arendell
 Collected date/time: 09/06/24 00:02
 Received date/time: 09/07/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 904/9320	WG2361562	1	09/12/24 18:43	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method Calculation	WG2360503	1	09/11/24 14:55	09/24/24 21:02	DDD	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG2360503	1	09/11/24 14:55	09/13/24 19:55	ZRG	Mt. Juliet, TN

⁷Gl

⁸Al

⁹Sc

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Jeff Carr
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	1.40		0.319	0.596	0.542	0.285	09/20/2024 16:03	WG2356942
(T) Barium	101					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	118					30.0-136	09/20/2024 16:03	WG2356942

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.90		0.406	0.567	09/20/2024 16:03	WG2358602

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.493		0.251	0.521	0.167	0.131	09/11/2024 13:29	WG2358602
(T) Barium-133	98.3					30.0-143	09/11/2024 13:29	WG2358602

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.959		0.240	0.438	0.412	0.216	09/20/2024 16:03	WG2356942
(T) Barium	118					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	108					30.0-136	09/20/2024 16:03	WG2356942

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.26		0.312	0.440	09/20/2024 16:03	WG2358602

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.296		0.200	0.403	0.155	0.128	09/11/2024 13:29	WG2358602
(T) Barium-133	102					30.0-143	09/11/2024 13:29	WG2358602

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.736		0.361	0.639	0.640	0.334	09/20/2024 16:03	WG2356942
(T) Barium	112					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	120					30.0-136	09/20/2024 16:03	WG2356942

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.933		0.401	0.666	09/20/2024 16:03	WG2358602

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.197		0.174	0.326	0.185	0.145	09/11/2024 13:29	WG2358602
(T) Barium-133	95.2					30.0-143	09/11/2024 13:29	WG2358602

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	-0.0143	<u>U</u>	0.345	0.624	0.633	0.330	09/20/2024 16:03	WG2356942
(T) Barium	126					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	99.3					30.0-136	09/20/2024 16:03	WG2356942

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.498	<u>J</u>	0.430	0.652	09/20/2024 16:03	WG2358602

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.498		0.257	0.530	0.155	0.128	09/11/2024 13:29	WG2358602
(T) Barium-133	101					30.0-143	09/11/2024 13:29	WG2358602

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	-0.266	<u>U</u>	0.253	0.451	0.469	0.245	09/20/2024 16:03	WG2356942
(T) Barium	117					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	115					30.0-136	09/20/2024 16:03	WG2356942

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.163	<u>U</u>	0.295	0.494	09/20/2024 16:03	WG2358602

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.163		0.151	0.293	0.156	0.129	09/11/2024 13:29	WG2358602
(T) Barium-133	101					30.0-143	09/11/2024 13:29	WG2358602

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.667	J	0.386	0.663	0.687	0.358	09/20/2024 16:03	WG2356942
(T) Barium	101					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	112					30.0-136	09/20/2024 16:03	WG2356942

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.977		0.443	0.718	09/20/2024 16:03	WG2358602

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.310		0.217	0.406	0.210	0.155	09/11/2024 13:29	WG2358602
(T) Barium-133	99.5					30.0-143	09/11/2024 13:29	WG2358602

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	1.83		0.372	0.650	0.629	0.329	09/20/2024 16:03	WG2356942
(T) Barium	110					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	119					30.0-136	09/20/2024 16:03	WG2356942

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	2.27		0.448	0.649	09/20/2024 16:03	WG2358602

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.447		0.249	0.481	0.161	0.133	09/11/2024 13:29	WG2358602
(T) Barium-133	96.3					30.0-143	09/11/2024 13:29	WG2358602

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.460	J	0.343	0.620	0.615	0.322	09/20/2024 16:03	WG2356942
(T) Barium	122					30.0-143	09/20/2024 16:03	WG2356942
(T) Yttrium	107					30.0-136	09/20/2024 16:03	WG2356942

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.473	J	0.353	0.645	09/20/2024 16:03	WG2358602

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.0135	U	0.0835	0.127	0.195	0.148	09/11/2024 13:29	WG2358602
(T) Barium-133	99.0					30.0-143	09/11/2024 13:29	WG2358602

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.997		0.496	0.959	0.884	0.466	09/24/2024 21:02	WG2361562
(T) Barium	115					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	100					30.0-136	09/24/2024 21:02	WG2361562

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.09		0.510	0.898	09/24/2024 21:02	WG2358602

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.0956	J	0.120	0.203	0.157	0.130	09/11/2024 13:29	WG2358602
(T) Barium-133	93.8					30.0-143	09/11/2024 13:29	WG2358602

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	1.15		0.464	0.801	0.818	0.430	09/24/2024 21:02	WG2361562
(T) Barium	71.9					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	98.1					30.0-136	09/24/2024 21:02	WG2361562

- 1
Cp
- 2
Tc
- 3
Ss
- 4
Cn
- 5
Sr
- 6
Qc
- 7
Gl
- 8
Al
- 9
Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.55		0.519	0.833	09/24/2024 21:02	WG2358602

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.402		0.233	0.468	0.157	0.130	09/11/2024 13:29	WG2358602
(T) Barium-133	94.7					30.0-143	09/11/2024 13:29	WG2358602

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	-0.199	<u>U</u>	0.295	0.516	0.549	0.287	09/24/2024 21:02	WG2361562
(T) Barium	81.9					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	107					30.0-136	09/24/2024 21:02	WG2361562

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.167	<u>U</u>	0.338	0.584	09/24/2024 21:02	WG2358602

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.167	<u>J</u>	0.164	0.293	0.199	0.148	09/11/2024 13:29	WG2358602
(T) Barium-133	103					30.0-143	09/11/2024 13:29	WG2358602

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.510		0.209	0.407	0.369	0.195	09/24/2024 21:02	WG2361562
(T) Barium	107					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	105					30.0-136	09/24/2024 21:02	WG2361562

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.811		0.327	0.476	09/24/2024 21:02	WG2360503

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.302		0.252	0.456	0.301	0.203	09/13/2024 19:55	WG2360503
(T) Barium-133	100					30.0-143	09/13/2024 19:55	WG2360503

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	-0.0548	<u>U</u>	0.206	0.404	0.384	0.203	09/24/2024 21:02	WG2361562
(T) Barium	120					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	104					30.0-136	09/24/2024 21:02	WG2361562

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	0.000	<u>U</u>	0.211	0.433	09/24/2024 21:02	WG2360503

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	-0.0150	<u>U</u>	0.0466	0.0888	0.199	0.156	09/13/2024 19:55	WG2360503
(T) Barium-133	98.4					30.0-143	09/13/2024 19:55	WG2360503

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	1.10		0.203	0.401	0.335	0.178	09/24/2024 21:02	WG2361562
(T) Barium	100					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	102					30.0-136	09/24/2024 21:02	WG2361562

1 Cp

2 Tc

3 Ss

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	2.43		0.462	0.369	09/24/2024 21:02	WG2360503

4 Cn

5 Sr

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	1.33		0.415	0.993	0.154	0.127	09/13/2024 19:55	WG2360503
(T) Barium-133	104					30.0-143	09/13/2024 19:55	WG2360503

6 Qc

7 Gl

8 Al

9 Sc

Radiochemistry by Method 904/9320

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-228	0.552		0.263	0.480	0.468	0.247	09/24/2024 21:02	WG2361562
(T) Barium	93.8					30.0-143	09/24/2024 21:02	WG2361562
(T) Yttrium	89.5					30.0-136	09/24/2024 21:02	WG2361562

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Radiochemistry by Method Calculation

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
Combined Radium	1.22		0.390	0.496	09/24/2024 21:02	WG2360503

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	2 sigma CE	TPU	MDA	Lc	Analysis Date	Batch
	pCi/l		+ / -	+ / -	pCi/l	pCi/l	date / time	
RADIUM-226	0.671		0.288	0.628	0.164	0.129	09/13/2024 19:55	WG2360503
(T) Barium-133	106					30.0-143	09/13/2024 19:55	WG2360503

Method Blank (MB)

(MB) R4125059-1 09/20/24 16:03

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-228	-0.430	<u>U</u>	0.181	0.346	0.181
(T) Barium	122		122		
(T) Yttrium	93.1		93.1		

L1775404-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1775404-08 09/20/24 16:03 • (DUP) R4125059-5 09/20/24 16:03

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.460	0.343	0.615	0.322	0.664	0.291	0.516	0.272	36.4	0.455		20	3
(T) Barium	122				109	109							
(T) Yttrium	107				103	103							

Laboratory Control Sample (LCS)

(LCS) R4125059-2 09/20/24 16:03

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	4.18	83.5	80.0-120	
(T) Barium			123		
(T) Yttrium			113		

L1773936-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1773936-06 09/20/24 16:03 • (MS) R4125059-3 09/20/24 16:03 • (MSD) R4125059-4 09/20/24 16:03

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	16.7	0.0260	15.1	12.5	90.4	74.8	1	70.0-130			18.9		20
(T) Barium		124			124	98.3							
(T) Yttrium		114			113	110							

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gf

8 Al

9 Sc

Method Blank (MB)

(MB) R4126991-1 09/24/24 21:02

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-228	0.247	<u>J</u>	0.185	0.334	0.175
(T) Barium	97.8		97.8		
(T) Yttrium	112		112		

L1776572-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1776572-02 09/24/24 21:02 • (DUP) R4126991-5 09/24/24 21:02

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.816	0.362	0.640	0.334	0.171	0.273	0.502	0.266	131	1.42	<u>U</u>	20	3
(T) Barium	98.1				102	102							
(T) Yttrium	112				116	116							

Laboratory Control Sample (LCS)

(LCS) R4126991-2 09/24/24 21:02

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	4.05	81.0	80.0-120	
(T) Barium			112		
(T) Yttrium			93.9		

L1775404-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1775404-09 09/24/24 21:02 • (MS) R4126991-3 09/24/24 21:02 • (MSD) R4126991-4 09/24/24 21:02

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	16.7	0.997	12.7	12.8	70.1	70.7	1	70.0-130			0.784		20
(T) Barium		115			91.3	120							
(T) Yttrium		100			107	89.8							

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4118915-1 09/11/24 13:29

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-226	0.0116	<u>U</u>	0.0272	0.0462	0.0290
(T) Barium-133	102		102		

L1774968-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1774968-02 09/11/24 13:29 • (DUP) R4118915-5 09/11/24 13:29

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.761	0.315	0.154	0.127	0.562	0.332	0.330	0.223	30.2	0.437		20	3
(T) Barium-133	105				107	107							

Laboratory Control Sample (LCS)

(LCS) R4118915-2 09/11/24 13:29

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.00	4.54	90.8	75.0-125	
(T) Barium-133			98.3		

L1775404-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1775404-05 09/11/24 13:29 • (MS) R4118915-3 09/11/24 13:29 • (MSD) R4118915-4 09/11/24 13:29

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.0	0.163	18.1	17.9	89.7	88.9	1	75.0-125			0.943		20
(T) Barium-133		101			101	100							

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R4120671-1 09/13/24 19:55

Analyte	MB Result pCi/l	MB Qualifier	MB 2 sigma CE + / -	MB MDA pCi/l	MB Lc pCi/l
Radium-226	0.00603	<u>U</u>	0.0233	0.0530	0.0416
(T) Barium-133	92.8		92.8		

¹Cp

²Tc

³Ss

⁴Cn

L1775404-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1775404-12 09/13/24 19:55 • (DUP) R4120671-4 09/13/24 19:55

Analyte	Original Result pCi/l	Original 2 sigma CE + / -	Original MDA pCi/l	Original Lc pCi/l	DUP Result pCi/l	DUP 2 sigma CE + / -	DUP MDA pCi/l	DUP Lc pCi/l	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.302	0.252	0.301	0.203	0.429	0.262	0.247	0.175	34.9	0.350		20	3
(T) Barium-133	100				107	107							

⁵Sr

⁶Qc

⁷Gl

Laboratory Control Sample (LCS)

(LCS) R4120671-2 09/13/24 19:55

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.00	4.91	98.2	75.0-125	
(T) Barium-133			95.7		

⁸Al

⁹Sc

L1775404-13 Original Sample (OS) • Matrix Spike (MS)

(OS) L1775404-13 09/13/24 19:55 • (MS) R4120671-3 09/13/24 19:55

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Radium-226	20.0	-0.0150	20.5	102	1	75.0-125	
(T) Barium-133		98.4		103			

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

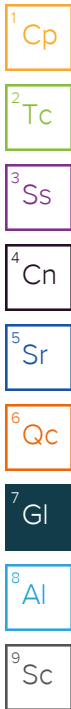
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
U	Below Detectable Limits: Indicates that the analyte was not detected.



ACCREDITATIONS & LOCATIONS

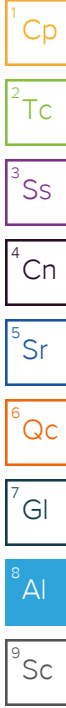
Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey-NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio-VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1,6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA-Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



Company Name/Address:
ERM - St. Louis, MO
 1968 Craig Road, Suite 100
 Saint Louis, MO 63146

Billing Information:
 Accounts Payable Dept.
 1701 Golf Road, Suite 1-1000
 Rolling Meadows, IL 60008-4242

Pres
 Chk

22 22

Analysis / Container / Preservative

Chain of Custody Page 1 of 2



MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
 Submitting a sample via this chain of custody
 constitutes acknowledgment and acceptance of the
 Pace Terms and Conditions found at:
<https://info.pacelabs.com/hubs/pas-standard-terms.pdf>

Report to:
Randy Homburg

Email To:
 Randy.Homburg@erm.com; Tim.Wilson@erm.co

Project Description:
 Grand Tower Energy Center Groundwater 3Q24

City/State
 Collected: **Grand Tower, FL**

Please Circle:
 PT MT ET

Phone: **314-682-3980**

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Arendell

Site/Facility ID #

P.O. #

Collected by (signature):
Marshall Arendell
 Immediately
 Packed on Ice N Y

Rush? (Lab MUST Be Notified)
 Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day **standard**

Quote #
 Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
-----------	-----------	----------	-------	------	------	--------------

RA-226 1L-HDPE-Add-HNO3

RA-228 1L-HDPE-Add-HNO3

SDG # **1775404**
L-052

Acctnum: **ERMSCMO**
 Template: **T243472**
 Prelogin: **P1087429**
 PM: **206 - Jeff Carr**
 PB:
 Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	RA-226 1L-HDPE-Add-HNO3	RA-228 1L-HDPE-Add-HNO3	Remarks	Sample # (lab only)
APW-03-WG-2024 0904	Grab	NPW		9/4/24	1500	3	X	X		-01
APW-08-WG-2024 0904		NPW		9/4/24	1615	3	X	X		-02
APW-07-WG-2024 0904		NPW		9/4/24	1700	3	X	X		-03
APW-10S-WG-2024 0905		NPW		9/5/24	1455	3	X	X		-04
APW-10D-WG-2024 0905		NPW		9/5/24	1415	3	X	X		-05
APW-06S-WG-2024 0905		NPW		9/5/24	0820	3	X	X		-06
APW-06D-WG-2024 0905		NPW		9/5/24	0915	3	X	X		-07
APW-05R-WG-2024 0905		NPW		9/5/24	1230	3	X	X		-08
APW-09-WG-2024 0906		NPW		9/6/24	0900	3	X	X		-09
APW-02-WG-2024 0905		NPW		9/5/24	1045	3	X	X		-10

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks:
 pH _____ Temp _____
 Flow _____ Other _____
 Samples returned via:
 UPS FedEx Courier
 Tracking #

Sample Receipt Checklist
 COC Seal Present/Intact: Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 If Applicable
 VOA Zero Headspace: Y N
 Preservation Correct/Checked: Y N
 RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature) <i>Marshall Arendell</i>	Date: 9/16/24	Time:	Received by: (Signature) <i>Tom</i>	Trip Blank Received: Yes / <input checked="" type="checkbox"/> No HCL / MeOH TBR
Relinquished by: (Signature) <i>Tom</i>	Date:	Time:	Received by: (Signature)	Temp: _____ °C Bottles Received: 45
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>Chadler</i>	Date: 09-07-24 Time: 0900 Hold: Condition: NCF / OK

PH-10BDH6021
 TRC-3223A2026

Company Name/Address:

ERM - St. Louis, MO

1968 Craig Road, Suite 100
Saint Louis, MO 63146

Billing Information:

Accounts Payable Dept.
1701 Golf Road, Suite 1-1000
Rolling Meadows, IL 60008-4242

Pres
Chk

12 12

Analysis / Container / Preservative

Chain of Custody Page 2 of 2



MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody
constitutes acknowledgment and acceptance of the
Pace Terms and Conditions found at:
<https://info.pacelabs.com/hubfs/pas-standard-terms.pdf>

Report to:
Randy Homburg

Email To:
Randy.Homburg@erm.com; Tim.Wilson@erm.co

Project Description:
Grand Tower Energy Center Groundwater 3Q24

City/State
Collected: Grand Tower, IL

Please Circle:
PT MT ET

Phone: 314-682-3980

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Arendell

Site/Facility ID #

P.O. #

Collected by (signature):
Marshall Arendell

Rush? (Lab MUST Be Notified)

Same Day Five Day
Next Day 5 Day (Rad Only)
Two Day 10 Day (Rad Only)
Three Day Standard

Quote #

Date Results Needed

No.
of
Cnts

Sample ID Comp/Grab Matrix * Depth Date Time

RA-226 1L-HDPE-Add HNO3

RA-228 1L-HDPE-Add-HNO3

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cnts													
APW-01R-WG-2024 0905	Grab	NPW		9/5/24	1610	3	X	X											
APW-04-WG-2024 0904		NPW		9/4/24	1815	3	X	X											
EB-01-WG-2024 0904		NPW		9/4/24	1130	3	X	X											
DUP-01-WG-2024 0905		NPW		9/5/24	0001	3	X	X											
DUP-02-WG-2024 0906		NPW		9/6/24	0002	3	X	X											

SDG # LTT5404

Table #

Acctnum: ERMSCMO

Template: T243472

Prelogin: P1087429

PM: 206 - Jeff Carr

PB:

Shipped Via: FedEX Ground

Remarks Sample # (lab only)

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
UPS FedEx Courier

Tracking #

Sample Receipt Checklist

COC Seal Present/Intact: Y N

COC Signed/Accurate: Y N

Bottles arrive intact: Y N

Correct bottles used: Y N

Sufficient volume sent: Y N

If Applicable

VOA Zero Headspace: Y N

Preservation Correct/Checked: Y N

RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature) *Marshall Arendell* ERM Date: 9/6/24 Time: 12:33 Received by: (Signature) *Tom Esen*

Trip Blank Received: Yes/No
HCL/MeOH
TBR

Relinquished by: (Signature) *Tom* Date: Time: Received by: (Signature)

Temp: °C Bottles Received: 45

If preservation required by Login: Date/Time

Relinquished by: (Signature) Date: Time: Received for lab by: (Signature) *CRABENA*

Date: 09.07.24 Time: 0900

Hold: Condition: NCF / OK

Fed Ex tracking #

Gun ID

Temperature

L17754104

Fed Ex tracking #	Gun ID	Temperature
7123 3300 4072	TA99	08+0.3-1.1
1040 5533 8765	TA99	2.0TD.3-2.3
7123 3300 4894	TA99	2.4TD.3-2.7

Name

Date

ERM - St. Louis, MO

Sample Delivery Group: L1790474
Samples Received: 10/18/2024
Project Number: 0599247
Description: Grand Tower Energy Center Groundwater 4Q24 Sampling
Report To: Randy Homburg
1968 Craig Road, Suite 100
Saint Louis, MO 63146

Entire Report Reviewed By:



Jeff Carr
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

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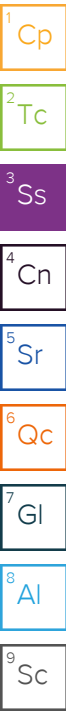
¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

SAMPLE SUMMARY

APW-03-WG-20241016 L1790474-01 GW

Collected by: Marshall Arendell
 Collected date/time: 10/16/24 15:00
 Received date/time: 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/21/24 22:37	10/21/24 22:37	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	10	10/22/24 03:05	10/22/24 03:05	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 18:04	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:35	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:07	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:11	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 17:36	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 14:52	JPD	Mt. Juliet, TN



APW-08-WG-20241016 L1790474-02 GW

Collected by: Marshall Arendell
 Collected date/time: 10/16/24 16:25
 Received date/time: 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/21/24 22:50	10/21/24 22:50	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 18:37	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:37	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:12	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:13	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 17:39	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 15:42	JPD	Mt. Juliet, TN

APW-07-WG-20241016 L1790474-03 GW

Collected by: Marshall Arendell
 Collected date/time: 10/16/24 17:45
 Received date/time: 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/21/24 23:03	10/21/24 23:03	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 18:39	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:40	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:13	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:18	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 17:42	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 15:45	JPD	Mt. Juliet, TN

APW-10S-WG-20241015 L1790474-04 GW

Collected by: Marshall Arendell
 Collected date/time: 10/15/24 17:00
 Received date/time: 10/18/24 09:00

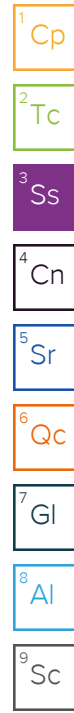
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/21/24 23:16	10/21/24 23:16	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 18:41	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:42	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:15	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:19	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 18:09	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 15:48	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	5	10/31/24 23:24	11/01/24 16:26	JPD	Mt. Juliet, TN

SAMPLE SUMMARY

APW-10D-WG-20241015 L1790474-05 GW

Collected by: Marshall Arendell
 Collected date/time: 10/15/24 15:35
 Received date/time: 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/21/24 23:54	10/21/24 23:54	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:04	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:49	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:17	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:21	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 17:48	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 15:51	JPD	Mt. Juliet, TN



APW-06S-WG-20241016 L1790474-06 GW

Collected by: Marshall Arendell
 Collected date/time: 10/16/24 10:35
 Received date/time: 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 00:06	10/22/24 00:06	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:07	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:52	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 13:55	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:22	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 17:51	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 15:54	JPD	Mt. Juliet, TN

APW-06D-WG-20241016 L1790474-07 GW

Collected by: Marshall Arendell
 Collected date/time: 10/16/24 09:15
 Received date/time: 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 00:19	10/22/24 00:19	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	10	10/22/24 03:55	10/22/24 03:55	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:09	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:54	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:18	JTM	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2393512	1	11/02/24 18:40	11/03/24 15:24	MAP	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 17:54	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 16:08	JPD	Mt. Juliet, TN

APW-05R-WG-20241016 L1790474-08 GW

Collected by: Marshall Arendell
 Collected date/time: 10/16/24 12:25
 Received date/time: 10/18/24 09:00

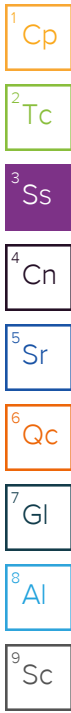
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 00:32	10/22/24 00:32	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:12	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:57	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:35	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:20	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 18:12	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 16:11	JPD	Mt. Juliet, TN

SAMPLE SUMMARY

APW-09-WG-20241017 L1790474-09 GW

Collected by Marshall Arendell Collected date/time 10/17/24 09:50 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 00:45	10/22/24 00:45	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:14	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385490	1	10/21/24 16:21	10/22/24 18:59	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:37	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:22	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 18:15	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 16:14	JPD	Mt. Juliet, TN



APW-02-WG-20241015 L1790474-10 GW

Collected by Marshall Arendell Collected date/time 10/15/24 13:38 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	10	10/22/24 00:57	10/22/24 00:57	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:16	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385970	1	10/23/24 12:47	10/24/24 15:59	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:38	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:23	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 18:19	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 16:17	JPD	Mt. Juliet, TN

APW-01R-WG-20241015 L1790474-11 GW

Collected by Marshall Arendell Collected date/time 10/15/24 18:25 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 01:10	10/22/24 01:10	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:19	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385970	1	10/23/24 12:47	10/24/24 16:07	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:40	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:25	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 18:22	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 16:20	JPD	Mt. Juliet, TN

APW-04-WG-20241017 L1790474-12 GW

Collected by Marshall Arendell Collected date/time 10/17/24 08:45 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 01:23	10/22/24 01:23	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:21	LAS	Mt. Juliet, TN
Mercury by Method 7470A	WG2385970	1	10/23/24 12:47	10/24/24 16:10	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:45	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 14:27	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387793	1	10/31/24 21:52	11/01/24 18:25	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387926	1	10/31/24 23:24	11/01/24 16:23	JPD	Mt. Juliet, TN

SAMPLE SUMMARY

EB-01-WG-20241015 L1790474-13 GW

Collected by Marshall Arendell Collected date/time 10/15/24 10:15 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 01:36	10/22/24 01:36	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385483	1	10/24/24 14:08	10/25/24 19:24	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 13:37	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387929	1	10/31/24 22:32	11/01/24 15:14	JPD	Mt. Juliet, TN

1
Cp

2
Tc

3
Ss

4
Cn

DUP-01-WG-20241016 L1790474-14 GW

Collected by Marshall Arendell Collected date/time 10/16/24 00:01 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385378	1	10/22/24 01:48	10/22/24 01:48	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385487	1	10/23/24 12:51	10/24/24 18:48	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2385970	1	10/23/24 12:47	10/24/24 16:12	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:47	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 13:38	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387797	1	11/01/24 07:51	11/04/24 16:37	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387929	1	10/31/24 22:32	11/01/24 15:27	JPD	Mt. Juliet, TN

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

DUP-02-WG-20241017 L1790474-15 GW

Collected by Marshall Arendell Collected date/time 10/17/24 00:02 Received date/time 10/18/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2385254	1	10/18/24 22:17	10/19/24 17:11	JAC	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2385382	1	10/22/24 01:59	10/22/24 01:59	ZSA	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2385247	1	10/18/24 22:40	10/18/24 22:40	KRB	Mt. Juliet, TN
Mercury by Method 7470A	WG2385487	1	10/23/24 12:51	10/24/24 18:59	NDL	Mt. Juliet, TN
Mercury by Method 7470A	WG2385970	1	10/23/24 12:47	10/24/24 16:15	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387787	1	10/31/24 12:38	10/31/24 19:49	MAP	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2387810	1	10/31/24 22:56	11/01/24 13:40	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387797	1	11/01/24 07:51	11/04/24 16:40	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2387929	1	10/31/24 22:32	11/01/24 15:31	JPD	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

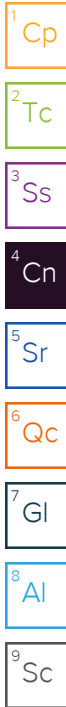


Jeff Carr
Project Manager

Sample Delivery Group (SDG) Narrative

Analysis was filtered in the laboratory.

<u>Lab Sample ID</u>	<u>Project Sample ID</u>	<u>Method</u>
L1790474-01	APW-03-WG-20241016	7470A, 6020B, 6010D
L1790474-02	APW-08-WG-20241016	7470A, 6020B, 6010D
L1790474-03	APW-07-WG-20241016	7470A, 6020B, 6010D
L1790474-04	APW-10S-WG-20241015	7470A, 6020B, 6010D
L1790474-05	APW-10D-WG-20241015	7470A, 6020B, 6010D
L1790474-06	APW-06S-WG-20241016	7470A, 6020B, 6010D
L1790474-07	APW-06D-WG-20241016	7470A, 6020B, 6010D
L1790474-08	APW-05R-WG-20241016	7470A, 6010D, 6020B
L1790474-09	APW-09-WG-20241017	7470A, 6010D, 6020B
L1790474-10	APW-02-WG-20241015	7470A, 6010D, 6020B
L1790474-11	APW-01R-WG-20241015	7470A, 6010D, 6020B
L1790474-12	APW-04-WG-20241017	7470A, 6010D, 6020B
L1790474-14	DUP-01-WG-20241016	7470A, 6010D, 6020B
L1790474-15	DUP-02-WG-20241017	7470A, 6010D, 6020B
R4141842-3		6020B



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	587		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	10.5		1.00	1	10/21/2024 22:37	WG2385378
Fluoride	ND		0.150	1	10/21/2024 22:37	WG2385378
Sulfate	271		50.0	10	10/22/2024 03:05	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.94	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-01 WG2385247: 7.94 at 18.9C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 18:04	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:35	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	4.41		0.200	1	11/01/2024 14:07	WG2387810
Boron,Dissolved	4.38		0.200	1	11/03/2024 15:11	WG2393512
Calcium	123		1.00	1	11/01/2024 14:07	WG2387810
Calcium,Dissolved	121		1.00	1	11/03/2024 15:11	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 14:52	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 17:36	WG2387793
Arsenic	ND		0.00200	1	11/01/2024 14:52	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793
Barium	0.108		0.00200	1	11/01/2024 14:52	WG2387926
Barium,Dissolved	0.103		0.00200	1	11/01/2024 17:36	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 14:52	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 14:52	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 17:36	WG2387793
Chromium	ND		0.00200	1	11/01/2024 14:52	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 14:52	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793
Lead	ND		0.00200	1	11/01/2024 14:52	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793
Lithium	0.0328		0.00200	1	11/01/2024 14:52	WG2387926
Lithium,Dissolved	0.0357		0.00200	1	11/01/2024 17:36	WG2387793
Molybdenum	0.0608		0.00500	1	11/01/2024 14:52	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.0626		0.00500	1	11/01/2024 17:36	WG2387793
Selenium	ND		0.00200	1	11/01/2024 14:52	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793
Thallium	ND		0.00200	1	11/01/2024 14:52	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 17:36	WG2387793

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	403		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	8.61		1.00	1	10/21/2024 22:50	WG2385378
Fluoride	ND		0.150	1	10/21/2024 22:50	WG2385378
Sulfate	29.4		5.00	1	10/21/2024 22:50	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.33	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-02 WG2385247: 7.33 at 19.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 18:37	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:37	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	11/01/2024 14:12	WG2387810
Boron,Dissolved	ND		0.200	1	11/03/2024 15:13	WG2393512
Calcium	102		1.00	1	11/01/2024 14:12	WG2387810
Calcium,Dissolved	99.9		1.00	1	11/03/2024 15:13	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:42	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 17:39	WG2387793
Arsenic	ND		0.00200	1	11/01/2024 15:42	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 17:39	WG2387793
Barium	0.192		0.00200	1	11/01/2024 15:42	WG2387926
Barium,Dissolved	0.188		0.00200	1	11/01/2024 17:39	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 15:42	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 17:39	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 15:42	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 17:39	WG2387793
Chromium	0.00738		0.00200	1	11/01/2024 15:42	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 17:39	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 15:42	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 17:39	WG2387793
Lead	ND		0.00200	1	11/01/2024 15:42	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 17:39	WG2387793
Lithium	0.0187		0.00200	1	11/01/2024 15:42	WG2387926
Lithium,Dissolved	0.0196		0.00200	1	11/01/2024 17:39	WG2387793
Molybdenum	ND		0.00500	1	11/01/2024 15:42	WG2387926

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	ND		0.00500	1	11/01/2024 17:39	WG2387793
Selenium	0.0187		0.00200	1	11/01/2024 15:42	WG2387926
Selenium,Dissolved	0.0193		0.00200	1	11/01/2024 17:39	WG2387793
Thallium	ND		0.00200	1	11/01/2024 15:42	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 17:39	WG2387793

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	741		13.3	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	9.63		1.00	1	10/21/2024 23:03	WG2385378
Fluoride	ND		0.150	1	10/21/2024 23:03	WG2385378
Sulfate	46.3		5.00	1	10/21/2024 23:03	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.93	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-03 WG2385247: 6.93 at 19C

Mercury by Method 7470A

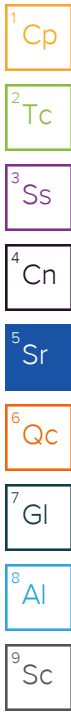
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 18:39	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:40	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	0.228		0.200	1	11/01/2024 14:13	WG2387810
Boron,Dissolved	0.225		0.200	1	11/03/2024 15:18	WG2393512
Calcium	219		1.00	1	11/01/2024 14:13	WG2387810
Calcium,Dissolved	171		1.00	1	11/03/2024 15:18	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:45	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 17:42	WG2387793
Arsenic	ND		0.00200	1	11/01/2024 15:45	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793
Barium	0.351		0.00200	1	11/01/2024 15:45	WG2387926
Barium,Dissolved	0.265		0.00200	1	11/01/2024 17:42	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 15:45	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 15:45	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 17:42	WG2387793
Chromium	ND		0.00200	1	11/01/2024 15:45	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 15:45	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793
Lead	ND		0.00200	1	11/01/2024 15:45	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793
Lithium	0.0169		0.00200	1	11/01/2024 15:45	WG2387926
Lithium,Dissolved	0.0173		0.00200	1	11/01/2024 17:42	WG2387793
Molybdenum	ND		0.00500	1	11/01/2024 15:45	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	ND		0.00500	1	11/01/2024 17:42	WG2387793
Selenium	ND		0.00200	1	11/01/2024 15:45	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793
Thallium	ND		0.00200	1	11/01/2024 15:45	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 17:42	WG2387793

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	758		20.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	13.2		1.00	1	10/21/2024 23:16	WG2385378
Fluoride	ND		0.150	1	10/21/2024 23:16	WG2385378
Sulfate	ND		5.00	1	10/21/2024 23:16	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.16	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-04 WG2385247: 7.16 at 19.3C

Mercury by Method 7470A

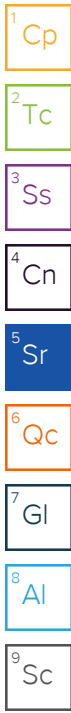
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 18:41	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:42	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	0.567		0.200	1	11/01/2024 14:15	WG2387810
Boron,Dissolved	0.562		0.200	1	11/03/2024 15:19	WG2393512
Calcium	162		1.00	1	11/01/2024 14:15	WG2387810
Calcium,Dissolved	152		1.00	1	11/03/2024 15:19	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:48	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 18:09	WG2387793
Arsenic	0.190		0.00200	1	11/01/2024 15:48	WG2387926
Arsenic,Dissolved	0.0557		0.00200	1	11/01/2024 18:09	WG2387793
Barium	0.474		0.0100	5	11/01/2024 16:26	WG2387926
Barium,Dissolved	0.305		0.00200	1	11/01/2024 18:09	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 15:48	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 18:09	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 15:48	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 18:09	WG2387793
Chromium	ND		0.00200	1	11/01/2024 15:48	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 18:09	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 15:48	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 18:09	WG2387793
Lead	ND		0.00200	1	11/01/2024 15:48	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 18:09	WG2387793
Lithium	0.0297		0.00200	1	11/01/2024 15:48	WG2387926
Lithium,Dissolved	0.0296		0.00200	1	11/01/2024 18:09	WG2387793
Molybdenum	ND		0.00500	1	11/01/2024 15:48	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	ND		0.00500	1	11/01/2024 18:09	WG2387793
Selenium	ND		0.00200	1	11/01/2024 15:48	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 18:09	WG2387793
Thallium	ND		0.00200	1	11/01/2024 15:48	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 18:09	WG2387793

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	447		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	15.0		1.00	1	10/21/2024 23:54	WG2385378
Fluoride	ND		0.150	1	10/21/2024 23:54	WG2385378
Sulfate	32.9		5.00	1	10/21/2024 23:54	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.31	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-05 WG2385247: 7.31 at 19.3C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:04	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:49	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	11/01/2024 14:17	WG2387810
Boron,Dissolved	ND		0.200	1	11/03/2024 15:21	WG2393512
Calcium	129		1.00	1	11/01/2024 14:17	WG2387810
Calcium,Dissolved	113		1.00	1	11/03/2024 15:21	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:51	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 17:48	WG2387793
Arsenic	ND		0.00200	1	11/01/2024 15:51	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793
Barium	0.342		0.00200	1	11/01/2024 15:51	WG2387926
Barium,Dissolved	0.334		0.00200	1	11/01/2024 17:48	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 15:51	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 15:51	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 17:48	WG2387793
Chromium	ND		0.00200	1	11/01/2024 15:51	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793
Cobalt	0.00242		0.00200	1	11/01/2024 15:51	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793
Lead	ND		0.00200	1	11/01/2024 15:51	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793
Lithium	0.0147		0.00200	1	11/01/2024 15:51	WG2387926
Lithium,Dissolved	0.0156		0.00200	1	11/01/2024 17:48	WG2387793
Molybdenum	ND		0.00500	1	11/01/2024 15:51	WG2387926

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	ND		0.00500	1	11/01/2024 17:48	WG2387793
Selenium	ND		0.00200	1	11/01/2024 15:51	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793
Thallium	ND		0.00200	1	11/01/2024 15:51	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 17:48	WG2387793

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	599		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	19.4		1.00	1	10/22/2024 00:06	WG2385378
Fluoride	ND		0.150	1	10/22/2024 00:06	WG2385378
Sulfate	148		5.00	1	10/22/2024 00:06	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.27	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-06 WG2385247: 7.27 at 19.2C

Mercury by Method 7470A

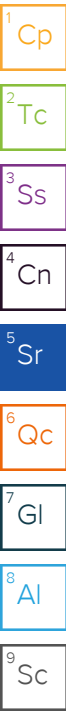
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:07	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:52	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	4.58		0.200	1	11/01/2024 13:55	WG2387810
Boron,Dissolved	4.60		0.200	1	11/03/2024 15:22	WG2393512
Calcium	126		1.00	1	11/01/2024 13:55	WG2387810
Calcium,Dissolved	112		1.00	1	11/03/2024 15:22	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:54	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 17:51	WG2387793
Arsenic	ND		0.00200	1	11/01/2024 15:54	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793
Barium	0.233		0.00200	1	11/01/2024 15:54	WG2387926
Barium,Dissolved	0.162		0.00200	1	11/01/2024 17:51	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 15:54	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 15:54	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 17:51	WG2387793
Chromium	ND		0.00200	1	11/01/2024 15:54	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 15:54	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793
Lead	ND		0.00200	1	11/01/2024 15:54	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793
Lithium	0.0370		0.00200	1	11/01/2024 15:54	WG2387926
Lithium,Dissolved	0.0393		0.00200	1	11/01/2024 17:51	WG2387793
Molybdenum	0.187		0.00500	1	11/01/2024 15:54	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.189		0.00500	1	11/01/2024 17:51	WG2387793
Selenium	ND		0.00200	1	11/01/2024 15:54	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793
Thallium	ND		0.00200	1	11/01/2024 15:54	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 17:51	WG2387793

- ¹Cp
- ²Tc
- ³Ss
- ⁴Cn
- ⁵Sr
- ⁶Qc
- ⁷Gl
- ⁸Al
- ⁹Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	568		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	14.7		1.00	1	10/22/2024 00:19	WG2385378
Fluoride	ND		0.150	1	10/22/2024 00:19	WG2385378
Sulfate	214		50.0	10	10/22/2024 03:55	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.42	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-07 WG2385247: 7.42 at 19.2C

Mercury by Method 7470A

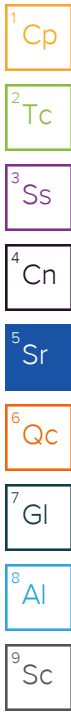
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:09	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:54	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	3.99		0.200	1	11/01/2024 14:18	WG2387810
Boron,Dissolved	4.03		0.200	1	11/03/2024 15:24	WG2393512
Calcium	120		1.00	1	11/01/2024 14:18	WG2387810
Calcium,Dissolved	118		1.00	1	11/03/2024 15:24	WG2393512

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 16:08	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 17:54	WG2387793
Arsenic	0.0103		0.00200	1	11/01/2024 16:08	WG2387926
Arsenic,Dissolved	0.00485		0.00200	1	11/01/2024 17:54	WG2387793
Barium	0.119		0.00200	1	11/01/2024 16:08	WG2387926
Barium,Dissolved	0.113		0.00200	1	11/01/2024 17:54	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 16:08	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 17:54	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 16:08	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 17:54	WG2387793
Chromium	ND		0.00200	1	11/01/2024 16:08	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 17:54	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 16:08	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 17:54	WG2387793
Lead	ND		0.00200	1	11/01/2024 16:08	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 17:54	WG2387793
Lithium	0.0168		0.00200	1	11/01/2024 16:08	WG2387926
Lithium,Dissolved	0.0173		0.00200	1	11/01/2024 17:54	WG2387793
Molybdenum	0.0527		0.00500	1	11/01/2024 16:08	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.0542		0.00500	1	11/01/2024 17:54	WG2387793
Selenium	ND		0.00200	1	11/01/2024 16:08	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 17:54	WG2387793
Thallium	ND		0.00200	1	11/01/2024 16:08	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 17:54	WG2387793

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	560		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	18.9		1.00	1	10/22/2024 00:32	WG2385378
Fluoride	0.199		0.150	1	10/22/2024 00:32	WG2385378
Sulfate	192		5.00	1	10/22/2024 00:32	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.53	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-08 WG2385247: 7.53 at 19.1C

Mercury by Method 7470A

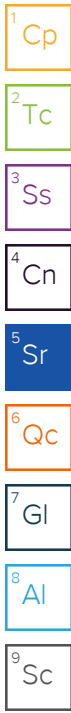
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:12	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:57	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	6.19		0.200	1	11/01/2024 14:20	WG2387810
Boron,Dissolved	6.29		0.200	1	10/31/2024 19:35	WG2387787
Calcium	111		1.00	1	11/01/2024 14:20	WG2387810
Calcium,Dissolved	111		1.00	1	10/31/2024 19:35	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 16:11	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 18:12	WG2387793
Arsenic	0.00236		0.00200	1	11/01/2024 16:11	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793
Barium	0.158		0.00200	1	11/01/2024 16:11	WG2387926
Barium,Dissolved	0.116		0.00200	1	11/01/2024 18:12	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 16:11	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 16:11	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 18:12	WG2387793
Chromium	ND		0.00200	1	11/01/2024 16:11	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 16:11	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793
Lead	0.00237		0.00200	1	11/01/2024 16:11	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793
Lithium	0.0314		0.00200	1	11/01/2024 16:11	WG2387926
Lithium,Dissolved	0.0316		0.00200	1	11/01/2024 18:12	WG2387793
Molybdenum	0.164		0.00500	1	11/01/2024 16:11	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.168		0.00500	1	11/01/2024 18:12	WG2387793
Selenium	ND		0.00200	1	11/01/2024 16:11	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793
Thallium	ND		0.00200	1	11/01/2024 16:11	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 18:12	WG2387793

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	370		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	10.7		1.00	1	10/22/2024 00:45	WG2385378
Fluoride	ND		0.150	1	10/22/2024 00:45	WG2385378
Sulfate	40.8		5.00	1	10/22/2024 00:45	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.51	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-09 WG2385247: 7.51 at 19.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:14	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/22/2024 18:59	WG2385490

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	0.471		0.200	1	11/01/2024 14:22	WG2387810
Boron,Dissolved	0.466		0.200	1	10/31/2024 19:37	WG2387787
Calcium	88.4		1.00	1	11/01/2024 14:22	WG2387810
Calcium,Dissolved	89.4		1.00	1	10/31/2024 19:37	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 16:14	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 18:15	WG2387793
Arsenic	0.00219		0.00200	1	11/01/2024 16:14	WG2387926
Arsenic,Dissolved	0.00210		0.00200	1	11/01/2024 18:15	WG2387793
Barium	0.116		0.00200	1	11/01/2024 16:14	WG2387926
Barium,Dissolved	0.111		0.00200	1	11/01/2024 18:15	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 16:14	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 18:15	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 16:14	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 18:15	WG2387793
Chromium	0.00338		0.00200	1	11/01/2024 16:14	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 18:15	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 16:14	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 18:15	WG2387793
Lead	ND		0.00200	1	11/01/2024 16:14	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 18:15	WG2387793
Lithium	0.0160		0.00200	1	11/01/2024 16:14	WG2387926
Lithium,Dissolved	0.0162		0.00200	1	11/01/2024 18:15	WG2387793
Molybdenum	0.0196		0.00500	1	11/01/2024 16:14	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.0194		0.00500	1	11/01/2024 18:15	WG2387793
Selenium	0.0182		0.00200	1	11/01/2024 16:14	WG2387926
Selenium,Dissolved	0.0191		0.00200	1	11/01/2024 18:15	WG2387793
Thallium	ND		0.00200	1	11/01/2024 16:14	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 18:15	WG2387793

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	816		13.3	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	ND		10.0	10	10/22/2024 00:57	WG2385378
Fluoride	ND		1.50	10	10/22/2024 00:57	WG2385378
Sulfate	385		50.0	10	10/22/2024 00:57	WG2385378

Sample Narrative:

L1790474-10 WG2385378: Dilution due to matrix impact on instrumentation at lower dilution

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.20	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-10 WG2385247: 7.2 at 19.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:16	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/24/2024 15:59	WG2385970

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	8.09		0.200	1	11/01/2024 14:23	WG2387810
Boron,Dissolved	8.21		0.200	1	10/31/2024 19:38	WG2387787
Calcium	170		1.00	1	11/01/2024 14:23	WG2387810
Calcium,Dissolved	155		1.00	1	10/31/2024 19:38	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 16:17	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 18:19	WG2387793
Arsenic	0.0267		0.00200	1	11/01/2024 16:17	WG2387926
Arsenic,Dissolved	0.00280		0.00200	1	11/01/2024 18:19	WG2387793
Barium	0.173		0.00200	1	11/01/2024 16:17	WG2387926
Barium,Dissolved	0.141		0.00200	1	11/01/2024 18:19	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 16:17	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 18:19	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 16:17	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 18:19	WG2387793
Chromium	0.0191		0.00200	1	11/01/2024 16:17	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 18:19	WG2387793
Cobalt	0.00570		0.00200	1	11/01/2024 16:17	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 18:19	WG2387793
Lead	0.0176		0.00200	1	11/01/2024 16:17	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 18:19	WG2387793

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Lithium	0.0480		0.00200	1	11/01/2024 16:17	WG2387926
Lithium,Dissolved	0.0444		0.00200	1	11/01/2024 18:19	WG2387793
Molybdenum	0.129		0.00500	1	11/01/2024 16:17	WG2387926
Molybdenum,Dissolved	0.163		0.00500	1	11/01/2024 18:19	WG2387793
Selenium	ND		0.00200	1	11/01/2024 16:17	WG2387926
Selenium,Dissolved	ND		0.00200	1	11/01/2024 18:19	WG2387793
Thallium	ND		0.00200	1	11/01/2024 16:17	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 18:19	WG2387793

- 1
Cp
- 2
Tc
- 3
Ss
- 4
Cn
- 5
Sr
- 6
Qc
- 7
Gl
- 8
Al
- 9
Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	384		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	6.15		1.00	1	10/22/2024 01:10	WG2385378
Fluoride	ND		0.150	1	10/22/2024 01:10	WG2385378
Sulfate	58.5		5.00	1	10/22/2024 01:10	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	6.85	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-11 WG2385247: 6.85 at 19C

Mercury by Method 7470A

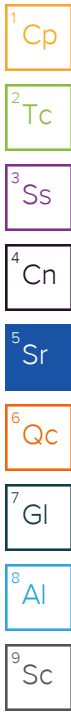
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:19	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/24/2024 16:07	WG2385970

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	0.242		0.200	1	11/01/2024 14:25	WG2387810
Boron,Dissolved	0.238		0.200	1	10/31/2024 19:40	WG2387787
Calcium	89.5		1.00	1	11/01/2024 14:25	WG2387810
Calcium,Dissolved	91.1		1.00	1	10/31/2024 19:40	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 16:20	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 18:22	WG2387793
Arsenic	ND		0.00200	1	11/01/2024 16:20	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 18:22	WG2387793
Barium	0.165		0.00200	1	11/01/2024 16:20	WG2387926
Barium,Dissolved	0.162		0.00200	1	11/01/2024 18:22	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 16:20	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 18:22	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 16:20	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 18:22	WG2387793
Chromium	0.00206		0.00200	1	11/01/2024 16:20	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 18:22	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 16:20	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 18:22	WG2387793
Lead	ND		0.00200	1	11/01/2024 16:20	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 18:22	WG2387793
Lithium	0.0152		0.00200	1	11/01/2024 16:20	WG2387926
Lithium,Dissolved	0.0165		0.00200	1	11/01/2024 18:22	WG2387793
Molybdenum	ND		0.00500	1	11/01/2024 16:20	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	ND		0.00500	1	11/01/2024 18:22	WG2387793
Selenium	0.00327		0.00200	1	11/01/2024 16:20	WG2387926
Selenium,Dissolved	0.00341		0.00200	1	11/01/2024 18:22	WG2387793
Thallium	ND		0.00200	1	11/01/2024 16:20	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 18:22	WG2387793

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	418		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	10.1		1.00	1	10/22/2024 01:23	WG2385378
Fluoride	ND		0.150	1	10/22/2024 01:23	WG2385378
Sulfate	65.6		5.00	1	10/22/2024 01:23	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.46	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-12 WG2385247: 7.46 at 19C

Mercury by Method 7470A

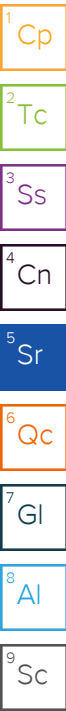
Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:21	WG2385483
Mercury,Dissolved	ND		0.000200	1	10/24/2024 16:10	WG2385970

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	1.07		0.200	1	11/01/2024 14:27	WG2387810
Boron,Dissolved	1.10		0.200	1	10/31/2024 19:45	WG2387787
Calcium	101		1.00	1	11/01/2024 14:27	WG2387810
Calcium,Dissolved	102		1.00	1	10/31/2024 19:45	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 16:23	WG2387926
Antimony,Dissolved	ND		0.00400	1	11/01/2024 18:25	WG2387793
Arsenic	0.00219		0.00200	1	11/01/2024 16:23	WG2387926
Arsenic,Dissolved	ND		0.00200	1	11/01/2024 18:25	WG2387793
Barium	0.142		0.00200	1	11/01/2024 16:23	WG2387926
Barium,Dissolved	0.126		0.00200	1	11/01/2024 18:25	WG2387793
Beryllium	ND		0.00200	1	11/01/2024 16:23	WG2387926
Beryllium,Dissolved	ND		0.00200	1	11/01/2024 18:25	WG2387793
Cadmium	ND		0.00100	1	11/01/2024 16:23	WG2387926
Cadmium,Dissolved	ND		0.00100	1	11/01/2024 18:25	WG2387793
Chromium	0.00762		0.00200	1	11/01/2024 16:23	WG2387926
Chromium,Dissolved	ND		0.00200	1	11/01/2024 18:25	WG2387793
Cobalt	ND		0.00200	1	11/01/2024 16:23	WG2387926
Cobalt,Dissolved	ND		0.00200	1	11/01/2024 18:25	WG2387793
Lead	ND		0.00200	1	11/01/2024 16:23	WG2387926
Lead,Dissolved	ND		0.00200	1	11/01/2024 18:25	WG2387793
Lithium	0.0293		0.00200	1	11/01/2024 16:23	WG2387926
Lithium,Dissolved	0.0314		0.00200	1	11/01/2024 18:25	WG2387793
Molybdenum	0.0458		0.00500	1	11/01/2024 16:23	WG2387926



Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.0502		0.00500	1	11/01/2024 18:25	WG2387793
Selenium	0.0176		0.00200	1	11/01/2024 16:23	WG2387926
Selenium,Dissolved	0.0172		0.00200	1	11/01/2024 18:25	WG2387793
Thallium	ND		0.00200	1	11/01/2024 16:23	WG2387926
Thallium,Dissolved	ND		0.00200	1	11/01/2024 18:25	WG2387793

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	322		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	8.81		1.00	1	10/22/2024 01:36	WG2385378
Fluoride	ND		0.150	1	10/22/2024 01:36	WG2385378
Sulfate	13.9		5.00	1	10/22/2024 01:36	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.97	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-13 WG2385247: 7.97 at 19C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/25/2024 19:24	WG2385483

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	11/01/2024 13:37	WG2387810
Calcium	71.5		1.00	1	11/01/2024 13:37	WG2387810

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:14	WG2387929
Arsenic	ND		0.00200	1	11/01/2024 15:14	WG2387929
Barium	0.0182		0.00200	1	11/01/2024 15:14	WG2387929
Beryllium	ND		0.00200	1	11/01/2024 15:14	WG2387929
Cadmium	ND		0.00100	1	11/01/2024 15:14	WG2387929
Chromium	ND		0.00200	1	11/01/2024 15:14	WG2387929
Cobalt	ND		0.00200	1	11/01/2024 15:14	WG2387929
Lead	ND		0.00200	1	11/01/2024 15:14	WG2387929
Lithium	0.00219		0.00200	1	11/01/2024 15:14	WG2387929
Molybdenum	ND		0.00500	1	11/01/2024 15:14	WG2387929
Selenium	ND		0.00200	1	11/01/2024 15:14	WG2387929
Thallium	ND		0.00200	1	11/01/2024 15:14	WG2387929

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	543		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	18.7		1.00	1	10/22/2024 01:48	WG2385378
Fluoride	0.177		0.150	1	10/22/2024 01:48	WG2385378
Sulfate	191		5.00	1	10/22/2024 01:48	WG2385378

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.54	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-14 WG2385247: 7.54 at 19.1C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/24/2024 18:48	WG2385487
Mercury,Dissolved	ND		0.000200	1	10/24/2024 16:12	WG2385970

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	6.23		0.200	1	11/01/2024 13:38	WG2387810
Boron,Dissolved	6.28		0.200	1	10/31/2024 19:47	WG2387787
Calcium	112		1.00	1	11/01/2024 13:38	WG2387810
Calcium,Dissolved	112		1.00	1	10/31/2024 19:47	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:27	WG2387929
Antimony,Dissolved	ND		0.00400	1	11/04/2024 16:37	WG2387797
Arsenic	0.00374		0.00200	1	11/01/2024 15:27	WG2387929
Arsenic,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797
Barium	0.166		0.00200	1	11/01/2024 15:27	WG2387929
Barium,Dissolved	0.117		0.00200	1	11/04/2024 16:37	WG2387797
Beryllium	ND		0.00200	1	11/01/2024 15:27	WG2387929
Beryllium,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797
Cadmium	ND		0.00100	1	11/01/2024 15:27	WG2387929
Cadmium,Dissolved	ND		0.00100	1	11/04/2024 16:37	WG2387797
Chromium	0.00211		0.00200	1	11/01/2024 15:27	WG2387929
Chromium,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797
Cobalt	ND		0.00200	1	11/01/2024 15:27	WG2387929
Cobalt,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797
Lead	ND		0.00200	1	11/01/2024 15:27	WG2387929
Lead,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797
Lithium	0.0304		0.00200	1	11/01/2024 15:27	WG2387929
Lithium,Dissolved	0.0303		0.00200	1	11/04/2024 16:37	WG2387797
Molybdenum	0.165		0.00500	1	11/01/2024 15:27	WG2387929



Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.165		0.00500	1	11/04/2024 16:37	WG2387797
Selenium	ND		0.00200	1	11/01/2024 15:27	WG2387929
Selenium,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797
Thallium	ND		0.00200	1	11/01/2024 15:27	WG2387929
Thallium,Dissolved	ND		0.00200	1	11/04/2024 16:37	WG2387797

- ¹Cp
- ²Tc
- ³Ss
- ⁴Cn
- ⁵Sr
- ⁶Qc
- ⁷Gl
- ⁸Al
- ⁹Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	371		10.0	1	10/19/2024 17:11	WG2385254

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	11.1		1.00	1	10/22/2024 01:59	WG2385382
Fluoride	0.203		0.150	1	10/22/2024 01:59	WG2385382
Sulfate	41.5		5.00	1	10/22/2024 01:59	WG2385382

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.56	<u>T8</u>	1	10/18/2024 22:40	WG2385247

Sample Narrative:

L1790474-15 WG2385247: 7.56 at 19.4C

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/24/2024 18:59	WG2385487
Mercury,Dissolved	ND		0.000200	1	10/24/2024 16:15	WG2385970

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	0.466		0.200	1	11/01/2024 13:40	WG2387810
Boron,Dissolved	0.469		0.200	1	10/31/2024 19:49	WG2387787
Calcium	87.5		1.00	1	11/01/2024 13:40	WG2387810
Calcium,Dissolved	89.7		1.00	1	10/31/2024 19:49	WG2387787

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Antimony	ND		0.00400	1	11/01/2024 15:31	WG2387929
Antimony,Dissolved	ND		0.00400	1	11/04/2024 16:40	WG2387797
Arsenic	0.00210		0.00200	1	11/01/2024 15:31	WG2387929
Arsenic,Dissolved	0.00213		0.00200	1	11/04/2024 16:40	WG2387797
Barium	0.121		0.00200	1	11/01/2024 15:31	WG2387929
Barium,Dissolved	0.114		0.00200	1	11/04/2024 16:40	WG2387797
Beryllium	ND		0.00200	1	11/01/2024 15:31	WG2387929
Beryllium,Dissolved	ND		0.00200	1	11/04/2024 16:40	WG2387797
Cadmium	ND		0.00100	1	11/01/2024 15:31	WG2387929
Cadmium,Dissolved	ND		0.00100	1	11/04/2024 16:40	WG2387797
Chromium	0.00350		0.00200	1	11/01/2024 15:31	WG2387929
Chromium,Dissolved	ND		0.00200	1	11/04/2024 16:40	WG2387797
Cobalt	ND		0.00200	1	11/01/2024 15:31	WG2387929
Cobalt,Dissolved	ND		0.00200	1	11/04/2024 16:40	WG2387797
Lead	ND		0.00200	1	11/01/2024 15:31	WG2387929
Lead,Dissolved	ND		0.00200	1	11/04/2024 16:40	WG2387797
Lithium	0.0149		0.00200	1	11/01/2024 15:31	WG2387929
Lithium,Dissolved	0.0151		0.00200	1	11/04/2024 16:40	WG2387797
Molybdenum	0.0191		0.00500	1	11/01/2024 15:31	WG2387929

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Metals (ICPMS) by Method 6020B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Molybdenum,Dissolved	0.0190		0.00500	1	11/04/2024 16:40	WG2387797
Selenium	0.0190		0.00200	1	11/01/2024 15:31	WG2387929
Selenium,Dissolved	0.0175		0.00200	1	11/04/2024 16:40	WG2387797
Thallium	ND		0.00200	1	11/01/2024 15:31	WG2387929
Thallium,Dissolved	ND		0.00200	1	11/04/2024 16:40	WG2387797

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R4136127-1 10/19/24 17:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		10.0	10.0

1 Cp

2 Tc

3 Ss

L1790437-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1790437-07 10/19/24 17:11 • (DUP) R4136127-3 10/19/24 17:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	304	309	1	1.63		10

4 Cn

5 Sr

L1790474-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1790474-15 10/19/24 17:11 • (DUP) R4136127-4 10/19/24 17:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	371	385	1	3.70		10

6 Qc

7 Gl

8 Al

Laboratory Control Sample (LCS)

(LCS) R4136127-2 10/19/24 17:11

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Dissolved Solids	8800	8890	101	85.0-115	

9 Sc

Method Blank (MB)

(MB) R4135722-1 10/21/24 20:56

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.547	1.00
Fluoride	U		0.0761	0.150
Sulfate	U		0.637	5.00

L1790069-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1790069-07 10/21/24 21:34 • (DUP) R4135722-3 10/22/24 05:37

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	33.4	34.4	1	2.94		15
Fluoride	0.412	0.389	1	5.72		15
Sulfate	19.2	20.3	1	5.98		15

L1790069-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1790069-11 10/21/24 22:25 • (DUP) R4135722-6 10/22/24 06:15

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	ND	ND	1	0.000		15
Fluoride	ND	ND	1	0.000		15
Sulfate	ND	ND	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R4135722-2 10/21/24 21:08

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Chloride	40.0	38.7	96.9	80.0-120	
Fluoride	8.00	8.23	103	80.0-120	
Sulfate	40.0	39.0	97.4	80.0-120	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1790069-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790069-07 10/21/24 21:34 • (MS) R4135722-4 10/22/24 05:50 • (MSD) R4135722-5 10/22/24 06:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	33.4	64.1	65.8	76.7	81.2	1	80.0-120	J6		2.73	15
Fluoride	8.00	0.412	8.08	8.39	95.9	99.7	1	80.0-120			3.67	15
Sulfate	40.0	19.2	53.5	54.4	85.8	88.2	1	80.0-120			1.77	15

L1790069-11 Original Sample (OS) • Matrix Spike (MS)

(OS) L1790069-11 10/21/24 22:25 • (MS) R4135722-7 10/22/24 06:28

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40.0	ND	38.0	95.0	1	80.0-120	
Fluoride	8.00	ND	7.99	99.9	1	80.0-120	
Sulfate	40.0	ND	38.2	95.6	1	80.0-120	

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R4136364-1 10/22/24 01:24

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.547	1.00
Fluoride	U		0.0761	0.150
Sulfate	U		0.637	5.00

L1790474-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1790474-15 10/22/24 01:59 • (DUP) R4136364-3 10/22/24 14:28

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	11.1	11.1	1	0.156		15
Fluoride	0.203	0.151	1	29.8	J3	15
Sulfate	41.5	41.5	1	0.0231		15

Laboratory Control Sample (LCS)

(LCS) R4136364-2 10/22/24 01:42

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Chloride	40.0	41.9	105	80.0-120	
Fluoride	8.00	8.57	107	80.0-120	
Sulfate	40.0	42.9	107	80.0-120	

L1790474-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-15 10/22/24 01:59 • (MS) R4136364-4 10/22/24 14:45 • (MSD) R4136364-5 10/22/24 15:03

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chloride	40.0	11.1	47.0	45.5	89.8	86.0	1	80.0-120			3.34	15
Fluoride	8.00	0.203	8.01	7.75	97.5	94.4	1	80.0-120			3.20	15
Sulfate	40.0	41.5	72.6	70.2	77.7	71.6	1	80.0-120	J6	J6	3.40	15

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1790474-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1790474-01 10/18/24 22:40 • (DUP) R4134842-2 10/18/24 22:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.94	7.95	1	0.126		1

Sample Narrative:

OS: 7.94 at 18.9C
 DUP: 7.95 at 18.9C

L1790606-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1790606-02 10/18/24 22:40 • (DUP) R4134842-3 10/18/24 22:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.56	6.57	1	0.152		1

Sample Narrative:

OS: 6.56 at 19.3C
 DUP: 6.57 at 19.2C

Laboratory Control Sample (LCS)

(LCS) R4134842-1 10/18/24 22:40

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	10.0	100	99.0-101	

Sample Narrative:

LCS: 10.02 at 19.4C



Method Blank (MB)

(MB) R4137876-1 10/25/24 17:59

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury	U		0.0000700	0.000200

1 Cp

2 Tc

3 Ss

Laboratory Control Sample (LCS)

(LCS) R4137876-2 10/25/24 18:02

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Mercury	0.00300	0.00320	107	80.0-120	

4 Cn

5 Sr

L1790474-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-01 10/25/24 18:04 • (MS) R4137876-4 10/25/24 18:09 • (MSD) R4137876-5 10/25/24 18:12

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.00300	ND	0.00318	0.00323	106	108	1	75.0-125			1.56	20

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4137442-1 10/24/24 18:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.0000700	0.000200

1 Cp

2 Tc

3 Ss

Laboratory Control Sample (LCS)

(LCS) R4137442-2 10/24/24 18:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00265	88.3	80.0-120	

4 Cn

5 Sr

L1790474-14 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-14 10/24/24 18:48 • (MS) R4137442-4 10/24/24 18:54 • (MSD) R4137442-5 10/24/24 18:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00260	0.00262	86.7	87.2	1	75.0-125			0.581	20

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4136138-1 10/22/24 17:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.0000700	0.000200

Laboratory Control Sample (LCS)

(LCS) R4136138-2 10/22/24 17:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury,Dissolved	0.00300	0.00303	101	80.0-120	

L1789540-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1789540-01 10/22/24 17:56 • (MS) R4136138-4 10/22/24 18:01 • (MSD) R4136138-5 10/22/24 18:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00303	0.00316	101	105	1	75.0-125			4.24	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4137309-1 10/24/24 15:43

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.0000700	0.000200

Laboratory Control Sample (LCS)

(LCS) R4137309-2 10/24/24 15:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury,Dissolved	0.00300	0.00346	115	80.0-120	

L1791012-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1791012-05 10/24/24 15:49 • (MS) R4137309-4 10/24/24 15:54 • (MSD) R4137309-5 10/24/24 15:56

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00329	0.00309	110	103	1	75.0-125			6.02	20

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R4140519-1 10/31/24 19:24

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Boron,Dissolved	U		0.0200	0.200
Calcium,Dissolved	U		0.0793	1.00

Laboratory Control Sample (LCS)

(LCS) R4140519-2 10/31/24 19:26

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Boron,Dissolved	1.00	0.940	94.0	80.0-120	
Calcium,Dissolved	10.0	9.76	97.6	80.0-120	

L1790615-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790615-01 10/31/24 19:28 • (MS) R4140519-4 10/31/24 19:31 • (MSD) R4140519-5 10/31/24 19:33

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Boron,Dissolved	1.00	ND	1.00	1.02	93.5	95.5	1	75.0-125			1.95	20
Calcium,Dissolved	10.0	166	173	173	69.8	71.8	1	75.0-125	V	V	0.120	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4140949-1 11/01/24 13:52

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Boron	U		0.0200	0.200
Calcium	U		0.0793	1.00

Laboratory Control Sample (LCS)

(LCS) R4140949-2 11/01/24 13:54

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Boron	1.00	0.950	95.0	80.0-120	
Calcium	10.0	9.85	98.5	80.0-120	

L1790474-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-06 11/01/24 13:55 • (MS) R4140949-4 11/01/24 13:59 • (MSD) R4140949-5 11/01/24 14:00

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Boron	1.00	4.58	5.48	5.48	90.5	89.9	1	75.0-125			0.119	20
Calcium	10.0	126	134	134	72.3	75.1	1	75.0-125	V		0.211	20

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R4141402-1 11/03/24 14:38

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Boron,Dissolved	U		0.0200	0.200
Calcium,Dissolved	U		0.0793	1.00

Laboratory Control Sample (LCS)

(LCS) R4141402-2 11/03/24 14:39

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Boron,Dissolved	1.00	0.984	98.4	80.0-120	
Calcium,Dissolved	10.0	9.91	99.1	80.0-120	

L1789575-14 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1789575-14 11/03/24 14:41 • (MS) R4141402-4 11/03/24 14:44 • (MSD) R4141402-5 11/03/24 14:46

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Boron,Dissolved	1.00	ND	0.992	0.997	96.9	97.5	1	75.0-125			0.517	20
Calcium,Dissolved	10.0	52.1	64.4	64.9	123	128	1	75.0-125	V		0.792	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4141034-1 11/01/24 16:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony,Dissolved	U		0.000310	0.00400
Arsenic,Dissolved	U		0.000120	0.00200
Barium,Dissolved	U		0.000500	0.00200
Beryllium,Dissolved	U		0.000200	0.00200
Cadmium,Dissolved	U		0.000120	0.00100
Chromium,Dissolved	U		0.000900	0.00200
Cobalt,Dissolved	U		0.000100	0.00200
Lead,Dissolved	U		0.000500	0.00200
Lithium,Dissolved	U		0.000600	0.00200
Molybdenum,Dissolved	U		0.000500	0.00500
Selenium,Dissolved	U		0.000250	0.00200
Thallium,Dissolved	U		0.000130	0.00200

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R4141034-2 11/01/24 16:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony,Dissolved	0.0500	0.0486	97.1	80.0-120	
Arsenic,Dissolved	0.0500	0.0480	95.9	80.0-120	
Barium,Dissolved	0.0500	0.0451	90.2	80.0-120	
Beryllium,Dissolved	0.0500	0.0484	96.8	80.0-120	
Cadmium,Dissolved	0.0500	0.0508	102	80.0-120	
Chromium,Dissolved	0.0500	0.0500	100	80.0-120	
Cobalt,Dissolved	0.0500	0.0504	101	80.0-120	
Lead,Dissolved	0.0500	0.0469	93.7	80.0-120	
Lithium,Dissolved	0.0500	0.0505	101	80.0-120	
Molybdenum,Dissolved	0.0500	0.0486	97.1	80.0-120	
Selenium,Dissolved	0.0500	0.0481	96.2	80.0-120	
Thallium,Dissolved	0.0500	0.0459	91.7	80.0-120	

L1790387-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790387-01 11/01/24 16:51 • (MS) R4141034-4 11/01/24 16:57 • (MSD) R4141034-5 11/01/24 17:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	ND	0.0506	0.0507	101	101	1	75.0-125			0.205	20
Arsenic,Dissolved	0.0500	ND	0.0488	0.0476	97.1	94.6	1	75.0-125			2.52	20
Barium,Dissolved	0.0500	0.0115	0.0583	0.0590	93.5	95.0	1	75.0-125			1.28	20

L1790387-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790387-01 11/01/24 16:51 • (MS) R4141034-4 11/01/24 16:57 • (MSD) R4141034-5 11/01/24 17:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium,Dissolved	0.0500	ND	0.0487	0.0478	97.5	95.7	1	75.0-125			1.88	20
Cadmium,Dissolved	0.0500	ND	0.0501	0.0494	100	98.8	1	75.0-125			1.34	20
Chromium,Dissolved	0.0500	ND	0.0499	0.0486	99.8	97.1	1	75.0-125			2.73	20
Cobalt,Dissolved	0.0500	ND	0.0499	0.0485	99.8	96.9	1	75.0-125			2.97	20
Lead,Dissolved	0.0500	ND	0.0462	0.0470	92.3	94.0	1	75.0-125			1.83	20
Lithium,Dissolved	0.0500	0.0470	0.0961	0.0959	98.1	97.7	1	75.0-125			0.203	20
Molybdenum,Dissolved	0.0500	ND	0.0510	0.0506	102	101	1	75.0-125			0.730	20
Selenium,Dissolved	0.0500	0.0367	0.0856	0.0857	97.7	97.9	1	75.0-125			0.0998	20
Thallium,Dissolved	0.0500	ND	0.0445	0.0455	89.1	91.1	1	75.0-125			2.27	20

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R4141842-1 11/04/24 16:17

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony,Dissolved	U		0.000310	0.00400
Arsenic,Dissolved	U		0.000120	0.00200
Barium,Dissolved	U		0.000500	0.00200
Beryllium,Dissolved	U		0.000200	0.00200
Cadmium,Dissolved	U		0.000120	0.00100
Chromium,Dissolved	U		0.000900	0.00200
Cobalt,Dissolved	U		0.000100	0.00200
Lead,Dissolved	U		0.000500	0.00200
Lithium,Dissolved	U		0.000600	0.00200
Molybdenum,Dissolved	U		0.000500	0.00500
Selenium,Dissolved	U		0.000250	0.00200
Thallium,Dissolved	U		0.000130	0.00200

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R4141842-2 11/04/24 16:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony,Dissolved	0.0500	0.0502	100	80.0-120	
Arsenic,Dissolved	0.0500	0.0481	96.2	80.0-120	
Barium,Dissolved	0.0500	0.0470	94.0	80.0-120	
Beryllium,Dissolved	0.0500	0.0483	96.5	80.0-120	
Cadmium,Dissolved	0.0500	0.0491	98.2	80.0-120	
Chromium,Dissolved	0.0500	0.0501	100	80.0-120	
Cobalt,Dissolved	0.0500	0.0498	99.7	80.0-120	
Lead,Dissolved	0.0500	0.0479	95.7	80.0-120	
Lithium,Dissolved	0.0500	0.0498	99.6	80.0-120	
Molybdenum,Dissolved	0.0500	0.0474	94.7	80.0-120	
Selenium,Dissolved	0.0500	0.0475	95.1	80.0-120	
Thallium,Dissolved	0.0500	0.0497	99.4	80.0-120	

L1790704-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790704-01 11/04/24 16:24 • (MS) R4141842-4 11/04/24 16:30 • (MSD) R4141842-5 11/04/24 16:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	ND	0.0497	0.0498	99.4	99.7	1	75.0-125			0.257	20
Arsenic,Dissolved	0.0500	ND	0.0493	0.0477	97.9	94.7	1	75.0-125			3.21	20
Barium,Dissolved	0.0500	0.192	0.234	0.234	84.2	83.5	1	75.0-125			0.155	20

L1790704-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790704-01 11/04/24 16:24 • (MS) R4141842-4 11/04/24 16:30 • (MSD) R4141842-5 11/04/24 16:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium,Dissolved	0.0500	ND	0.0480	0.0471	96.1	94.1	1	75.0-125			2.04	20
Cadmium,Dissolved	0.0500	ND	0.0491	0.0480	98.3	96.0	1	75.0-125			2.33	20
Chromium,Dissolved	0.0500	ND	0.0501	0.0486	97.3	94.3	1	75.0-125			3.07	20
Cobalt,Dissolved	0.0500	ND	0.0490	0.0479	98.1	95.8	1	75.0-125			2.35	20
Lead,Dissolved	0.0500	ND	0.0494	0.0466	98.7	93.2	1	75.0-125			5.76	20
Lithium,Dissolved	0.0500	0.00467	0.0532	0.0527	97.1	96.0	1	75.0-125			1.06	20
Molybdenum,Dissolved	0.0500	ND	0.0474	0.0477	94.9	95.4	1	75.0-125			0.583	20
Selenium,Dissolved	0.0500	0.00476	0.0510	0.0508	92.5	92.1	1	75.0-125			0.367	20
Thallium,Dissolved	0.0500	ND	0.0507	0.0487	101	97.4	1	75.0-125			4.06	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Method Blank (MB)

(MB) R4140974-1 11/01/24 14:46

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000310	0.00400
Arsenic	U		0.000120	0.00200
Barium	U		0.000500	0.00200
Beryllium	U		0.000200	0.00200
Cadmium	U		0.000120	0.00100
Chromium	U		0.000900	0.00200
Cobalt	U		0.000100	0.00200
Lead	U		0.000500	0.00200
Lithium	U		0.000600	0.00200
Molybdenum	U		0.000500	0.00500
Selenium	U		0.000250	0.00200
Thallium	U		0.000130	0.00200

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R4140974-2 11/01/24 14:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	0.0500	0.0494	98.9	80.0-120	
Arsenic	0.0500	0.0489	97.8	80.0-120	
Barium	0.0500	0.0471	94.3	80.0-120	
Beryllium	0.0500	0.0489	97.9	80.0-120	
Cadmium	0.0500	0.0513	103	80.0-120	
Chromium	0.0500	0.0514	103	80.0-120	
Cobalt	0.0500	0.0516	103	80.0-120	
Lead	0.0500	0.0493	98.6	80.0-120	
Lithium	0.0500	0.0493	98.7	80.0-120	
Molybdenum	0.0500	0.0485	96.9	80.0-120	
Selenium	0.0500	0.0469	93.7	80.0-120	
Thallium	0.0500	0.0480	96.1	80.0-120	

L1790474-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-01 11/01/24 14:52 • (MS) R4140974-4 11/01/24 14:58 • (MSD) R4140974-5 11/01/24 15:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	ND	0.0507	0.0495	101	99.0	1	75.0-125			2.33	20
Arsenic	0.0500	ND	0.0511	0.0516	98.8	99.8	1	75.0-125			1.04	20
Barium	0.0500	0.108	0.156	0.155	96.1	92.7	1	75.0-125			1.12	20

L1790474-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-01 11/01/24 14:52 • (MS) R4140974-4 11/01/24 14:58 • (MSD) R4140974-5 11/01/24 15:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium	0.0500	ND	0.0488	0.0499	97.7	99.8	1	75.0-125			2.10	20
Cadmium	0.0500	ND	0.0516	0.0515	103	103	1	75.0-125			0.151	20
Chromium	0.0500	ND	0.0514	0.0523	103	105	1	75.0-125			1.69	20
Cobalt	0.0500	ND	0.0510	0.0519	102	104	1	75.0-125			1.61	20
Lead	0.0500	ND	0.0480	0.0490	96.0	98.0	1	75.0-125			2.06	20
Lithium	0.0500	0.0328	0.0810	0.0812	96.5	96.7	1	75.0-125			0.149	20
Molybdenum	0.0500	0.0608	0.110	0.109	99.1	96.5	1	75.0-125			1.19	20
Selenium	0.0500	ND	0.0485	0.0500	96.9	100	1	75.0-125			3.11	20
Thallium	0.0500	ND	0.0464	0.0473	92.7	94.5	1	75.0-125			1.93	20

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R4140919-2 11/01/24 15:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000310	0.00400
Arsenic	U		0.000120	0.00200
Barium	U		0.000500	0.00200
Beryllium	U		0.000200	0.00200
Cadmium	U		0.000120	0.00100
Chromium	U		0.000900	0.00200
Cobalt	U		0.000100	0.00200
Lead	U		0.000500	0.00200
Lithium	U		0.000600	0.00200
Molybdenum	U		0.000500	0.00500
Selenium	U		0.000250	0.00200
Thallium	U		0.000130	0.00200

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R4140919-3 11/01/24 15:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	0.0500	0.0545	109	80.0-120	
Arsenic	0.0500	0.0499	99.8	80.0-120	
Barium	0.0500	0.0497	99.3	80.0-120	
Beryllium	0.0500	0.0479	95.8	80.0-120	
Cadmium	0.0500	0.0475	95.0	80.0-120	
Chromium	0.0500	0.0510	102	80.0-120	
Cobalt	0.0500	0.0505	101	80.0-120	
Lead	0.0500	0.0480	96.1	80.0-120	
Lithium	0.0500	0.0473	94.6	80.0-120	
Molybdenum	0.0500	0.0486	97.3	80.0-120	
Selenium	0.0500	0.0481	96.3	80.0-120	
Thallium	0.0500	0.0458	91.6	80.0-120	

L1790474-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-13 11/01/24 15:14 • (MS) R4140919-5 11/01/24 15:21 • (MSD) R4140919-6 11/01/24 15:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	ND	0.0570	0.0558	113	111	1	75.0-125			2.02	20
Arsenic	0.0500	ND	0.0502	0.0502	99.7	99.7	1	75.0-125			0.0145	20
Barium	0.0500	0.0182	0.0686	0.0685	101	100	1	75.0-125			0.258	20

L1790474-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1790474-13 11/01/24 15:14 • (MS) R4140919-5 11/01/24 15:21 • (MSD) R4140919-6 11/01/24 15:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Beryllium	0.0500	ND	0.0472	0.0489	94.3	97.8	1	75.0-125			3.59	20
Cadmium	0.0500	ND	0.0484	0.0482	96.8	96.4	1	75.0-125			0.409	20
Chromium	0.0500	ND	0.0519	0.0521	101	101	1	75.0-125			0.265	20
Cobalt	0.0500	ND	0.0496	0.0507	99.1	101	1	75.0-125			2.29	20
Lead	0.0500	ND	0.0489	0.0497	97.9	99.4	1	75.0-125			1.48	20
Lithium	0.0500	0.00219	0.0500	0.0519	95.6	99.5	1	75.0-125			3.85	20
Molybdenum	0.0500	ND	0.0504	0.0503	99.8	99.4	1	75.0-125			0.357	20
Selenium	0.0500	ND	0.0493	0.0500	97.7	99.0	1	75.0-125			1.31	20
Thallium	0.0500	ND	0.0467	0.0457	93.3	91.4	1	75.0-125			2.11	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

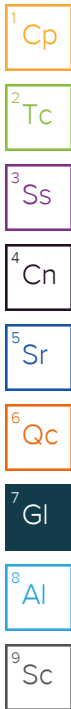
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1,6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Company Name/Address:
ERM - St. Louis, MO
 1968 Craig Road, Suite 100
 Saint Louis, MO 63146

Billing Information:
 Accounts Payable Dept.
 1701 Golf Road, Suite 1-1000
 Rolling Meadows, IL 60008-4242

Analysis / Container / Preservative

Chain of Custody Page 1 of 2



MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubfs/pas-standard-terms.pdf>

Report to:
Randy Homburg

Email To:
 Randy.Homburg@erm.com; Tim.Wilson@erm.co

Project Description:
Grand Tower Energy Center Groundwater 4Q24

City/State Collected:
Grand Tower, IL

Please Circle:
 PT MT ET

Phone: **314-682-3980**

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Arendell

Site/Facility ID #

P.O. #

Collected by (signature):
Marshall Arendell

Rush? (Lab MUST Be Notified)
 ___ Same Day ___ Five Day
 ___ Next Day ___ 5 Day (Rad Only)
 ___ Two Day ___ 10 Day (Rad Only)
 ___ Three Day **Standard**

Quote #

Immediately Packed on Ice N ___ Y **X**

Date Results Needed

No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
APW-03-WG-2024 1016	Grab	GW	56.27	10/16/24	1500	5
APW-08-WG-2024 1016		GW	57.70	10/16/24	1625	5
APW-07-WG-2024 1016		GW	59.28	10/16/24	1745	5
APW-10S-WG-2024 1015		GW	57.73	10/15/24	1700	5
APW-10D-WG-2024 1015		GW	74.26	10/15/24	1535	5
APW-06S-WG-2024 1016		GW	59.80	10/16/24	1035	5
APW-06D-WG-2024 1016		GW	152.56	10/16/24	0915	5
APW-05R-WG-2024 1016		GW	58.50	10/16/24	1225	5
APW-09-WG-2024 1017		GW	59.05	10/17/24	0950	5
APW-02-WG-2024 1015		GW	54.03	10/15/24	1338	5

Anions 125mlHDPE-NoPres	Dissolved Metals 250mlHDPE-NoPres	TDS 1L-HDPE NoPres	Total Metals 250mlHDPE-HNO3	pH 125mlHDPE-NoPres
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X

SDG # **U790474**
 Table # **K001**
 Acctnum: **ERMSCMO**
 Template: **T243415**
 Prelogin: **P1103193**
 PM: **206 - Jeff Carr**
 PB:
 Shipped Via: **FedEX Ground**
 Remarks Sample # (lab only)

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks:
 pH _____ Temp _____
 Flow _____ Other _____
 Samples returned via:
 UPS ___ FedEx ___ Courier _____
 Tracking # _____

Sample Receipt Checklist
 COC Seal Present/Intact: Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 IF Applicable
 VOA Zero Headspace: Y N
 Preservation Correct/Checked: Y N
 RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature)
Marshall Arendell ERM
 Date: **10/17/24**
 Time: **1240**

Date: **10/17/24**
 Time: **1240**

Received by: (Signature)
Jeff Carr
 Date: **10/17/24**
 Time: **1240**

Trip Blank Received: Yes / (No)
 HCL / MeOH
 TBR
 Temp: _____ °C
 Bottles Received: **74**

If preservation required by Login: Date/Time
 Hold:
 Condition:
 NCF / OK

Relinquished by: (Signature)
 Date: _____
 Time: _____

Date: _____
 Time: _____

Received for lab by: (Signature)
Jeff Carr
 Date: **10/18/24**
 Time: **0900**

Date: _____
 Time: _____

Hold:
 Condition:
 NCF / OK

Company Name/Address:
ERM - St. Louis, MO
 1968 Craig Road, Suite 100
 Saint Louis, MO 63146

Billing Information:
Accounts Payable Dept.
 1701 Golf Road, Suite 1-1000
 Rolling Meadows, IL 60008-4242

Pres
Chk

Analysis / Container / Preservative

Report to:
Randy Homburg

Email To:
 Randy.Homburg@erm.com; Tim.Wilson@erm.co

Project Description:
Grand Tower Energy Center Groundwater 4Q24

City/State
 Collected: **Grand Tower, IL**

Please Circle:
 PT MT **ET**

Phone: **314-682-3980**

Client Project #
0599247

Lab Project #
ERMSCMO-0599247

Collected by (print):
Marshall Arendell

Site/Facility ID #

P.O. #

Collected by (signature):
Marshall Arendell

Rush? (Lab MUST Be Notified)
 ___ Same Day ___ Five Day
 ___ Next Day ___ 5 Day (Rad Only)
 ___ Two Day ___ 10 Day (Rad Only)
 ___ Three Day **Standard**

Quote #

Immediately Packed on Ice N ___ Y **X**

Date Results Needed

No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Anions 125mlHDPE-NoPres	Dissolved Metals 250mlHDPE-NoPres	TDS 1L-HDPE NoPres	Total Metals 250mlHDPE-HNO3	pH 125mlHDPE-NoPres			
APW-01R-WG-2024 1015	Grab	GW	54.03	10/15/24	1825	5	X	X	X	X	X			
APW-04-WG-2024 1017		GW	55.77	10/17/24	0845	5	X	X	X	X	X			
EB-01-WG-2024 1015	I	GW	-	10/15/24	1015	5	X	X	X	X	X			
DUP-01-WG-2024 1016		GW	-	10/16/24	0001	5	X	X	X	X	X			
DUP-02-WG-2024 1017	I	GW	-	10/17/24	0002	5	X	X	X	X	X			



MT JULIET, TN
 12065 Lebanon Rd Mount Juliet, TN 37122
 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubs/pas-standard-terms.pdf>

SDG # **6790474**
 Table #
 Acctnum: **ERMSCMO**
 Template: **T243415**
 Prelogin: **P1103193**
 PM: **206 - Jeff Carr**
 PB:
 Shipped Via: **FedEX Ground**

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks:
 pH _____ Temp _____
 Flow _____ Other _____
 Samples returned via:
 UPS ___ FedEx ___ Courier _____
 Tracking # _____

Sample Receipt Checklist
 COC Seal Present/Intact: ___ NP ___ Y ___ N
 COC Signed/Accurate: ___ Y ___ N
 Bottles arrive intact: ___ Y ___ N
 Correct bottles used: ___ Y ___ N
 Sufficient volume sent: ___ Y ___ N
If Applicable
 VOA Zero Headspace: ___ X ___ N
 Preservation Correct/Checked: ___ Y ___ N
 RAD Screen <0.5 mR/hr: ___ Y ___ N

Relinquished by: (Signature)
Marshall Arendell ERM
 Relinquished by: (Signature)
Jeff Clark
 Relinquished by: (Signature)

Date:
10/17/24
 Date:
10/17/24
 Date:

Time:
1240
 Time:
1240
 Time:

Received by: (Signature)
Jeff Clark
 Received by: (Signature)
 Received for lab by: (Signature)
Jefferson

Trip Blank Received: Yes (No)
 HCL/MeOH
 TBR
 Temp: °C
74
 Bottles Received:
74
 Date:
10/18/24
 Time:
0900

If preservation required by Login: Date/Time
 Condition:
 NCF / **OK**

UN90474

Fed Ex tracking #	Gun ID	Temperature
4091 2576 1310	TLA9	0.1 + 0.3 = 0.4
1309	↓	4.3 + 0.3 = 4.6
1283		1.2 + 0.3 = 1.5
1294		1.7 + 0.3 = 2.0
1272		2.0 + 0.3 = 2.3
1261		0.5 + 0.3 = 0.6

Name _____ Date _____



APPENDIX D STATISTICAL EVALUATION

APPENDIX D1. TABLES

APPENDIX D2. FIGURES

APPENDIX D3. PROUCL INPUT AND OUTPUT

APPENDIX D1. TABLES

Table D1. Descriptive Statistics
Annual Groundwater Monitoring Report
Grand Tower Energy Center

Analyte	Well Type	Well ID	Samples	Detects	Minimum	Maximum	Median	Mean	KM Mean	Std. Dev.	KM Std. Dev.
Antimony [ug/L]	Downgradient	APW-02	19	2 (11%)	1	4	1	1.689		1.251	
		APW-03	19	0 (0%)	1	4	1	1.632		1.257	
		APW-05/05R	19	1 (5%)	1	4	1	1.637		1.254	
		APW-06D	18	0 (0%)	1	4	1	1.667		1.283	
		APW-06S	19	0 (0%)	1	4	1	1.632		1.257	
		APW-07	19	0 (0%)	1	4	1	1.632		1.257	
		APW-08	19	0 (0%)	1	4	1	1.632		1.257	
	Upgradient	APW-10D	19	0 (0%)	1	4	1	1.632		1.257	
		APW-10S	19	0 (0%)	1	4	1	1.632		1.257	
		APW-01R	16	0 (0%)	1	4	1	1.188		0.75	
		APW-04	16	0 (0%)	1	4	1	1.188		0.75	
		APW-09	16	1 (6%)	1	4	1	1.188		0.75	
POOLED	48	1 (2%)	1	4	1	1.188		0.7339			
Arsenic [ug/L]	Downgradient	APW-02	19	19 (100%)	9.3	26.7	17	17.92		5.109	
		APW-03	19	16 (84%)	1.7	5.9	2.2	2.634	2.597	1.094	1.09
		APW-05/05R	19	19 (100%)	1.5	4.8	2.36	2.531		0.8476	
		APW-06D	18	18 (100%)	6.8	13.5	10.3	10.01		1.591	
		APW-06S	19	14 (74%)	1	2	1.3	1.468	1.317	0.4028	0.3064
		APW-07	19	9 (47%)	1	2.3	1.4	1.495		0.472	
		APW-08	19	9 (47%)	1	2.5	1.6	1.547		0.5136	
		APW-10D	19	8 (42%)	1	5.7	1.6	1.689		1.069	
		APW-10S	19	19 (100%)	174	276	190	196.4		22.73	
		POOLED	48	44 (92%)	1	3.3	1.95	1.93	1.913	0.5739	0.5713
	Upgradient	APW-01R	16	13 (81%)	1	3.3	1.25	1.619	1.589	0.693	0.6612
		APW-04	16	15 (94%)	1.4	2.9	1.75	1.888	1.865	0.4603	0.45
		APW-09	16	16 (100%)	1.8	3.1	2.2	2.284		0.3171	
		POOLED	48	44 (92%)	1	3.3	1.95	1.93	1.913	0.5739	0.5713
Barium [ug/L]	Downgradient	APW-02	19	19 (100%)	145	739	303	324.5		175.5	
		APW-03	19	19 (100%)	80.6	190	123	130.7		31.06	
		APW-05/05R	19	19 (100%)	102	233	187	182.9		35.21	
		APW-06D	18	18 (100%)	115	173	144	144.3		17.85	
		APW-06S	19	19 (100%)	190	305	222	223.3		24.61	
		APW-07	19	19 (100%)	303	522	374	379.2		53.3	
		APW-08	19	19 (100%)	167	261	215	210.1		27.74	
		APW-10D	19	19 (100%)	220	485	343	351.4		62.65	
	Upgradient	APW-10S	19	19 (100%)	474	804	589	599.4		69.61	
		APW-01R	16	16 (100%)	165	259	179	185.6		22.81	
		APW-04	16	16 (100%)	123	165	139	140.1		10.88	
		APW-09	16	16 (100%)	118	227	130	139.7		29.8	
		POOLED	48	48 (100%)	118	259	143.5	155.1		31.02	
Beryllium [ug/L]	Downgradient	APW-02	19	1 (5%)	1	2	1	1.268		0.4498	
		APW-03	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-05/05R	19	0 (0%)	1	2	1	1.263		0.4524	
		APW-06D	18	0 (0%)	1	2	1	1.222		0.4278	
		APW-06S	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-07	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-08	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-10D	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-10S	19	0 (0%)	1	2	1	1.211		0.4189	
		Upgradient	APW-01R	16	0 (0%)	1	2	1	1.062		0.25
	APW-04		16	0 (0%)	1	2	1	1.062		0.25	
	APW-09		16	0 (0%)	1	2	1	1.062		0.25	
	POOLED	48	0 (0%)	1	2	1	1.062		0.2446		
Boron [mg/L]	Downgradient	APW-02	18	18 (100%)	7.75	10.2	8.56	8.691		0.6418	
		APW-03	18	18 (100%)	1.84	4.94	4.275	4.129		0.8318	
		APW-05/05R	18	18 (100%)	2.18	10.3	8.825	8.266		1.89	
		APW-06D	17	17 (100%)	3.09	5.51	3.84	3.919		0.612	
		APW-06S	18	18 (100%)	4.05	9.19	5.835	6.021		1.196	
		APW-07	18	17 (94%)	0.168	0.526	0.26	0.2703	0.2689	0.08109	0.08029
		APW-08	18	15 (83%)	0.095	0.2	0.1365	0.1403	0.1283	0.03289	0.01923
		APW-10D	18	15 (83%)	0.0522	0.2	0.08955	0.1025	0.08301	0.04739	0.01627
		APW-10S	18	18 (100%)	0.525	0.683	0.568	0.5742		0.03817	
		Upgradient	APW-01R	15	15 (100%)	0.176	0.357	0.228	0.2448		0.05144
	APW-04		15	15 (100%)	0.559	2.37	1.33	1.418		0.6777	
	APW-09		15	15 (100%)	0.191	1.61	0.369	0.5089		0.3736	
	POOLED	45	45 (100%)	0.176	2.37	0.369	0.7237		0.6704		

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Analyte	Well Type	Well ID	Samples	Detects	Minimum	Maximum	Median	Mean	KM Mean	Std. Dev.	KM Std. Dev.
Cadmium [ug/L]	Downgradient	APW-02	19	1 (5%)	1	1	1	1		0	
		APW-03	19	1 (5%)	1	1	1	1		0	
		APW-05/05R	19	0 (0%)	1	1	1	1		0	
		APW-06D	18	0 (0%)	1	1	1	1		0	
		APW-06S	19	0 (0%)	1	1	1	1		0	
		APW-07	19	0 (0%)	1	1	1	1		0	
		APW-08	19	1 (5%)	1	1	1	1		0	
	Upgradient	APW-10D	19	1 (5%)	1	1.1	1	1.005		0.02294	
		APW-10S	19	0 (0%)	1	1	1	1		0	
		APW-01R	16	0 (0%)	1	1	1	1		0	
		APW-04	16	0 (0%)	1	1	1	1		0	
		APW-09	16	0 (0%)	1	1	1	1		0	
		POOLED	48	0 (0%)	1	1	1	1		0	
Calcium [mg/L]	Downgradient	APW-02	19	19 (100%)	132	198	156	155.6		18.73	
		APW-03	19	19 (100%)	74.9	153	115	112.3		21.5	
		APW-05/05R	19	19 (100%)	74	142	123	120.1		16.27	
		APW-06D	18	18 (100%)	96.7	128	110	110.2		9.17	
		APW-06S	19	19 (100%)	87.5	131	99.5	103.5		11.78	
		APW-07	19	19 (100%)	161	238	193	196.3		18.02	
		APW-08	19	19 (100%)	79.4	105	95	93.05		8.105	
		APW-10D	19	19 (100%)	98.5	611	124	163.3		123	
		APW-10S	19	19 (100%)	129	171	150	149.4		12.05	
	Upgradient	APW-01R	15	15 (100%)	59.2	97.1	88.2	84.93		10.58	
		APW-04	15	15 (100%)	87.9	124	102	103.3		9.315	
		APW-09	15	15 (100%)	69.5	110	81.9	84.44		8.904	
		POOLED	45	45 (100%)	59.2	124	89.5	90.9		12.95	
Chloride [mg/L]	Downgradient	APW-02	19	18 (95%)	5.38	13	10	9.827	9.7	2.207	2.22
		APW-03	19	19 (100%)	8.04	23	19	17.38		4.454	
		APW-05/05R	19	19 (100%)	14	28.1	16	16.88		3.127	
		APW-06D	18	18 (100%)	14	22	16	16.91		2.314	
		APW-06S	19	19 (100%)	19.4	31	24	24.33		3.019	
		APW-07	19	19 (100%)	9	16	12	12.7		2.303	
		APW-08	19	19 (100%)	8.61	13	10	10.39		1.143	
		APW-10D	19	19 (100%)	10	25.5	15.4	15.67		3.948	
		APW-10S	19	19 (100%)	6	21	11.4	11.58		5.145	
	Upgradient	APW-01R	16	10 (62%)	2	11	6	6.442	5.379	2.399	3.262
		APW-04	16	16 (100%)	9	12	11	10.76		0.9058	
		APW-09	16	16 (100%)	11	768	13	59.76		188.9	
		POOLED	48	42 (88%)	2	768	11	25.65	25.3	109.5	108.4
Chromium [ug/L]	Downgradient	APW-02	19	17 (89%)	2	127	14.8	29.86	29.9	35.89	34.9
		APW-03	19	10 (53%)	1	24.1	2	4.632	4.795	5.575	5.328
		APW-05/05R	19	7 (37%)	1	13.7	2	2.926		3.117	
		APW-06D	18	8 (44%)	1	72.7	1.6	6.401		16.68	
		APW-06S	19	9 (47%)	1	17.3	2	3.047		3.722	
		APW-07	19	9 (47%)	1	32.9	2	4.011		7.156	
		APW-08	19	12 (63%)	1	8.2	2.1	3.104	3.173	2.211	2.078
		APW-10D	19	10 (53%)	1	14.8	2	3.047	2.844	3.28	3.28
		APW-10S	19	13 (68%)	1	15	2	3.258	3.143	3.65	3.603
	Upgradient	APW-01R	16	13 (81%)	1	8.5	2.25	2.792	2.855	1.88	1.766
		APW-04	16	11 (69%)	1	25.1	2.4	3.748	3.873	5.797	5.557
		APW-09	16	7 (44%)	1	14.8	1.5	2.275		3.358	
		POOLED	48	31 (65%)	1	25.1	1.75	2.939	2.884	3.979	3.957
Cobalt [ug/L]	Downgradient	APW-02	19	14 (74%)	1	11	2.32	3.517	3.549	2.808	2.697
		APW-03	19	5 (26%)	1	2.1	1	1.337		0.4487	
		APW-05/05R	19	1 (5%)	1	2	1	1.263		0.4524	
		APW-06D	18	7 (39%)	1	5.4	1.25	1.789		1.21	
		APW-06S	19	1 (5%)	1	2	1	1.211		0.4189	
		APW-07	19	2 (11%)	1	2	1	1.226		0.4161	
		APW-08	19	11 (58%)	1	2.1	1.4	1.511	1.358	0.4306	0.3621
		APW-10D	19	18 (95%)	1.3	7	2.71	3.081	3.055	1.258	1.253
		APW-10S	19	5 (26%)	1	2.1	1	1.358		0.4811	
	Upgradient	APW-01R	16	7 (44%)	1	4.1	1.15	1.625		0.927	
		APW-04	16	4 (25%)	1	2.5	1	1.188		0.4334	
		APW-09	16	3 (19%)	1	3.1	1	1.219		0.5659	
		POOLED	48	14 (29%)	1	4.1	1	1.344		0.6906	

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Analyte	Well Type	Well ID	Samples	Detects	Minimum	Maximum	Median	Mean	KM Mean	Std. Dev.	KM Std. Dev.
Dissolved Solids, Total [mg/L]	Downgradient	APW-02	17	17 (100%)	820	934	880	878.6		35.75	
		APW-03	17	17 (100%)	450	724	524	547.5		76.97	
		APW-05/05R	17	17 (100%)	552	842	750	742.2		77.1	
		APW-06D	15	15 (100%)	482	735	564	578.5		57.82	
		APW-06S	17	17 (100%)	500	678	600	598.6		48.39	
		APW-07	17	17 (100%)	624	824	740	748.5		50.86	
		APW-08	17	17 (100%)	370	466	410	411.3		34.03	
	Upgradient	APW-10D	17	17 (100%)	436	512	460	462.3		18.7	
		APW-10S	16	16 (100%)	678	900	739.5	746.9		50.95	
		APW-01R	15	15 (100%)	300	474	385	387.7		44.4	
		APW-04	16	16 (100%)	416	528	449	456.9		34.45	
		APW-09	15	15 (100%)	278	3380	372	565.9		779.2	
		POOLED	46	46 (100%)	278	3380	406	469.8		441.9	
		Fluoride [mg/L]	Downgradient	APW-02	19	18 (95%)	0.197	1.5	0.24	0.3067	0.2404
APW-03	19			18 (95%)	0.15	0.37	0.27	0.2651	0.2677	0.05088	0.0444
APW-05/05R	19			18 (95%)	0.15	0.38	0.33	0.3186	0.3212	0.05564	0.04672
APW-06D	18			16 (89%)	0.15	0.24	0.211	0.2098	0.2154	0.02477	0.01271
APW-06S	19			17 (89%)	0.15	0.41	0.26	0.2673	0.2768	0.05744	0.04082
APW-07	19			17 (89%)	0.15	0.35	0.19	0.1927	0.1948	0.04155	0.03864
APW-08	19			18 (95%)	0.15	0.336	0.28	0.2733	0.2776	0.03753	0.02461
APW-10D	19			13 (68%)	0.1	0.15	0.11	0.1189	0.1107	0.01941	0.01123
APW-10S	19			16 (84%)	0.15	0.251	0.16	0.169	0.169	0.02532	0.02465
Upgradient	APW-01R			16	16 (100%)	0.12	0.21	0.165	0.1627		0.02131
	APW-04		16	16 (100%)	0.15	0.2	0.17	0.1719		0.01328	
	APW-09		16	16 (100%)	0.19	0.23	0.2	0.2017		0.01228	
	POOLED		48	48 (100%)	0.12	0.23	0.18	0.1788		0.02307	
Iron [mg/L]	Downgradient		APW-02	2	2 (100%)	7.63	11.7	9.665	9.665		2.878
		APW-03	2	2 (100%)	0.367	1.66	1.0135	1.014		0.9143	
		APW-05/05R	2	2 (100%)	2.77	5.89	4.33	4.33		2.206	
		APW-06D	1	1 (100%)	3.65	3.65	3.65	3.65			
		APW-06S	2	2 (100%)	9.18	9.35	9.265	9.265		0.1202	
		APW-07	2	2 (100%)	17.3	18.9	18.1	18.1		1.131	
		APW-08	2	2 (100%)	0.44	3.14	1.79	1.79		1.909	
		APW-10D	2	2 (100%)	0.175	0.758	0.4665	0.4665		0.4122	
		APW-10S	2	2 (100%)	17.2	19.6	18.4	18.4		1.697	
		Upgradient	APW-01R	2	2 (100%)	0.405	1.42	0.9125	0.9125		0.7177
	APW-04		2	2 (100%)	0.563	0.709	0.636	0.636		0.1032	
	APW-09		2	2 (100%)	0.179	0.496	0.3375	0.3375		0.2242	
	POOLED		6	6 (100%)	0.179	1.42	0.5295	0.6287		0.4259	
	Lead [ug/L]	Downgradient	APW-02	19	18 (95%)	2	23.9	5.4	7.619	7.619	6.604
APW-03			19	6 (32%)	1	4.4	1.3	1.8		1.06	
APW-05/05R			19	4 (21%)	1	2.6	1	1.372		0.5684	
APW-06D			18	2 (11%)	1	2	1	1.267		0.4284	
APW-06S			19	1 (5%)	1	2.8	1	1.305		0.5512	
APW-07			19	1 (5%)	1	7.4	1	1.547		1.477	
APW-08			19	5 (26%)	1	2.8	1	1.458		0.5843	
APW-10D			19	2 (11%)	1	2	1	1.263		0.4524	
APW-10S			19	5 (26%)	1	4.3	1	1.547		0.8859	
Upgradient			APW-01R	16	5 (31%)	1	6.2	1	1.594		1.322
		APW-04	16	1 (6%)	1	2	1	1.1		0.2828	
		APW-09	16	1 (6%)	1	3.9	1	1.244		0.751	
		POOLED	48	7 (15%)	1	6.2	1	1.312		0.8984	
Lithium [ug/L]		Downgradient	APW-02	19	19 (100%)	38.6	64.7	47.4	48.72		7.068
	APW-03		19	19 (100%)	23.9	36.1	31.2	30.11		3.781	
	APW-05/05R		19	19 (100%)	17.9	52.3	39.7	38.65		6.669	
	APW-06D		18	18 (100%)	16	19.9	17.15	17.25		1.024	
	APW-06S		19	19 (100%)	32	56.4	41	40.76		5.138	
	APW-07		19	19 (100%)	14.1	23.1	17.4	17.22		2.106	
	APW-08		19	19 (100%)	14.2	22.3	18.7	18.25		2.69	
	APW-10D		19	19 (100%)	11.3	18	14.7	14.77		1.338	
	APW-10S		19	19 (100%)	26.3	40.1	29.7	30.59		3.221	
	Upgradient		APW-01R	16	16 (100%)	14.2	18.9	16.65	16.55		1.35
		APW-04	16	16 (100%)	29	42.4	37.85	36.09		5.258	
		APW-09	16	16 (100%)	13.1	24.6	15.6	16.07		2.836	
		POOLED	48	48 (100%)	13.1	42.4	17.45	22.9		10.04	

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Analyte	Well Type	Well ID	Samples	Detects	Minimum	Maximum	Median	Mean	KM Mean	Std. Dev.	KM Std. Dev.
Manganese [mg/L]	Downgradient	APW-02	2	2 (100%)	0.669	0.752	0.7105	0.7105		0.05869	
		APW-03	2	2 (100%)	0.321	0.435	0.378	0.378		0.08061	
		APW-05/05R	2	2 (100%)	0.554	0.9	0.727	0.727		0.2447	
		APW-06D	1	1 (100%)	0.622	0.622	0.622	0.622			
		APW-06S	2	2 (100%)	0.512	0.53	0.521	0.521		0.01273	
		APW-07	2	2 (100%)	1.11	1.19	1.15	1.15		0.05657	
		APW-08	2	2 (100%)	0.0435	0.202	0.12275	0.1228		0.1121	
	Upgradient	APW-10D	2	2 (100%)	0.88	1.16	1.02	1.02		0.198	
		APW-10S	2	2 (100%)	0.174	0.243	0.2085	0.2085		0.04879	
		APW-01R	2	2 (100%)	0.0791	0.139	0.10905	0.109		0.04236	
		APW-04	2	2 (100%)	0.192	0.21	0.201	0.201		0.01273	
		APW-09	2	2 (100%)	0.124	0.599	0.3615	0.3615		0.3359	
		POOLED	6	6 (100%)	0.0791	0.599	0.1655	0.2238		0.1898	
Mercury [ug/L]	Downgradient	APW-02	19	1 (5%)	0.2	0.43	0.2	0.2121		0.05277	
		APW-03	19	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-05/05R	19	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-06D	18	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-06S	19	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-07	19	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-08	19	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-10D	19	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-10S	19	0 (0%)	0.2	0.2	0.2	0.2		0	
	Upgradient	APW-01R	16	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-04	16	0 (0%)	0.2	0.2	0.2	0.2		0	
		APW-09	16	0 (0%)	0.2	0.2	0.2	0.2		0	
		POOLED	48	0 (0%)	0.2	0.2	0.2	0.2		0	
Molybdenum [ug/L]	Downgradient	APW-02	19	19 (100%)	95.1	332	165	172.2		54.09	
		APW-03	19	19 (100%)	26.2	84.9	62.1	62.31		16.09	
		APW-05/05R	19	19 (100%)	109	249	212	205.5		34.35	
		APW-06D	18	18 (100%)	46.3	72	60.35	60.8		7.536	
		APW-06S	19	19 (100%)	176	324	255	254.4		41.13	
		APW-07	19	15 (79%)	2.3	5	3.6	3.732	3.393	0.8788	0.6191
		APW-08	19	3 (16%)	1	5	1.5	2.037		1.587	
		APW-10D	19	1 (5%)	1	5	1.5	2.1		1.576	
		APW-10S	19	3 (16%)	1	5	1.5	2.126		1.554	
	Upgradient	APW-01R	16	0 (0%)	1	5	1.25	1.469		0.9741	
		APW-04	16	16 (100%)	29.9	89.1	58.1	59.08		20.69	
		APW-09	16	16 (100%)	15	45.5	22.3	23.24		7.743	
		POOLED	48	32 (67%)	1	89.1	22.3	27.93	32.44	27.06	22.77
Nickel [ug/L]	Downgradient	APW-02	11	11 (100%)	2.37	72.5	26.3	28.74		22.49	
		APW-03	11	8 (73%)	1	10	2.5	3.264	3.193	2.713	2.633
		APW-05/05R	11	7 (64%)	1	7.4	2	2.545	2.527	1.944	1.848
		APW-06D	10	10 (100%)	1.7	9.3	2.65	3.695		2.74	
		APW-06S	11	9 (82%)	1	9	2.1	2.573	2.527	2.228	2.139
		APW-07	11	5 (45%)	1	15	1.3	2.927		4.146	
		APW-08	11	11 (100%)	2.6	7.7	3.54	4.04		1.719	
		APW-10D	11	11 (100%)	2.5	9.5	6.3	6.03		1.943	
		APW-10S	11	6 (55%)	1	5.1	1.4	1.791	1.799	1.263	1.17
	Upgradient	APW-01R	10	10 (100%)	3.8	12	5.2	5.94		2.497	
		APW-04	10	10 (100%)	2	6.5	3.2	3.59		1.436	
		APW-09	10	6 (60%)	1	12	1.1	2.73	2.73	3.428	3.252
		POOLED	30	26 (87%)	1	12	3.85	4.087	4.087	2.851	2.803
pH, Lab [SU]	Downgradient	APW-02	19	19 (100%)	6.9	7.52	7.09	7.117		0.1382	
		APW-03	19	19 (100%)	7.21	7.94	7.65	7.62		0.2496	
		APW-05/05R	19	19 (100%)	7.18	7.6	7.31	7.354		0.1226	
		APW-06D	18	18 (100%)	7.19	7.73	7.27	7.325		0.1464	
		APW-06S	19	19 (100%)	7.02	7.67	7.16	7.19		0.1537	
		APW-07	19	19 (100%)	6.78	7.31	6.88	6.939		0.1391	
		APW-08	19	19 (100%)	7	7.68	7.2	7.231		0.183	
		APW-10D	19	19 (100%)	6.98	7.66	7.12	7.197		0.1838	
		APW-10S	19	19 (100%)	6.91	7.58	7.01	7.069		0.1569	
	Upgradient	APW-01R	16	16 (100%)	6.43	7.19	6.65	6.758		0.2465	
		APW-04	16	16 (100%)	7.2	8.17	7.33	7.398		0.2271	
		APW-09	16	16 (100%)	7.31	8.03	7.45	7.488		0.1875	
		POOLED	48	48 (100%)	6.43	8.17	7.32	7.214		0.3937	

Table D1. Descriptive Statistics
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Analyte	Well Type	Well ID	Samples	Detects	Minimum	Maximum	Median	Mean	KM Mean	Std. Dev.	KM Std. Dev.
Radium-226/228 [pCi/L]	Downgradient	APW-02	18	18 (100%)	0.476	4.09	2	1.881		0.8087	
		APW-03	19	19 (100%)	0.776	3.18	2	1.907		0.5202	
		APW-05/05R	18	18 (100%)	0.645	6.34	2	2.04		1.289	
		APW-06D	18	18 (100%)	0.9	2.8	2	1.914		0.3828	
		APW-06S	19	19 (100%)	0.497	2.93	2	1.764		0.5487	
		APW-07	19	19 (100%)	0.933	2.7	2	1.871		0.4065	
		APW-08	19	19 (100%)	0.595	2.39	2	1.701		0.5571	
	Upgradient	APW-10D	19	19 (100%)	0.494	2	2	1.661		0.507	
		APW-10S	19	19 (100%)	0.646	4.83	2	1.982		0.927	
		APW-01R	16	16 (100%)	0.691	2.54	2	1.838		0.5036	
		APW-04	16	16 (100%)	0.497	2.65	2	1.809		0.5181	
		APW-09	16	16 (100%)	0.503	2	2	1.742		0.5216	
		POOLED	48	48 (100%)	0.497	2.65	2	1.796		0.5051	
Selenium [ug/L]	Downgradient	APW-02	19	1 (5%)	1	2	1	1.237		0.4206	
		APW-03	19	2 (11%)	1	2	1	1.263		0.4412	
		APW-05/05R	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-06D	18	0 (0%)	1	2	1	1.222		0.4278	
		APW-06S	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-07	19	0 (0%)	1	2	1	1.211		0.4189	
		APW-08	19	19 (100%)	3.6	22.1	13.5	13.11		4.571	
		APW-10D	19	14 (74%)	1	3.3	1.6	1.728	1.671	0.6843	0.6585
		APW-10S	19	0 (0%)	1	2	1	1.211		0.4189	
	Upgradient	APW-01R	16	16 (100%)	2.8	5.4	3.8	3.921		0.644	
		APW-04	16	16 (100%)	8.5	16.5	13.15	12.68		2.742	
		APW-09	16	16 (100%)	12.6	22.5	15.2	16.73		3.378	
		POOLED	48	48 (100%)	2.8	22.5	12.8	11.11		5.947	
Sulfate [mg/L]	Downgradient	APW-02	19	19 (100%)	376	510	460	451.4		38.17	
		APW-03	19	19 (100%)	80.1	393	207	221.8		74.65	
		APW-05/05R	19	19 (100%)	70.5	460	365	340.2		92.93	
		APW-06D	18	18 (100%)	180	272	220	223.6		29.64	
		APW-06S	19	19 (100%)	127	247	208	198.9		38.38	
		APW-07	19	19 (100%)	34.7	78	56.3	56.43		11.55	
		APW-08	19	19 (100%)	23	43	37	34.16		6.172	
		APW-10D	19	19 (100%)	26	44	42	39.36		5.198	
		APW-10S	19	2 (11%)	5	21	10	9.526		3.47	
	Upgradient	APW-01R	16	16 (100%)	33	88	68.95	64.68		16.09	
		APW-04	16	16 (100%)	50.9	126	93	88.24		24.52	
		APW-09	16	16 (100%)	25	104	40.5	46.27		19.32	
		POOLED	48	48 (100%)	25	126	65	66.4		26.36	
Thallium [ug/L]	Downgradient	APW-02	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-03	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-05/05R	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-06D	18	0 (0%)	1	2	2	1.556		0.5113	
		APW-06S	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-07	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-08	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-10D	19	0 (0%)	1	2	2	1.579		0.5073	
		APW-10S	19	0 (0%)	1	2	2	1.579		0.5073	
	Upgradient	APW-01R	16	1 (6%)	1	2	1.7	1.525		0.5	
		APW-04	16	0 (0%)	1	2	1.5	1.5		0.5164	
		APW-09	16	1 (6%)	1	2	1.5	1.5		0.5164	
		POOLED	48	2 (4%)	1	2	1.7	1.508		0.5001	
Turbidity, Field [NTU]	Downgradient	APW-02	11	11 (100%)	19.2	663	104	150.9		176.4	
		APW-03	11	11 (100%)	1.94	103	6.04	25.36		33.19	
		APW-05/05R	11	11 (100%)	4.65	76.1	33.7	32.79		24.51	
		APW-06D	10	10 (100%)	3.02	181	24.35	45.35		52.97	
		APW-06S	11	11 (100%)	1.26	30.5	5.72	8.644		8.127	
		APW-07	11	11 (100%)	3.34	79.2	14.8	26.3		26.41	
		APW-08	11	11 (100%)	23.1	305	136	123.3		79	
		APW-10D	11	11 (100%)	4.76	198	45.3	85.92		80.07	
		APW-10S	11	11 (100%)	3.78	63.6	34.3	33.64		22.28	
	Upgradient	APW-01R	8	8 (100%)	25.6	133	58.55	65.53		40.05	
		APW-04	8	8 (100%)	18.3	38.7	24.65	26.76		7.888	
		APW-09	8	8 (100%)	3.82	34.2	10.35	14.99		11.15	
		POOLED	24	24 (100%)	3.82	133	26.05	35.76		32.11	

Notes:
mg/L = milligrams per liter
ug/L = micrograms per liter
pCi/L = picocuries per liter
NTU = nephelometric turbidity units
SU = standard units
KM = Kaplan-Meier; these values are only provided for groups with <50% non-detect

Table D2. Summary of Potential Statistical Outliers
Annual Groundwater Monitoring Report
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Well Type	Well ID	Analyte	Potential Outlier(s)	Max Upgradient Concentration
Downgradient	APW-02	Molybdenum [ug/L]	332	89.1
Downgradient	APW-02	Radium-226/228 [pCi/L]	4.09	2.65
Downgradient	APW-02	Turbidity, Field [NTU]	663	133
Downgradient	APW-02	pH, Lab [SU]	7.52	8.17
Downgradient	APW-03	Arsenic [ug/L]	5.9	3.3
Downgradient	APW-03	Chromium [ug/L]	24.1	25.1
Downgradient	APW-03	Cobalt [ug/L]	2.1	4.1
Downgradient	APW-03	Radium-226/228 [pCi/L]	2.58; 3.18	2.65
Downgradient	APW-05/0	Chloride [mg/L]	28.1	768
Downgradient	APW-05/0	Radium-226/228 [pCi/L]	3.86; 6.34	2.65
Downgradient	APW-06D	Boron [mg/L]	5.51	2.37
Downgradient	APW-06D	Chloride [mg/L]	21.2; 21.5; 22	768
Downgradient	APW-06D	Chromium [ug/L]	72.7	25.1
Downgradient	APW-06D	Dissolved Solids, Total [mg/L]	670; 735	3380
Downgradient	APW-06D	Nickel [ug/L]	8.25; 9.3	12
Downgradient	APW-06D	Radium-226/228 [pCi/L]	2.8	2.65
Downgradient	APW-06D	Turbidity, Field [NTU]	181	133
Downgradient	APW-06S	Chromium [ug/L]	17.3	25.1
Downgradient	APW-06S	Fluoride [mg/L]	0.41	0.23
Downgradient	APW-06S	Lithium [ug/L]	56.4	42.4
Downgradient	APW-06S	Nickel [ug/L]	9	12
Downgradient	APW-06S	Turbidity, Field [NTU]	30.5	133
Downgradient	APW-07	Barium [ug/L]	522	259
Downgradient	APW-07	Boron [mg/L]	0.526	2.37
Downgradient	APW-07	Chromium [ug/L]	32.9	25.1
Downgradient	APW-07	Fluoride [mg/L]	0.35	0.23
Downgradient	APW-07	Nickel [ug/L]	15	12
Downgradient	APW-07	Radium-226/228 [pCi/L]	2.01; 2.1; 2.7	2.65
Downgradient	APW-10D	Arsenic [ug/L]	5.7	3.3
Downgradient	APW-10D	Calcium [mg/L]	374; 611	124
Downgradient	APW-10D	Chromium [ug/L]	14.8	25.1
Downgradient	APW-10D	Cobalt [ug/L]	7	4.1
Downgradient	APW-10S	Arsenic [ug/L]	276	3.3
Downgradient	APW-10S	Barium [ug/L]	804	259
Downgradient	APW-10S	Boron [mg/L]	0.683	2.37
Downgradient	APW-10S	Chromium [ug/L]	8.7; 9.1; 15	25.1
Downgradient	APW-10S	Fluoride [mg/L]	0.21; 0.251	0.23
Downgradient	APW-10S	Radium-226/228 [pCi/L]	4.83	2.65
Upgradient	(POOLED)	Chloride [mg/L]	768	768
Upgradient	(POOLED)	Chromium [ug/L]	14.8; 25.1	25.1
Upgradient	(POOLED)	Dissolved Solids, Total [mg/L]	3380	3380
Upgradient	(POOLED)	Iron [mg/L]	1.42	1.42
Upgradient	(POOLED)	Manganese [mg/L]	0.599	0.599
Upgradient	(POOLED)	Radium-226/228 [pCi/L]	2.18; 2.54; 2.65	2.65
Upgradient	(POOLED)	Turbidity, Field [NTU]	83.2; 89.5; 95.6; 133	133
Upgradient	APW-01R	Chromium [ug/L]	8.5	25.1
Upgradient	APW-01R	Nickel [ug/L]	12	12
Upgradient	APW-01R	Radium-226/228 [pCi/L]	2.18; 2.54	2.65
Upgradient	APW-01R	Selenium [ug/L]	5.4	22.5
Upgradient	APW-04	Chromium [ug/L]	25.1	25.1
Upgradient	APW-04	Radium-226/228 [pCi/L]	2.65	2.65
Upgradient	APW-04	pH, Lab [SU]	8.17	8.17
Upgradient	APW-09	Barium [ug/L]	186; 227	259
Upgradient	APW-09	Calcium [mg/L]	110	124
Upgradient	APW-09	Chloride [mg/L]	768	768

Table D2. Summary of Potential Statistical Outliers
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Well Type	Well ID	Analyte	Potential Outlier(s)	Max Upgradient Concentration
Upgradient	APW-09	Chromium [ug/L]	14.8	25.1
Upgradient	APW-09	Dissolved Solids, Total [mg/L]	3380	3380
Upgradient	APW-09	Molybdenum [ug/L]	45.5	89.1
Upgradient	APW-09	Nickel [ug/L]	12	12
Upgradient	APW-09	Sulfate [mg/L]	104	126

Notes:

mg/L = milligrams per liter

ug/L = micrograms per liter

pCi/L = picocuries per liter

NTU = nephelometric turbidity units

SU = Standard Units

Potential outliers were analyzed with Tukey's outlier test. Only detected values from well/analyte pairs with ≥ 4 detections were tested.

**Table D3. Summary of Background Concentrations
Annual Groundwater Report
Grand Tower Energy Center**

Analyte	Distribution	UTL
Antimony [ug/L]		1
Arsenic [ug/L]	Normal	3.11
Barium [ug/L]	NDD	241.9
Beryllium [ug/L]		2
Boron [mg/L]	Gamma	1.354
Cadmium [ug/L]		1
Calcium [mg/L]	Normal	118.3
Chloride [mg/L]	NDD	12.84
Chromium [ug/L]	NDD	25.1
Cobalt [ug/L]	Normal	2.685
Dissolved Solids, Total [mg/L]	Normal	514.7
Fluoride [mg/L]	Normal	226.1
Iron [mg/L]	Normal	2.208
Lead [ug/L]	Normal	3.086
Lithium [ug/L]	NDD	32.42
Manganese [mg/L]	Normal	0.928
Mercury [ug/L]		0.2
Molybdenum [ug/L]	Normal	55.02
Nickel [ug/L]	Normal	10.42
Radium-226/228 [pCi/L]	NDD	8.113
Selenium [ug/L]	NDD	2.54
Sulfate [mg/L]	Normal	22.95
Thallium [ug/L]	NDD	93.25
Turbidity, Field [NTU]	Gamma	2
pH, Lab [SU]	Normal	132

Notes:

mg/L = milligrams per liter

ug/L = micrograms per liter

pCi/L = picocuries per liter

NTU = nephelometric turbidity units

SU = standard units

Table D4. Summary of Downgradient Confidence Limits
Annual Groundwater Monitoring Report
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Analyte	Well	Distribution	LCL	UCL
Antimony [ug/L]	APW-02	No Distribution Detected		1.247
Antimony [ug/L]	APW-03	Insufficient Data		
Antimony [ug/L]	APW-05/05R	Insufficient Data		
Antimony [ug/L]	APW-06D	Insufficient Data		
Antimony [ug/L]	APW-06S	Insufficient Data		
Antimony [ug/L]	APW-07	Insufficient Data		
Antimony [ug/L]	APW-08	Insufficient Data		
Antimony [ug/L]	APW-10D	Insufficient Data		
Antimony [ug/L]	APW-10S	Insufficient Data		
Arsenic [ug/L]	APW-02	Normal		19.95
Arsenic [ug/L]	APW-03	Normal		3.045
Arsenic [ug/L]	APW-05/05R	Normal		2.868
Arsenic [ug/L]	APW-06D	Normal		11.79
Arsenic [ug/L]	APW-06S	Normal		1.537
Arsenic [ug/L]	APW-07	Normal		1.51
Arsenic [ug/L]	APW-08	Normal		1.595
Arsenic [ug/L]	APW-10D	No Distribution Detected		1.985
Arsenic [ug/L]	APW-10S	No Distribution Detected		205.4
Barium [ug/L]	APW-02	Normal		203.5
Barium [ug/L]	APW-03	Normal		143
Barium [ug/L]	APW-05/05R	Normal		165.5
Barium [ug/L]	APW-06D	Normal		131.4
Barium [ug/L]	APW-06S	Normal		233.1
Barium [ug/L]	APW-07	No Distribution Detected		376.1
Barium [ug/L]	APW-08	Normal		203.2
Barium [ug/L]	APW-10D	Normal		376.3
Barium [ug/L]	APW-10S	Normal		627.1
Beryllium [ug/L]	APW-02	Insufficient Data		
Beryllium [ug/L]	APW-03	Insufficient Data		
Beryllium [ug/L]	APW-05/05R	Insufficient Data		
Beryllium [ug/L]	APW-06D	Insufficient Data		
Beryllium [ug/L]	APW-06S	Insufficient Data		
Beryllium [ug/L]	APW-07	Insufficient Data		
Beryllium [ug/L]	APW-08	Insufficient Data		
Beryllium [ug/L]	APW-10D	Insufficient Data		
Beryllium [ug/L]	APW-10S	Insufficient Data		
Boron [mg/L]	APW-02	Normal		8.954
Boron [mg/L]	APW-03	No Distribution Detected		4.471
Boron [mg/L]	APW-05/05R	No Distribution Detected		7.427
Boron [mg/L]	APW-06D	Normal		4.179
Boron [mg/L]	APW-06S	Normal		6.511
Boron [mg/L]	APW-07	Normal		0.303
Boron [mg/L]	APW-08	Normal		0.146
Boron [mg/L]	APW-10D	Normal		0.123
Boron [mg/L]	APW-10S	Normal		0.59
Cadmium [ug/L]	APW-02	Insufficient Data		
Cadmium [ug/L]	APW-03	Insufficient Data		
Cadmium [ug/L]	APW-05/05R	Insufficient Data		

Table D4. Summary of Downgradient Confidence Limits
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Analyte	Well	Distribution	LCL	UCL
Cadmium [ug/L]	APW-06D	Insufficient Data		
Cadmium [ug/L]	APW-06S	Insufficient Data		
Cadmium [ug/L]	APW-07	Insufficient Data		
Cadmium [ug/L]	APW-08	Insufficient Data		
Cadmium [ug/L]	APW-10D	Insufficient Data		
Cadmium [ug/L]	APW-10S	Insufficient Data		
Calcium [mg/L]	APW-02	Normal		163.1
Calcium [mg/L]	APW-03	Normal		137.1
Calcium [mg/L]	APW-05/05R	Normal		116.5
Calcium [mg/L]	APW-06D	Normal		119.8
Calcium [mg/L]	APW-06S	Normal		115.1
Calcium [mg/L]	APW-07	Normal		203.5
Calcium [mg/L]	APW-08	Normal		96.27
Calcium [mg/L]	APW-10D	No Distribution Detected		212.3
Calcium [mg/L]	APW-10S	Normal		154.2
Chloride [mg/L]	APW-02	Normal		7.884
Chloride [mg/L]	APW-03	Normal		14.79
Chloride [mg/L]	APW-05/05R	No Distribution Detected		19.75
Chloride [mg/L]	APW-06D	No Distribution Detected		17.86
Chloride [mg/L]	APW-06S	Normal		21.71
Chloride [mg/L]	APW-07	Normal		10.62
Chloride [mg/L]	APW-08	Normal		10.84
Chloride [mg/L]	APW-10D	Gamma		16.02
Chloride [mg/L]	APW-10S	Normal		17.71
Chromium [ug/L]	APW-02	No Distribution Detected		17.37
Chromium [ug/L]	APW-03	Normal		6.731
Chromium [ug/L]	APW-05/05R	Normal		3.973
Chromium [ug/L]	APW-06D	Lognormal		8.015
Chromium [ug/L]	APW-06S	Normal		4.371
Chromium [ug/L]	APW-07	Lognormal		5.141
Chromium [ug/L]	APW-08	Normal		3.914
Chromium [ug/L]	APW-10D	Gamma		5.077
Chromium [ug/L]	APW-10S	No Distribution Detected		4.637
Cobalt [ug/L]	APW-02	Normal		3.127
Cobalt [ug/L]	APW-03	Normal		1.279
Cobalt [ug/L]	APW-05/05R	Insufficient Data		
Cobalt [ug/L]	APW-06D	Normal		2.116
Cobalt [ug/L]	APW-06S	Insufficient Data		
Cobalt [ug/L]	APW-07	No Distribution Detected		1.067
Cobalt [ug/L]	APW-08	Normal		1.522
Cobalt [ug/L]	APW-10D	Normal		3.568
Cobalt [ug/L]	APW-10S	Normal		1.31
Dissolved Solids, Total [mg/L]	APW-02	Normal		893.8
Dissolved Solids, Total [mg/L]	APW-03	Normal		634.5
Dissolved Solids, Total [mg/L]	APW-05/05R	Normal		726.2
Dissolved Solids, Total [mg/L]	APW-06D	No Distribution Detected		604.8
Dissolved Solids, Total [mg/L]	APW-06S	Normal		650.8
Dissolved Solids, Total [mg/L]	APW-07	Normal		770.1

Table D4. Summary of Downgradient Confidence Limits
Annual Groundwater Monitoring Report
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Analyte	Well	Distribution	LCL	UCL
Dissolved Solids, Total [mg/L]	APW-08	Normal		391.9
Dissolved Solids, Total [mg/L]	APW-10D	Normal		470.2
Dissolved Solids, Total [mg/L]	APW-10S	Normal		791
Fluoride [mg/L]	APW-02	Normal		0.247
Fluoride [mg/L]	APW-03	No Distribution Detected		0.253
Fluoride [mg/L]	APW-05/05R	No Distribution Detected		0.341
Fluoride [mg/L]	APW-06D	Normal		0.22
Fluoride [mg/L]	APW-06S	Normal		0.29
Fluoride [mg/L]	APW-07	No Distribution Detected		0.182
Fluoride [mg/L]	APW-08	Normal		0.266
Fluoride [mg/L]	APW-10D	Normal		0.116
Fluoride [mg/L]	APW-10S	No Distribution Detected		0.179
Iron [mg/L]	APW-02	Insufficient Data		
Iron [mg/L]	APW-03	Insufficient Data		
Iron [mg/L]	APW-05/05R	Insufficient Data		
Iron [mg/L]	APW-06D	Insufficient Data		
Iron [mg/L]	APW-06S	Insufficient Data		
Iron [mg/L]	APW-07	Insufficient Data		
Iron [mg/L]	APW-08	Insufficient Data		
Iron [mg/L]	APW-10D	Insufficient Data		
Iron [mg/L]	APW-10S	Insufficient Data		
Lead [ug/L]	APW-02	Normal		10.25
Lead [ug/L]	APW-03	Normal		2.062
Lead [ug/L]	APW-05/05R	Normal		1.441
Lead [ug/L]	APW-06D	No Distribution Detected		1.162
Lead [ug/L]	APW-06S	Insufficient Data		
Lead [ug/L]	APW-07	Insufficient Data		
Lead [ug/L]	APW-08	Normal		1.507
Lead [ug/L]	APW-10D	No Distribution Detected		1.178
Lead [ug/L]	APW-10S	Normal		1.732
Lithium [ug/L]	APW-02	Normal		51.53
Lithium [ug/L]	APW-03	Normal		34.1
Lithium [ug/L]	APW-05/05R	Normal		41.3
Lithium [ug/L]	APW-06D	Normal		17.67
Lithium [ug/L]	APW-06S	Normal		42.81
Lithium [ug/L]	APW-07	Normal		18.06
Lithium [ug/L]	APW-08	Normal		16.64
Lithium [ug/L]	APW-10D	Normal		15.3
Lithium [ug/L]	APW-10S	Normal		31.87
Manganese [mg/L]	APW-02	Insufficient Data		
Manganese [mg/L]	APW-03	Insufficient Data		
Manganese [mg/L]	APW-05/05R	Insufficient Data		
Manganese [mg/L]	APW-06D	Insufficient Data		
Manganese [mg/L]	APW-06S	Insufficient Data		
Manganese [mg/L]	APW-07	Insufficient Data		
Manganese [mg/L]	APW-08	Insufficient Data		
Manganese [mg/L]	APW-10D	Insufficient Data		
Manganese [mg/L]	APW-10S	Insufficient Data		

Table D4. Summary of Downgradient Confidence Limits
Annual Groundwater Monitoring Report
Grand Tower Energy Center

Analyte	Well	Distribution	LCL	UCL
Mercury [ug/L]	APW-02	Insufficient Data		
Mercury [ug/L]	APW-03	Insufficient Data		
Mercury [ug/L]	APW-05/05R	Insufficient Data		
Mercury [ug/L]	APW-06D	Insufficient Data		
Mercury [ug/L]	APW-06S	Insufficient Data		
Mercury [ug/L]	APW-07	Insufficient Data		
Mercury [ug/L]	APW-08	Insufficient Data		
Mercury [ug/L]	APW-10D	Insufficient Data		
Mercury [ug/L]	APW-10S	Insufficient Data		
Molybdenum [ug/L]	APW-02	Normal		193.7
Molybdenum [ug/L]	APW-03	Normal		52.34
Molybdenum [ug/L]	APW-05/05R	Normal		219.2
Molybdenum [ug/L]	APW-06D	Normal		63.89
Molybdenum [ug/L]	APW-06S	Normal		229.8
Molybdenum [ug/L]	APW-07	Normal		4.079
Molybdenum [ug/L]	APW-08	Normal		1.128
Molybdenum [ug/L]	APW-10D	Insufficient Data		
Molybdenum [ug/L]	APW-10S	Normal		1.343
Nickel [ug/L]	APW-02	Normal		41.03
Nickel [ug/L]	APW-03	Normal		4.733
Nickel [ug/L]	APW-05/05R	Normal		3.58
Nickel [ug/L]	APW-06D	No Distribution Detected		5.283
Nickel [ug/L]	APW-06S	Gamma		4.849
Nickel [ug/L]	APW-07	Normal		5.278
Nickel [ug/L]	APW-08	Normal		4.98
Nickel [ug/L]	APW-10D	Normal		7.092
Nickel [ug/L]	APW-10S	Normal		2.446
Radium-226/228 [pCi/L]	APW-02	Normal		2.213
Radium-226/228 [pCi/L]	APW-03	No Distribution Detected		2.114
Radium-226/228 [pCi/L]	APW-05/05R	No Distribution Detected		2.569
Radium-226/228 [pCi/L]	APW-06D	No Distribution Detected		2.071
Radium-226/228 [pCi/L]	APW-06S	No Distribution Detected		1.982
Radium-226/228 [pCi/L]	APW-07	No Distribution Detected		2.033
Radium-226/228 [pCi/L]	APW-08	No Distribution Detected		1.923
Radium-226/228 [pCi/L]	APW-10D	Normal		1.511
Radium-226/228 [pCi/L]	APW-10S	No Distribution Detected		2.351
Selenium [ug/L]	APW-02	Insufficient Data		
Selenium [ug/L]	APW-03	No Distribution Detected		1.209
Selenium [ug/L]	APW-05/05R	Insufficient Data		
Selenium [ug/L]	APW-06D	Insufficient Data		
Selenium [ug/L]	APW-06S	Insufficient Data		
Selenium [ug/L]	APW-07	Insufficient Data		
Selenium [ug/L]	APW-08	Normal		14.93
Selenium [ug/L]	APW-10D	Normal		1.933
Selenium [ug/L]	APW-10S	Insufficient Data		
Sulfate [mg/L]	APW-02	Normal		466.6
Sulfate [mg/L]	APW-03	Normal		251.5
Sulfate [mg/L]	APW-05/05R	Normal		288.5

**Table D4. Summary of Downgradient Confidence Limits
Annual Groundwater Monitoring Report
Grand Tower Energy Center**

Analyte	Well	Distribution	LCL	UCL
Sulfate [mg/L]	APW-06D	Normal		235.7
Sulfate [mg/L]	APW-06S	Normal		214.2
Sulfate [mg/L]	APW-07	Normal		61.02
Sulfate [mg/L]	APW-08	Normal		29.89
Sulfate [mg/L]	APW-10D	Normal		37.06
Sulfate [mg/L]	APW-10S	No Distribution Detected		8.178
Thallium [ug/L]	APW-02	Insufficient Data		
Thallium [ug/L]	APW-03	Insufficient Data		
Thallium [ug/L]	APW-05/05R	Insufficient Data		
Thallium [ug/L]	APW-06D	Insufficient Data		
Thallium [ug/L]	APW-06S	Insufficient Data		
Thallium [ug/L]	APW-07	Insufficient Data		
Thallium [ug/L]	APW-08	Insufficient Data		
Thallium [ug/L]	APW-10D	Insufficient Data		
Thallium [ug/L]	APW-10S	Insufficient Data		
Turbidity, Field [NTU]	APW-02	Normal		382.5
Turbidity, Field [NTU]	APW-03	No Distribution Detected		11.9
Turbidity, Field [NTU]	APW-05/05R	Normal		46.18
Turbidity, Field [NTU]	APW-06D	Normal		76.06
Turbidity, Field [NTU]	APW-06S	Gamma		15.34
Turbidity, Field [NTU]	APW-07	Normal		14.61
Turbidity, Field [NTU]	APW-08	Normal		166.4
Turbidity, Field [NTU]	APW-10D	Gamma		191.3
Turbidity, Field [NTU]	APW-10S	Normal		45.81
pH, Lab [SU]	APW-02	Normal	7.062	7.172
pH, Lab [SU]	APW-03	Normal	7.521	7.719
pH, Lab [SU]	APW-05/05R	Normal	7.408	7.484
pH, Lab [SU]	APW-06D	Normal	7.412	7.494
pH, Lab [SU]	APW-06S	Normal	7.129	7.251
pH, Lab [SU]	APW-07	Normal	6.953	7.055
pH, Lab [SU]	APW-08	Normal	7.332	7.436
pH, Lab [SU]	APW-10D	Normal	7.252	7.376
pH, Lab [SU]	APW-10S	Normal	7.115	7.221

Notes:

mg/L = milligrams per liter

ug/L = micrograms per liter

pCi/L = picocuries per liter

NTU = nephelometric turbidity units

SU = standard units

95% LCL = 95% lower confidence limit of the mean

95% UCL = 95% upper confidence limit of the mean

APPENDIX D2. FIGURES

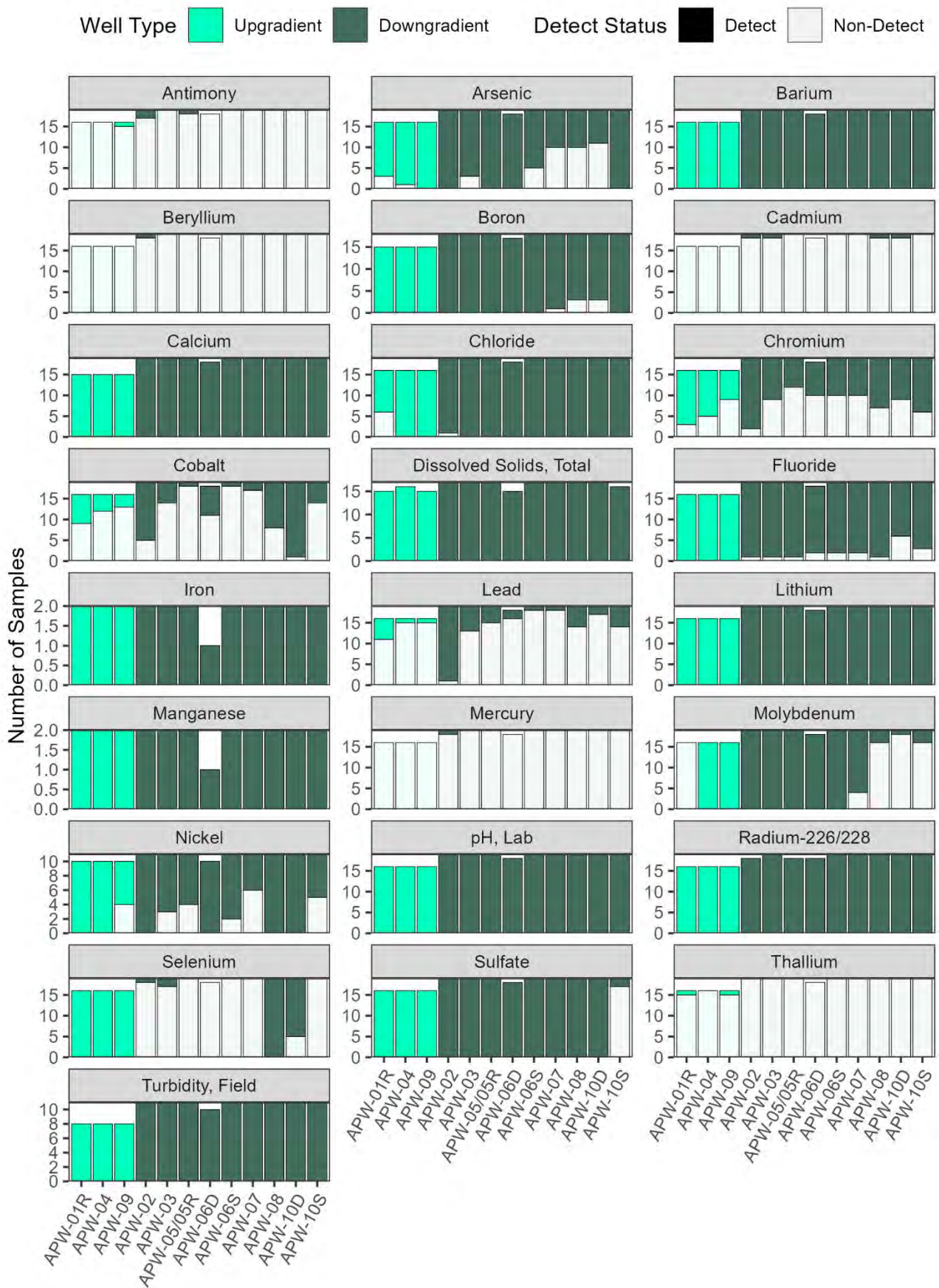
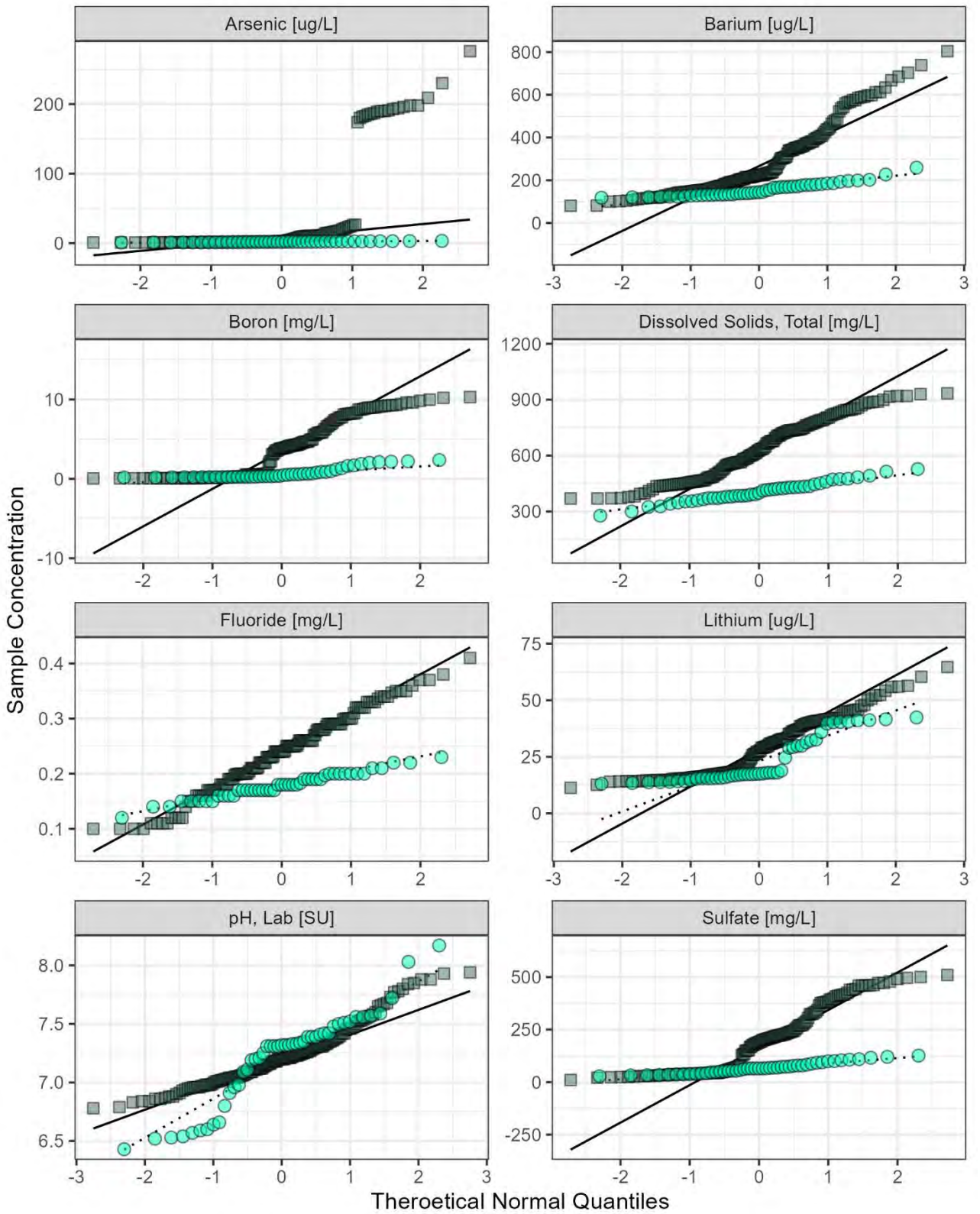


Figure D1. Summary of Analyte Detections by Well.

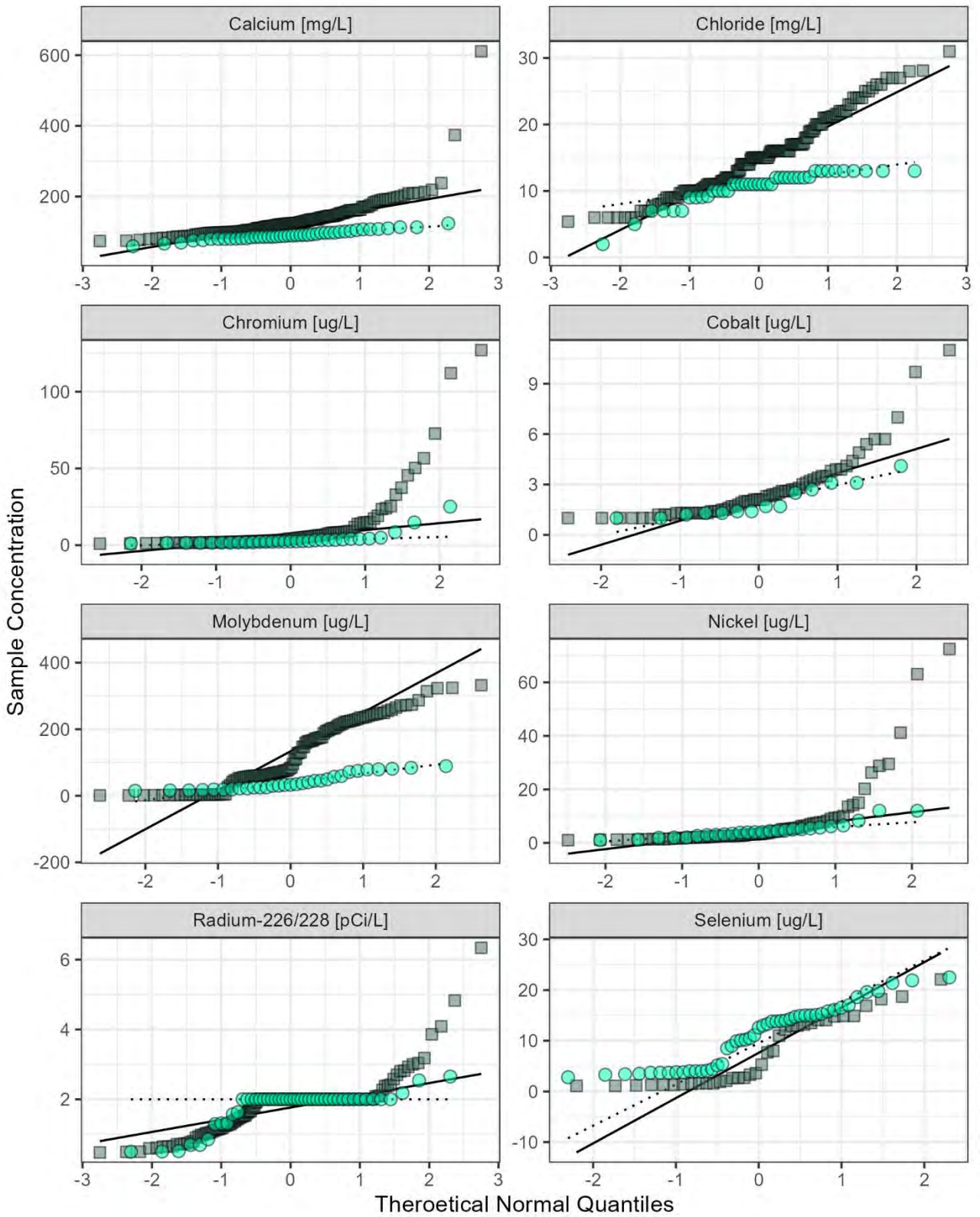
Well Type ■ Downgradient ● Upgradient



Note: This figure shows detected values only; groups with fewer than 5 detections are not shown.

Figure D2-A. Probability Plots.

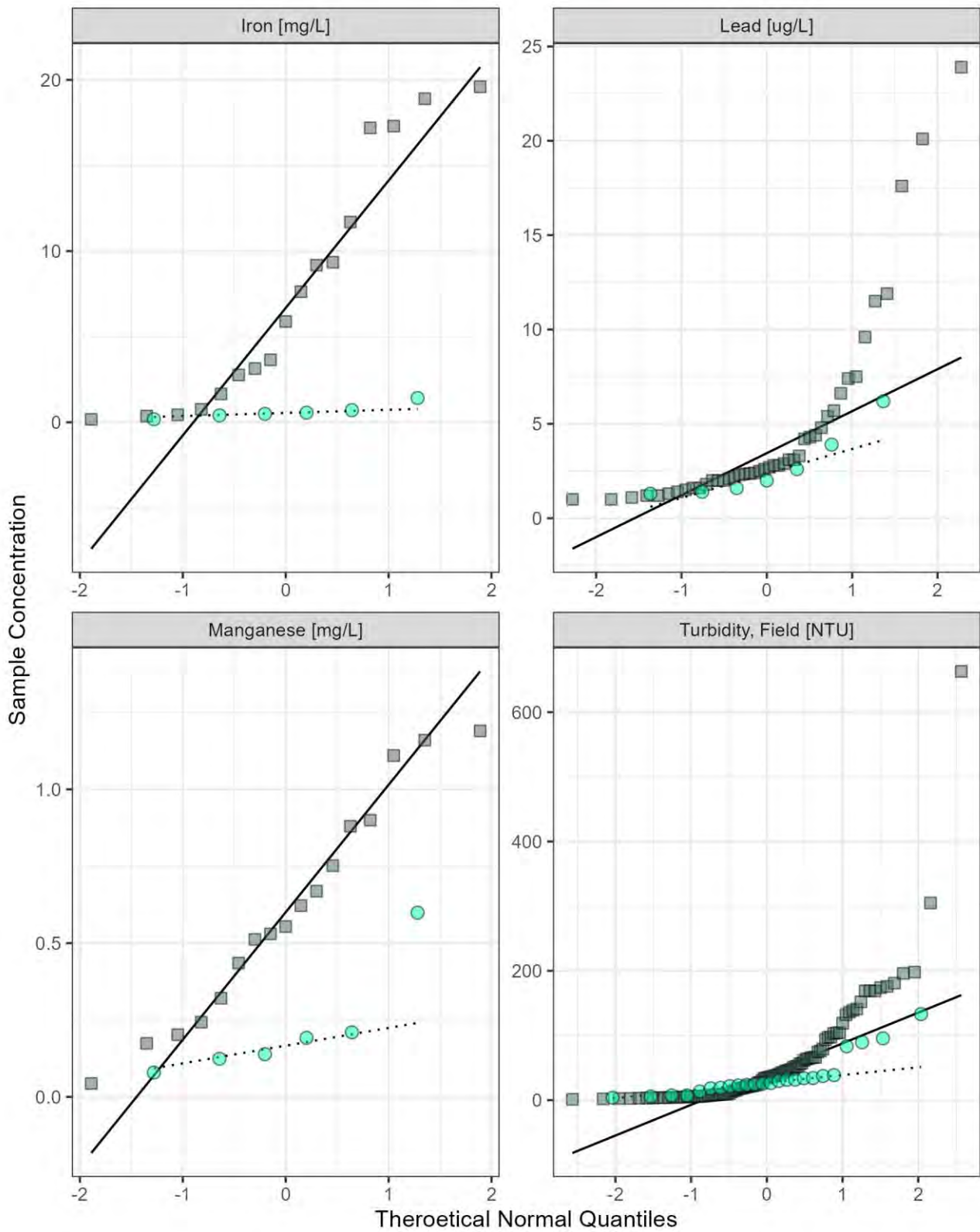
Well Type ■ Downgradient ● Upgradient



Note: This figure shows detected values only; groups with fewer than 5 detections are not shown.

Figure D2-B. Probability Plots.

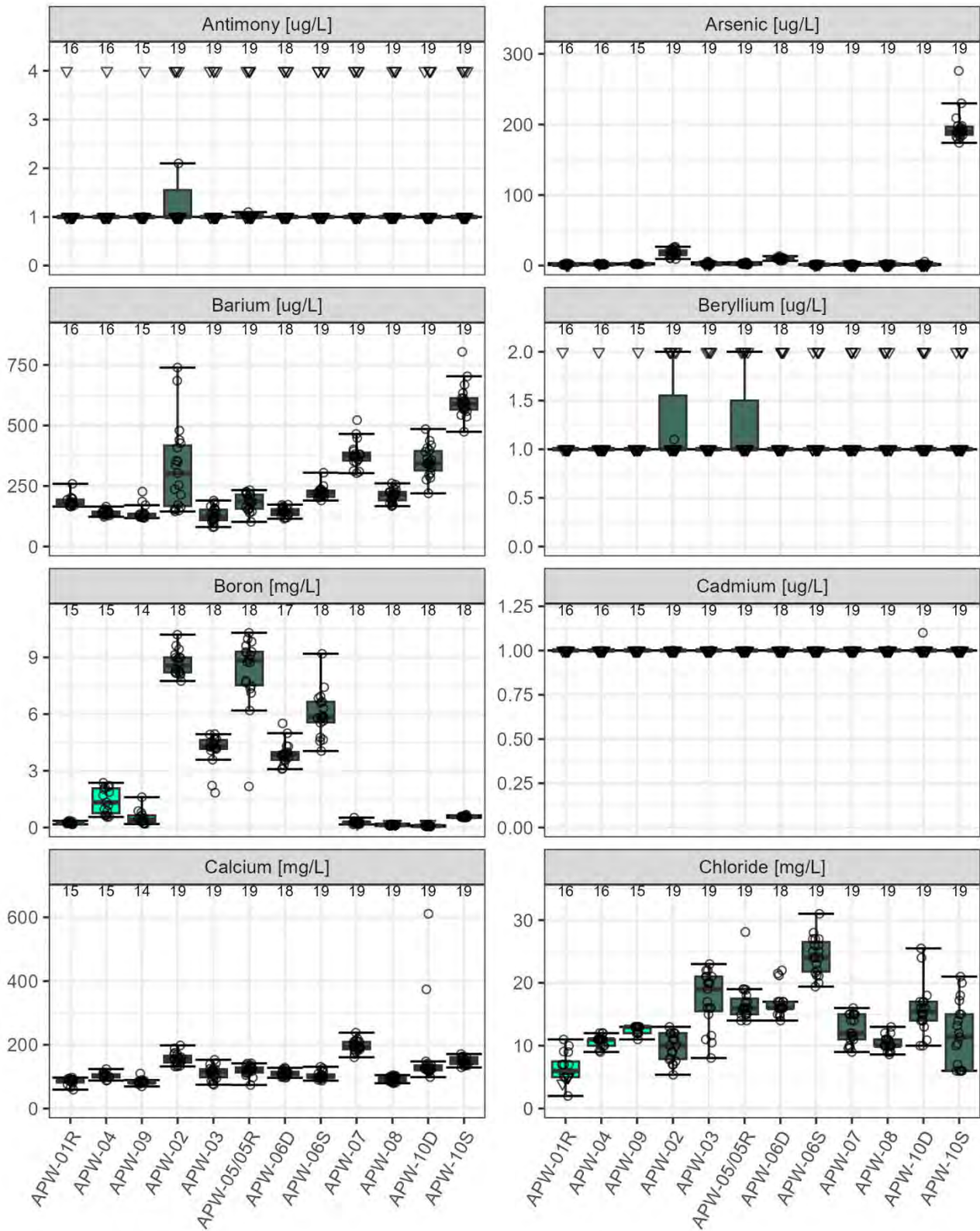
Well Type ■ Downgradient ● Upgradient



Note: This figure shows detected values only; groups with fewer than 5 detections are not shown.

Figure D2-C. Probability Plots.

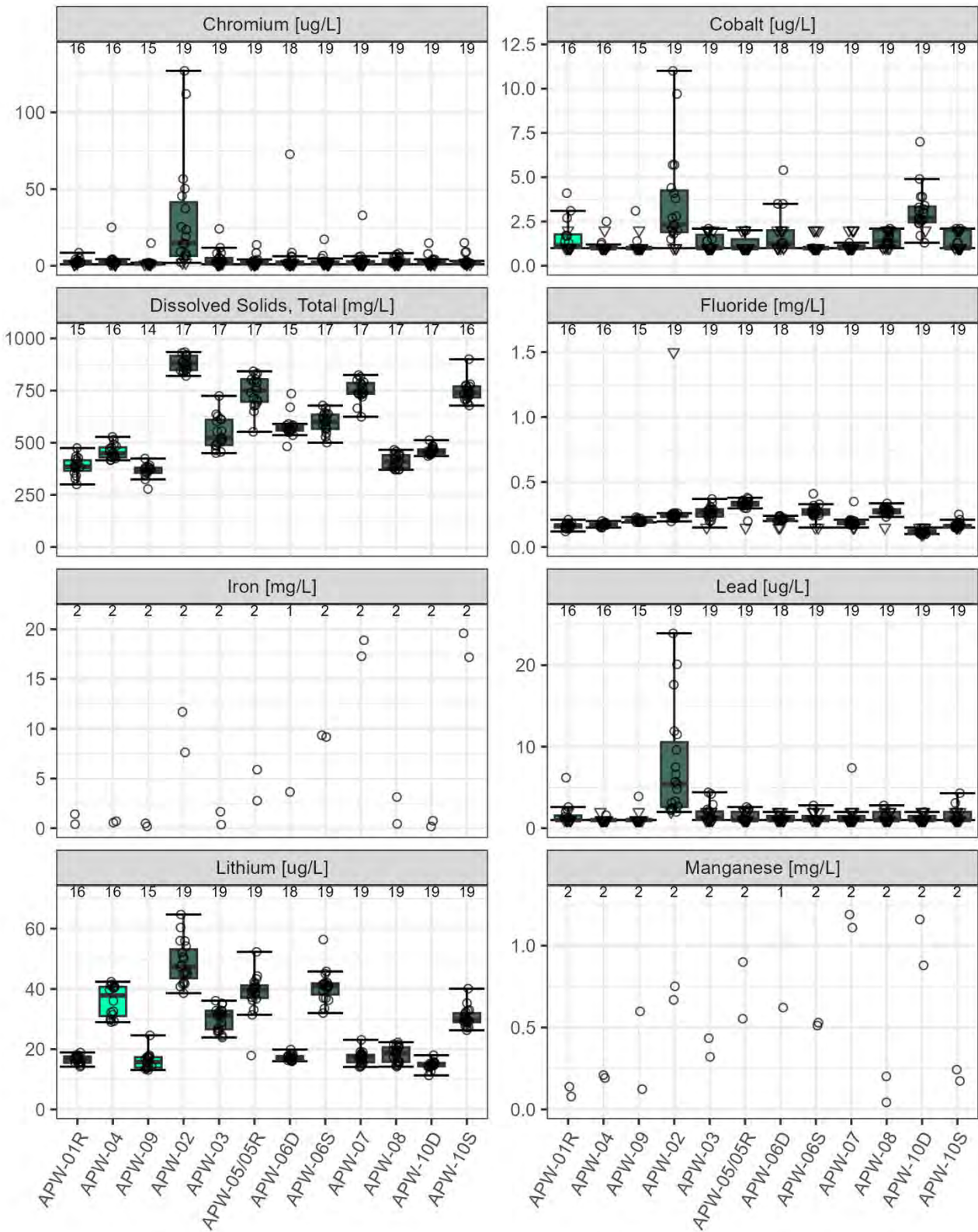
Detected ∇ FALSE \circ TRUE Well Type ■ Upgradient ■ Downgradient



Note: Values above each box indicate the number of samples

Figure D3-A. Box Plots.

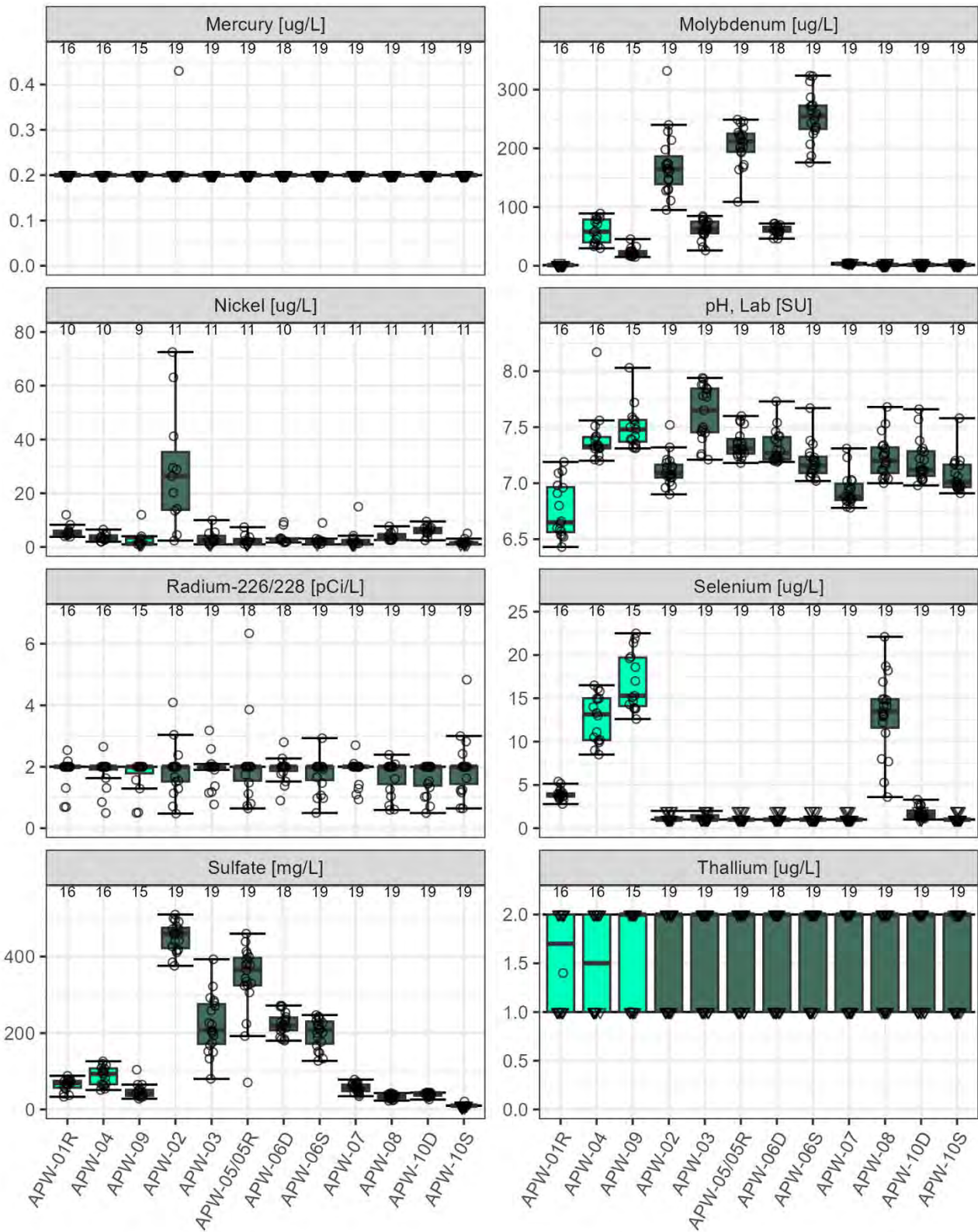
Detected ∇ FALSE \circ TRUE Well Type ■ Upgradient ■ Downgradient



Note: Values above each box indicate the number of samples

Figure D3-B. Box Plots.

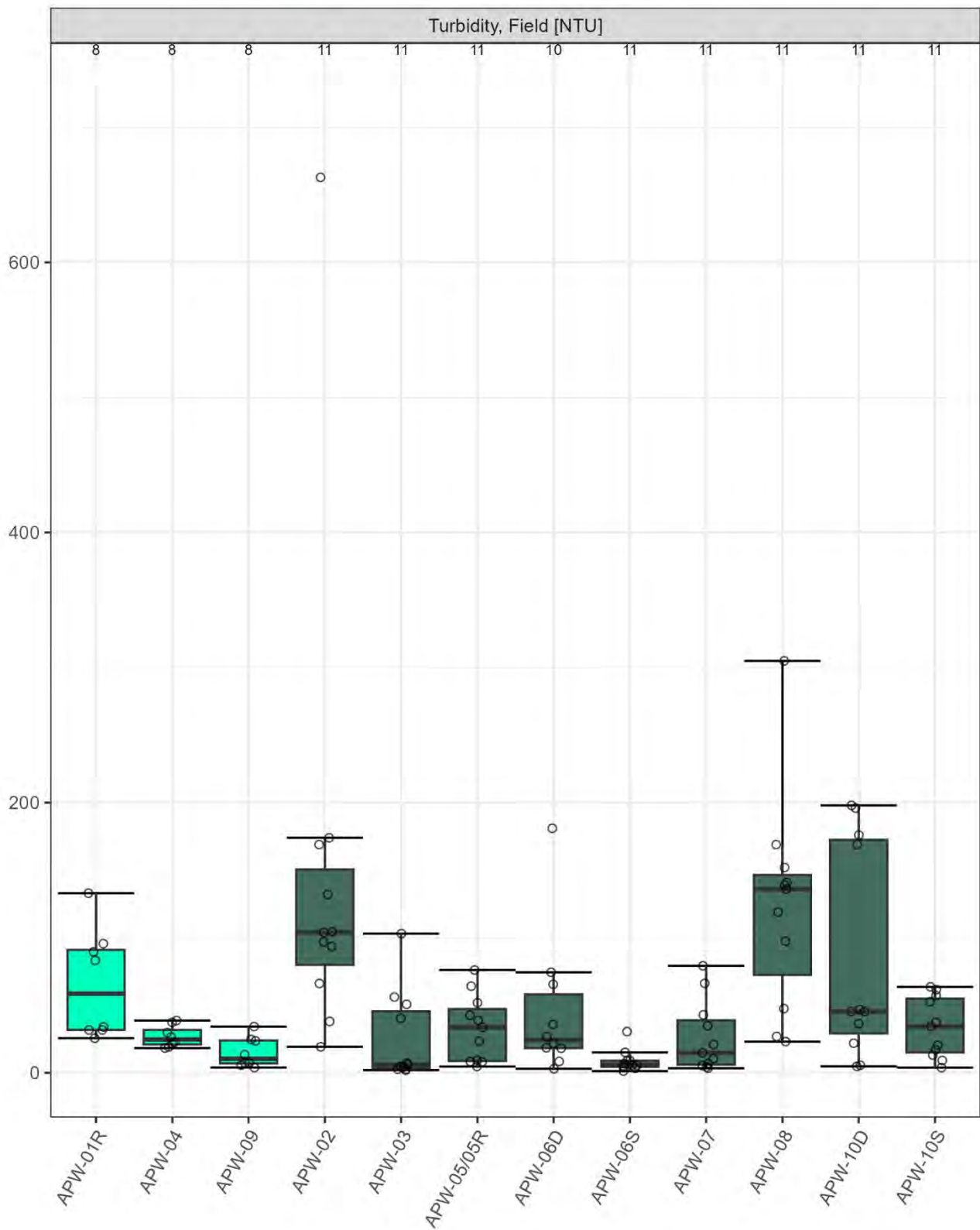
Detected ∇ FALSE \circ TRUE Well Type ■ Upgradient ■ Downgradient



Note: Values above each box indicate the number of samples

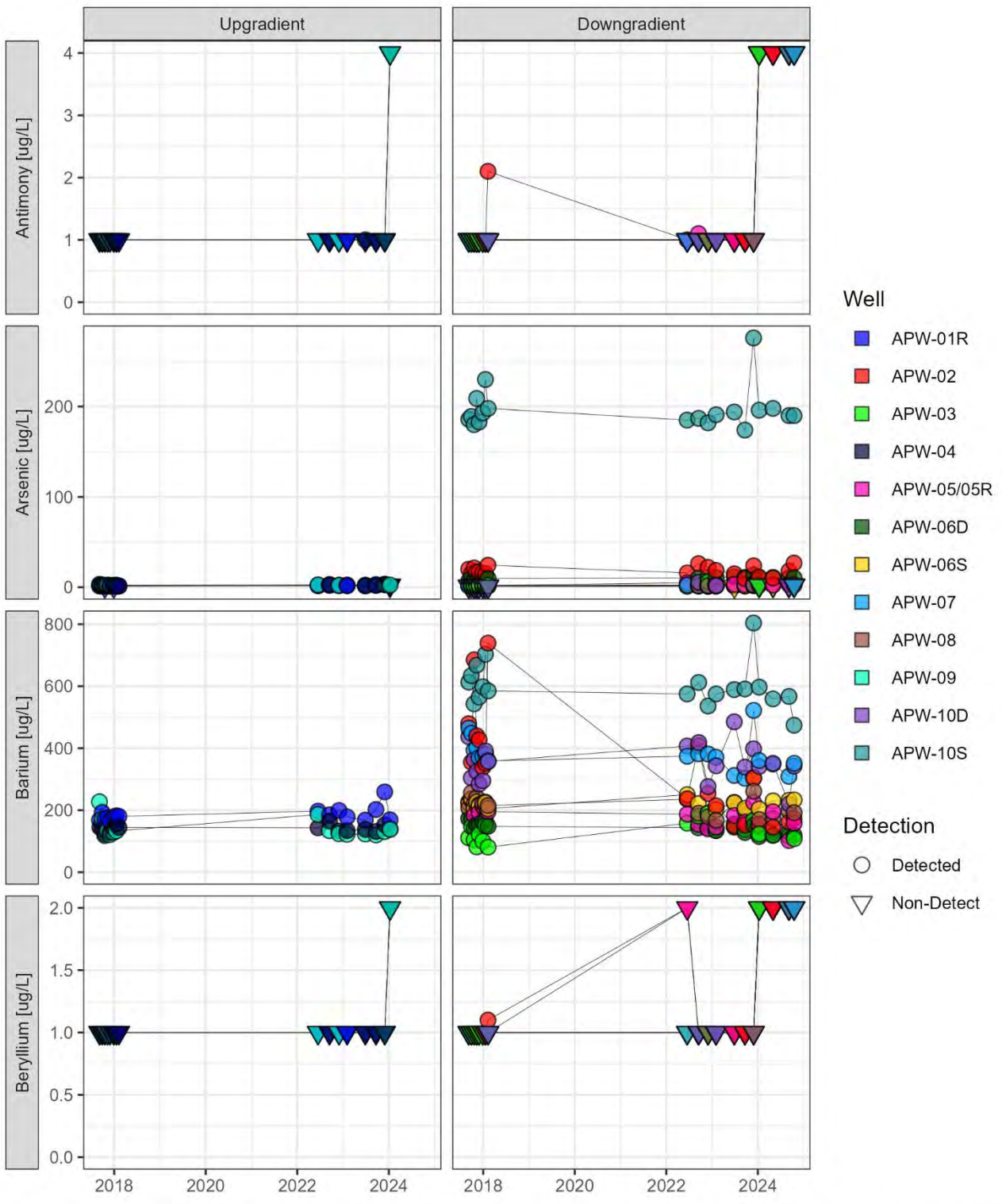
Figure D3-C. Box Plots.

Well Type █ Upgradient █ Downgradient Detected ○ TRUE



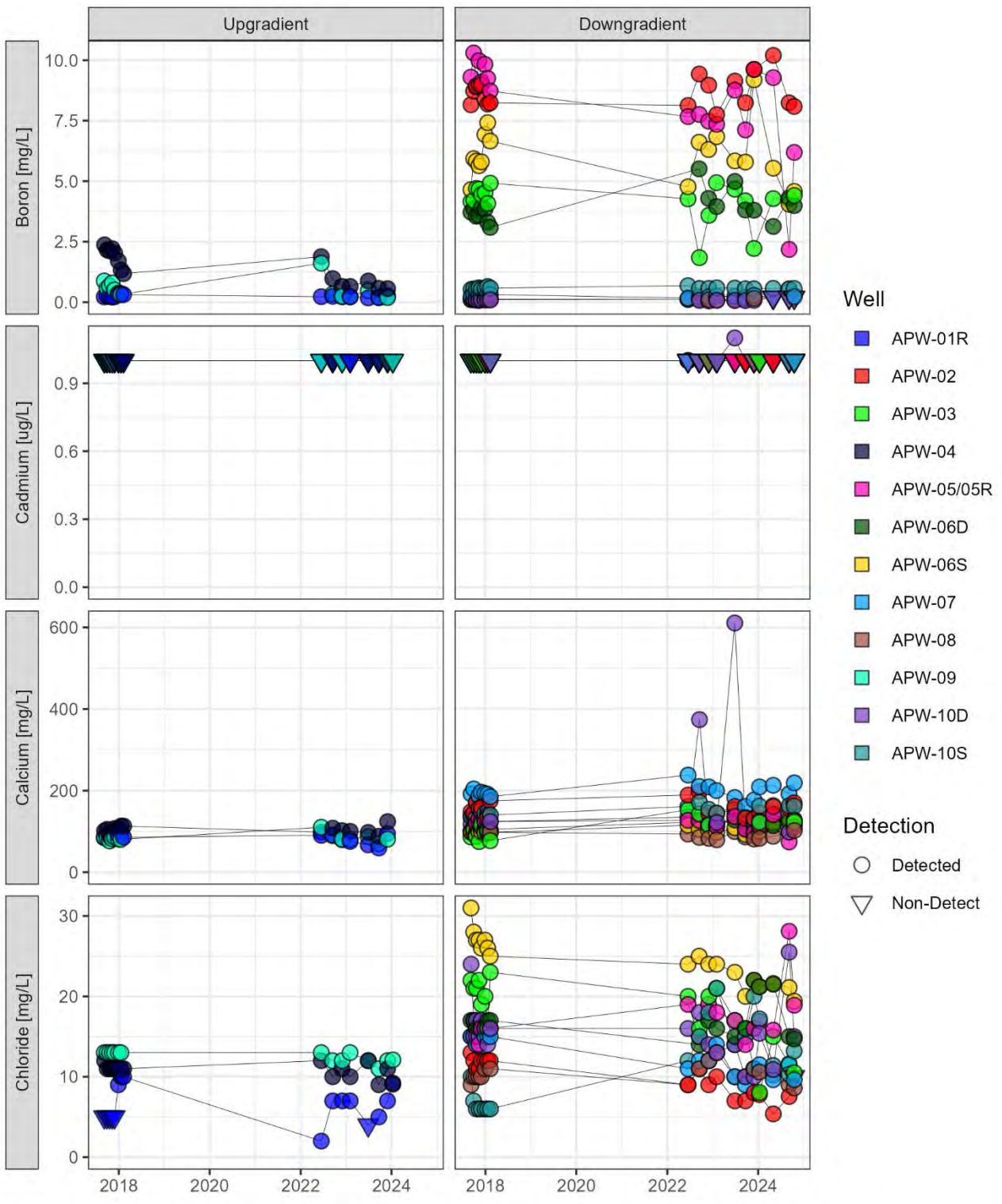
Note: Values above each box indicate the number of samples

Figure D3-D. Box Plots.



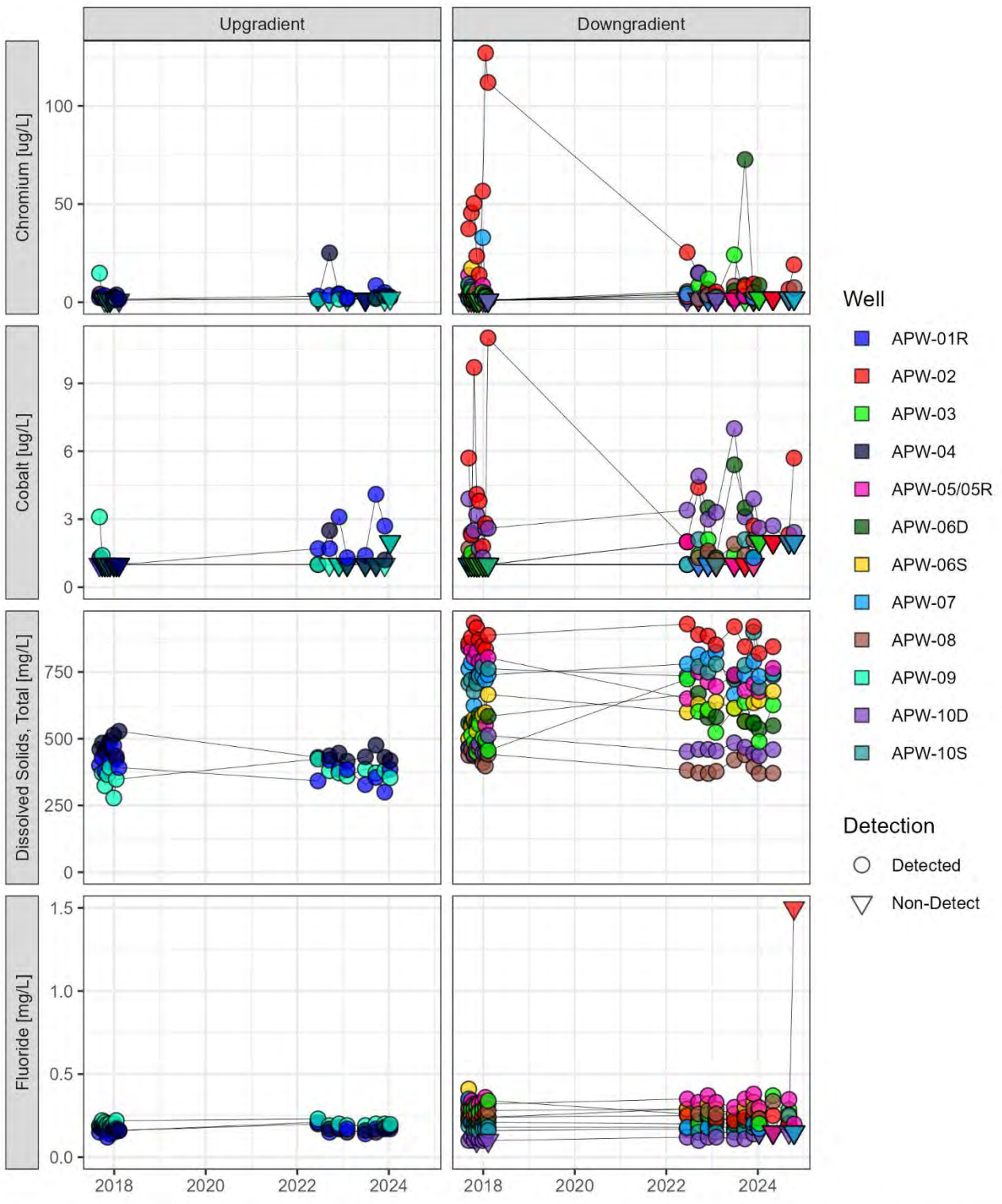
Note: Non-detects are shown at the reporting limit

Figure D4-A. Time Series Figures.



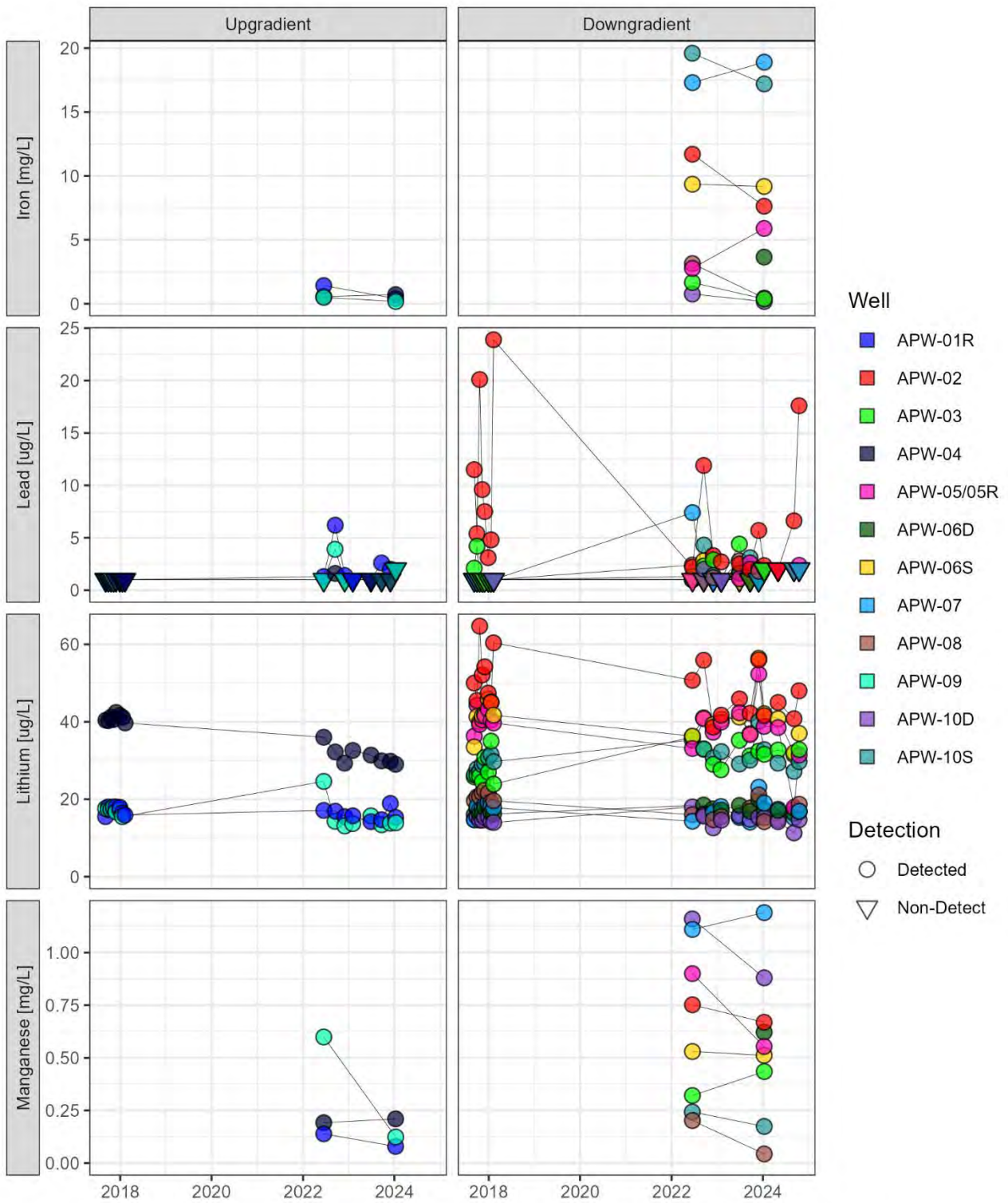
Note: Non-detects are shown at the reporting limit

Figure D4-B. Time Series Figures.



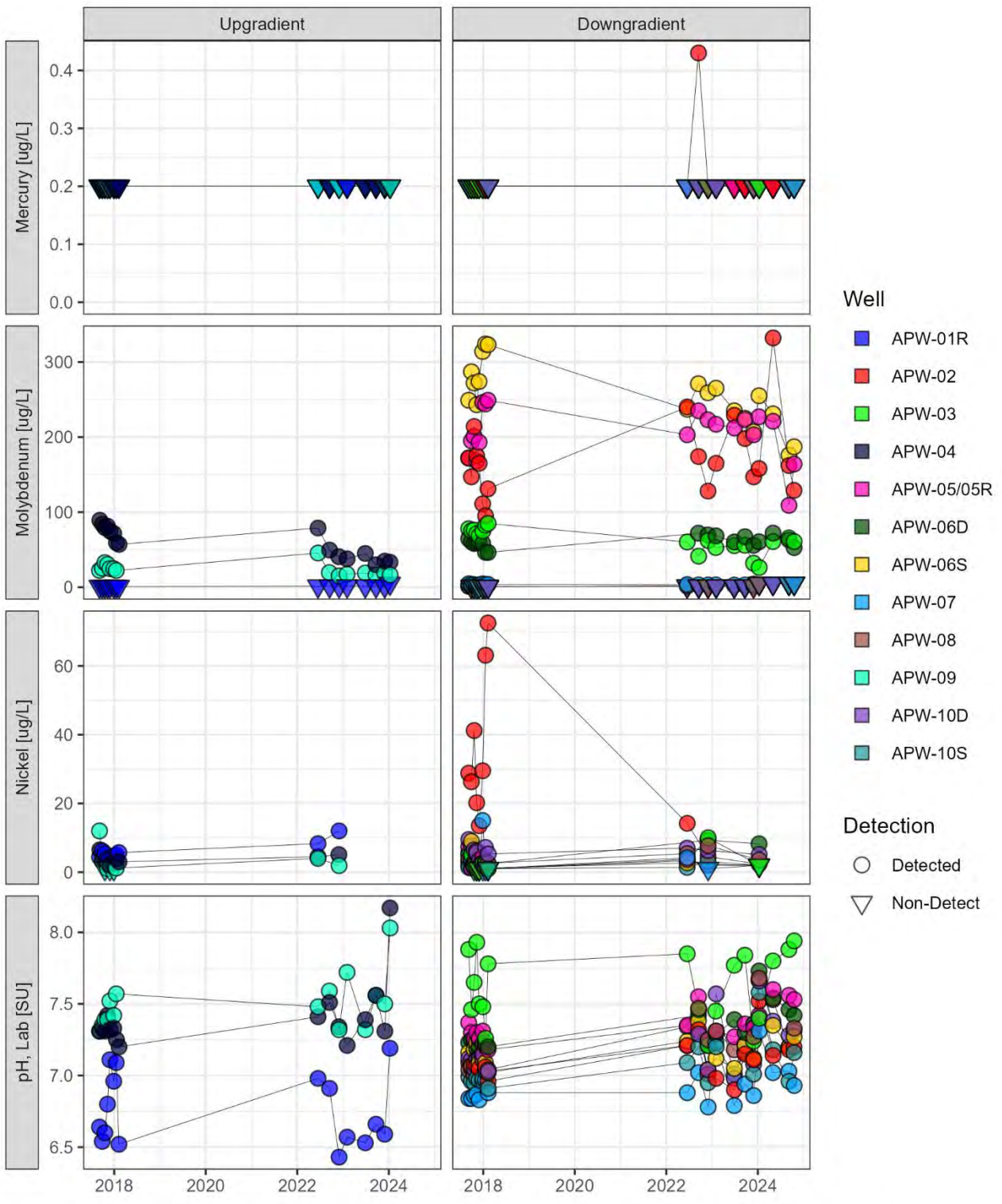
Note: Non-detects are shown at the reporting limit

Figure D4-C. Time Series Figures.



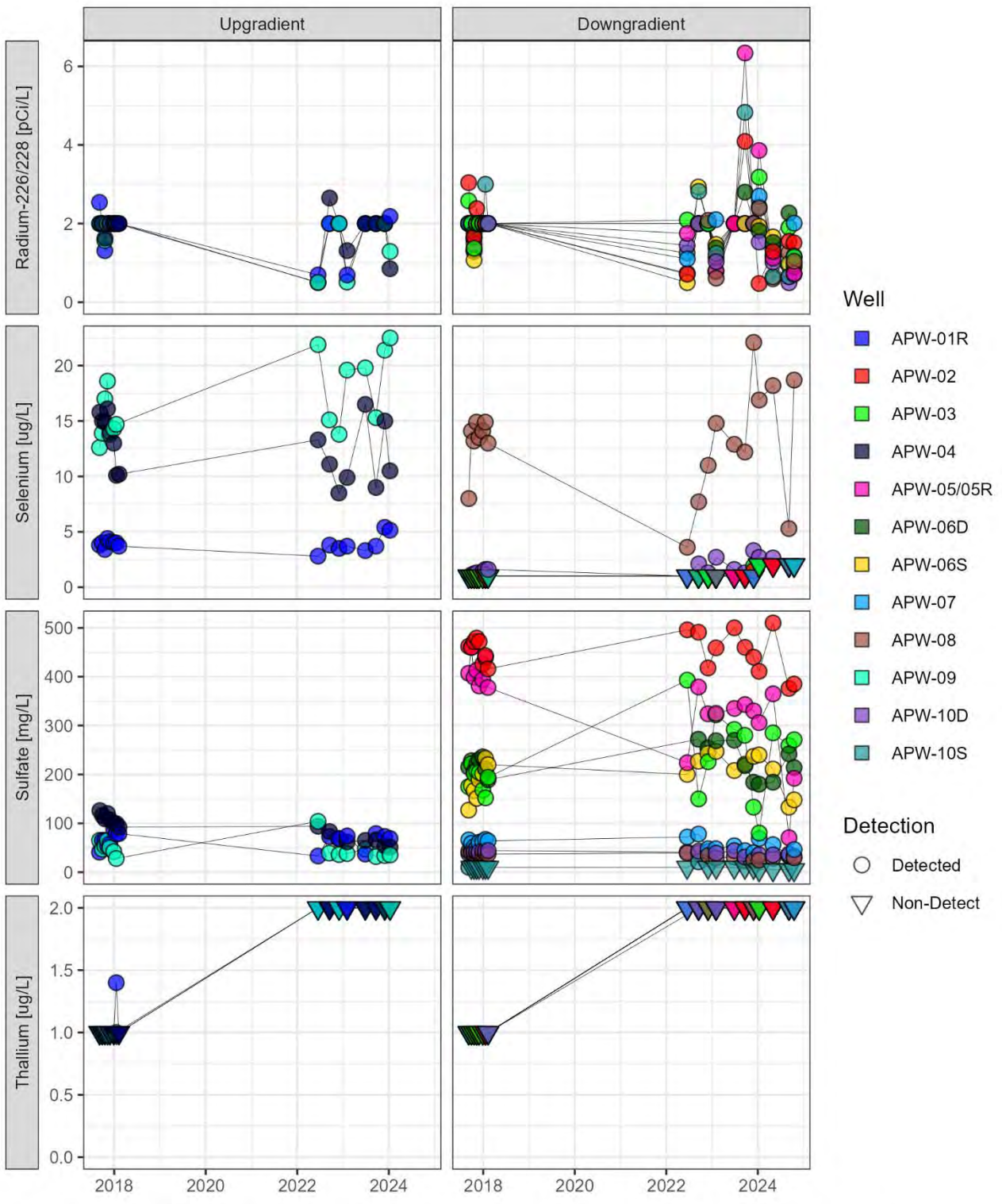
Note: Non-detects are shown at the reporting limit

Figure D4-D. Time Series Figures.



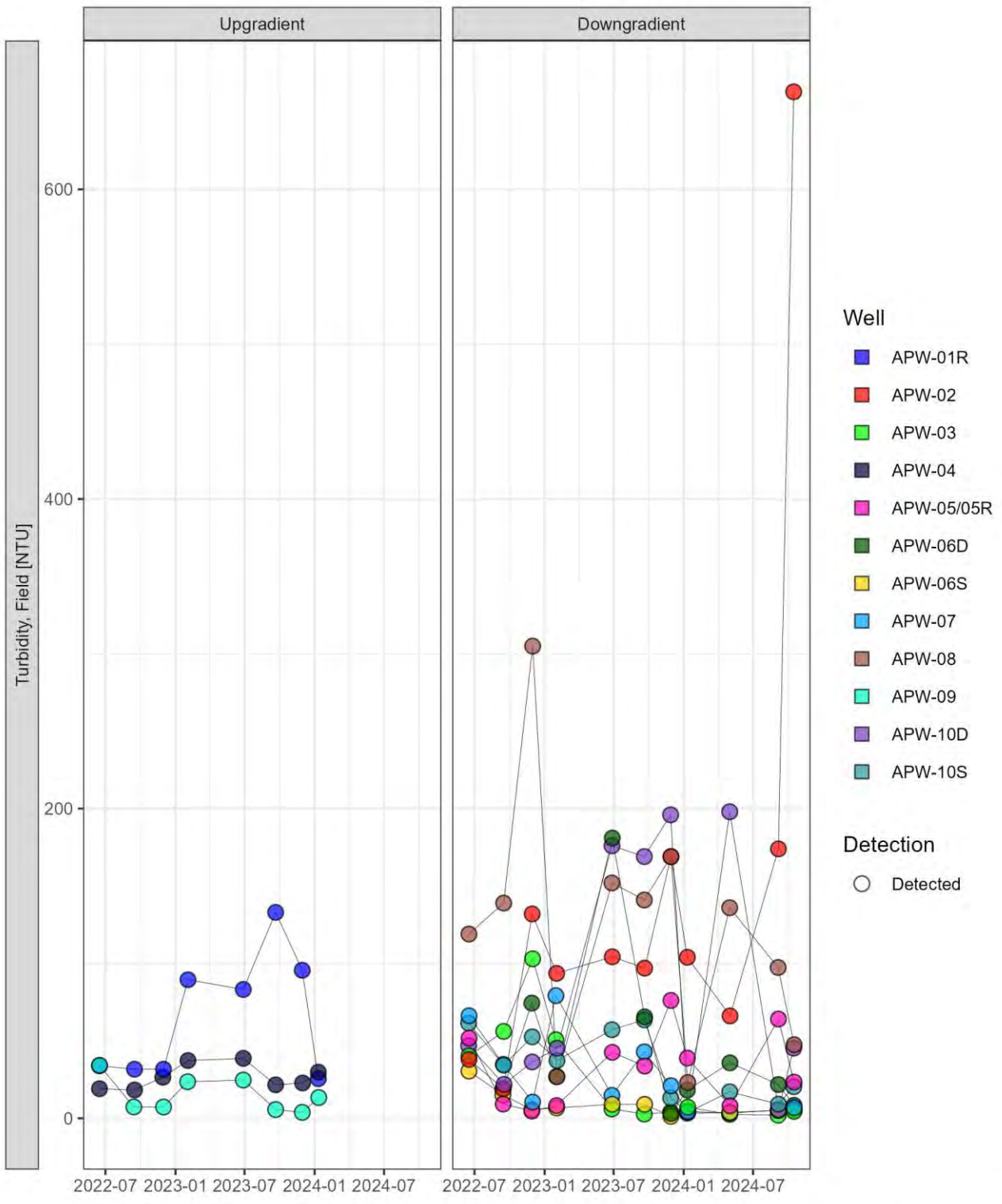
Note: Non-detects are shown at the reporting limit

Figure D4-E. Time Series Figures.



Note: Non-detects are shown at the reporting limit

Figure D4-F. Time Series Figures.



Note: Non-detects are shown at the reporting limit

Figure D4-G. Time Series Figures.

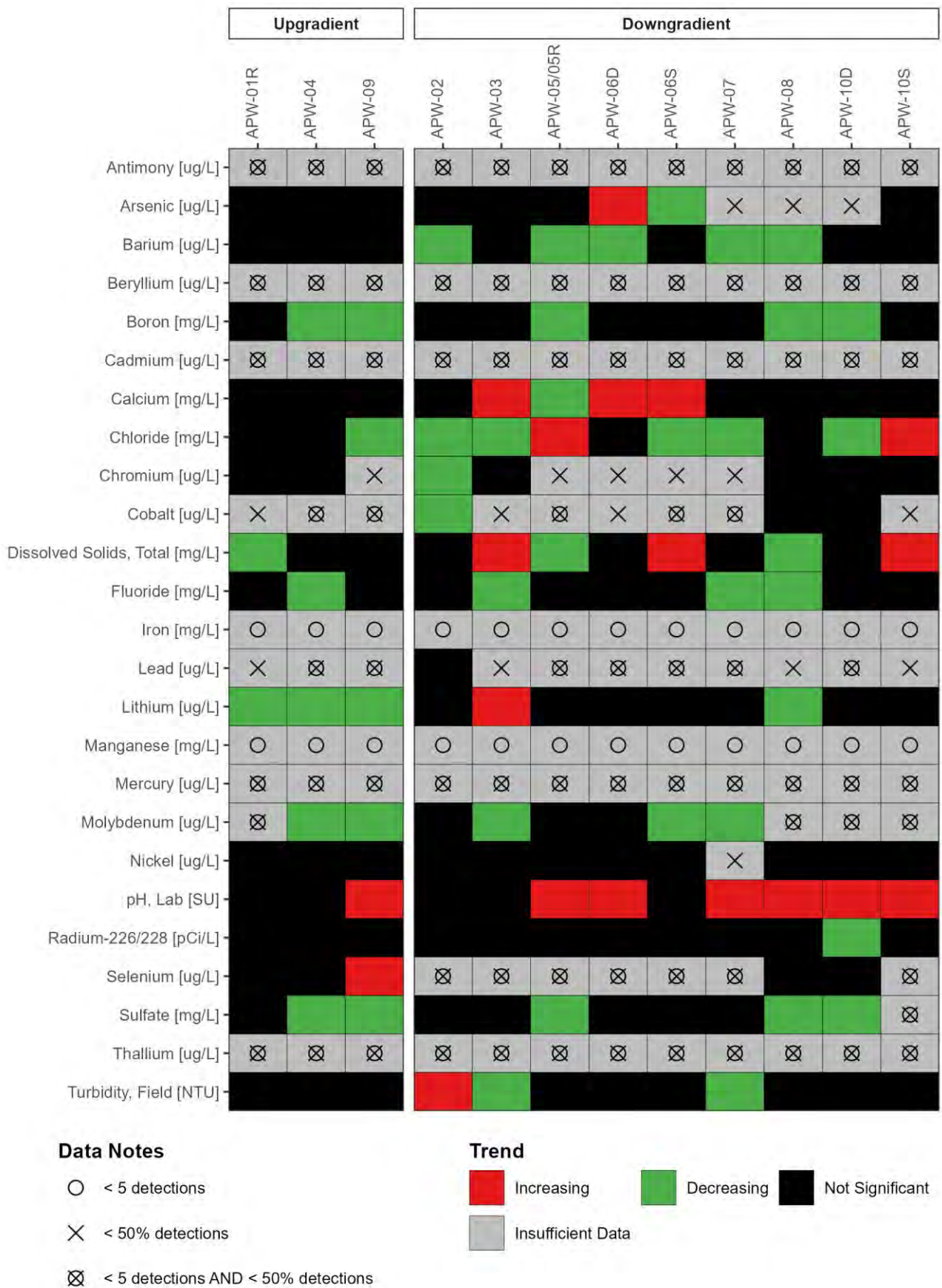
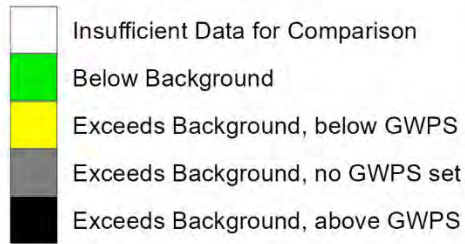


Figure D5. Trend Analysis Summary.

Background Comparison



Note:
 GWPS = Illinois Groundwater Protection Standards from Title 35, Section 845.600 of the Illinois Administrative Code

Figure D6. Summary of Background Concentration or Groundwater Protection Standard Exceedances.

APPENDIX D3. PROUCL INPUT AND OUTPUT

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

x_ols (antimony [ug/l]_interwell_pooled-upgradient)

General Statistics			
Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	46
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	1	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	97.87%
Mean Detected	1	SD Detected	N/A
Mean of Detected Logged Data	0	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (arsenic [ug/l]_interwell_pooled-upgradient)

General Statistics			
Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	21		
Number of Detects	43	Number of Non-Detects	4
Number of Distinct Detects	20	Number of Distinct Non-Detects	2
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	3.3	Maximum Non-Detect	2
Variance Detected	0.324	Percent Non-Detects	8.511%
Mean Detected	1.964	SD Detected	0.569
Mean of Detected Logged Data	0.633	SD of Detected Logged Data	0.296

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.961	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.923	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.0875	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.156	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.902	KM SD	0.583
95% UTL95% Coverage	3.11	95% KM UPL (t)	2.89
90% KM Percentile (z)	2.649	95% KM Percentile (z)	2.86
99% KM Percentile (z)	3.257	95% KM USL	3.611

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.861	SD	0.647
95% UTL95% Coverage	3.203	95% UPL (t)	2.958
90% Percentile (z)	2.69	95% Percentile (z)	2.925
99% Percentile (z)	3.366	95% USL	3.758

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.258	Anderson-Darling GOF Test	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0718	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.135	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

k hat (MLE)	12.09	k star (bias corrected MLE)	11.26
Theta hat (MLE)	0.162	Theta star (bias corrected MLE)	0.174
nu hat (MLE)	1040	nu star (bias corrected)	968.8
MLE Mean (bias corrected)	1.964		
MLE Sd (bias corrected)	0.585	95% Percentile of Chisquare (2kstar)	34.59

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.767	Mean	1.895
Maximum	3.3	Median	1.9
SD	0.599	CV	0.316
k hat (MLE)	9.816	k star (bias corrected MLE)	9.204
Theta hat (MLE)	0.193	Theta star (bias corrected MLE)	0.206
nu hat (MLE)	922.7	nu star (bias corrected)	865.2
MLE Mean (bias corrected)	1.895	MLE Sd (bias corrected)	0.625
95% Percentile of Chisquare (2kstar)	29.39	90% Percentile	2.727
95% Percentile	3.026	99% Percentile	3.642

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.372	3.418	95% Approx. Gamma UPL	3.045	3.07
95% Gamma USL	4.204	4.318			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.902	SD (KM)	0.583
Variance (KM)	0.339	SE of Mean (KM)	0.0865
k hat (KM)	10.66	k star (KM)	9.995
nu hat (KM)	1002	nu star (KM)	939.5
theta hat (KM)	0.178	theta star (KM)	0.19
80% gamma percentile (KM)	2.381	90% gamma percentile (KM)	2.702
95% gamma percentile (KM)	2.988	99% gamma percentile (KM)	3.573

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.307	3.344	95% Approx. Gamma UPL	2.998	3.017
95% KM Gamma Percentile	2.957	2.975	95% Gamma USL	4.09	4.185

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.963	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.951	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0756	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.123	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.899	Mean in Log Scale	0.592
SD in Original Scale	0.592	SD in Log Scale	0.322
95% UTL95% Coverage	3.526	95% BCA UTL95% Coverage	3.1
95% Bootstrap (%) UTL95% Coverage	3.18	95% UPL (t)	3.122
90% Percentile (z)	2.732	95% Percentile (z)	3.071
99% Percentile (z)	3.825	95% USL	4.65

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.595	95% KM UTL (Lognormal)95% Coverage	3.479
KM SD of Logged Data	0.314	95% KM UPL (Lognormal)	3.09
95% KM Percentile Lognormal (z)	3.04	95% KM USL (Lognormal)	4.557

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.861	Mean in Log Scale	0.55
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Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

SD in Original Scale	0.647	SD in Log Scale	0.408
95% UTL	95% Coverage 4.042	95% UPL (t)	3.465
90% Percentile (z)	2.924	95% Percentile (z)	3.392
99% Percentile (z)	4.481	95% USL	5.74

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with 95% Coverage	3.3
Approx. f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.02
95% USL	3.3	95% KM Chebyshev UPL	4.468

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (barium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	36
Minimum	118	First Quartile	132
Second Largest	227	Median	144
Maximum	259	Third Quartile	177
Mean	155.8	SD	31.03
Coefficient of Variation	0.199	Skewness	1.092
Mean of logged Data	5.031	SD of logged Data	0.187

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test

Shapiro Wilk Test Statistic	0.898
1% Shapiro Wilk Critical Value	0.928
Lilliefors Test Statistic	0.168
1% Lilliefors Critical Value	0.15

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	220.1	90% Percentile (z)	195.5
95% UPL (t)	208.4	95% Percentile (z)	206.8
95% USL	246.8	99% Percentile (z)	228

Gamma GOF Test

A-D Test Statistic	1.145
5% A-D Critical Value	0.748
K-S Test Statistic	0.155
5% K-S Critical Value	0.129

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	28.19	k star (bias corrected MLE)	26.4
Theta hat (MLE)	5.526	Theta star (bias corrected MLE)	5.9
nu hat (MLE)	2650	nu star (bias corrected)	2482
MLE Mean (bias corrected)	155.8	MLE Sd (bias corrected)	30.31

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	209.4	90% Percentile	195.7
95% Hawkins Wixley (HW) Approx. Gamma UPL	209.6	95% Percentile	208.8
95% WH Approx. Gamma UTL with 95% Coverage	223.3	99% Percentile	234.8

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	ProUCL 5.2 1/27/2025 9:06:47 AM		
From File	filec805d916c.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Coverage	95%		
Different or Future K Observations	1		
Number of Bootstrap Operations	2000		
95% HW Approx. Gamma UTL with	95% Coverage	223.9	
	95% WH USL	257.3	95% HW USL 259.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.954	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.145	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.118	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with	95% Coverage	225.7	90% Percentile (z)	194.6
	95% UPL (t)	210.3	95% Percentile (z)	208.3
	95% USL	265.1	99% Percentile (z)	236.6

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	47	95% UTL with	95% Coverage	259
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL		0.91
		Approximate Sample Size needed to achieve specified CC		59
95% Percentile Bootstrap UTL with	95% Coverage	249.4	95% BCA Bootstrap UTL with	95% Coverage
	95% UPL	217		241
	90% Chebyshev UPL	249.9		90% Percentile
	95% Chebyshev UPL	292.5		95% Percentile
	95% USL	259		99% Percentile
				244.3

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (beryllium [ug/l]_interwell_pooled-upgradient)

General Statistics			
Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	2	Number of Non-Detects	47
Number of Detects	0	Number of Distinct Non-Detects	2
Number of Distinct Detects	0	Minimum Non-Detect	1
Minimum Detect	N/A	Maximum Non-Detect	2
Maximum Detect	N/A	Percent Non-Detects	100%
Variance Detected	N/A	SD Detected	N/A
Mean Detected	N/A	SD of Detected Logged Data	N/A
Mean of Detected Logged Data	N/A		

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs! Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit! The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (boron [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	44	Number of Distinct Observations	44
Minimum	0.025	First Quartile	0.216
Second Largest	1.562	Median	0.309
Maximum	1.586	Third Quartile	0.567
Mean	0.455	SD	0.358
Coefficient of Variation	0.787	Skewness	1.662
Mean of logged Data	-1.057	SD of logged Data	0.77

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL) 2.091 d2max (for USL) 2.906

Normal GOF Test

Shapiro Wilk Test Statistic	0.811	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.924	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.19	Lilliefors GOF Test
1% Lilliefors Critical Value	0.154	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.205	90% Percentile (z)	0.915
95% UPL (t)	1.065	95% Percentile (z)	1.045
95% USL	1.497	99% Percentile (z)	1.289

Gamma GOF Test

A-D Test Statistic	1.061	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.134	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.135	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.001	k star (bias corrected MLE)	1.88
Theta hat (MLE)	0.228	Theta star (bias corrected MLE)	0.242
nu hat (MLE)	176.1	nu star (bias corrected)	165.4
MLE Mean (bias corrected)	0.455	MLE Sd (bias corrected)	0.332

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.109	90% Percentile	0.899
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.133	95% Percentile	1.102
95% WH Approx. Gamma UTL with 95% Coverage	1.354	99% Percentile	1.553
95% HW Approx. Gamma UTL with 95% Coverage	1.408		
95% WH USL	1.976	95% HW USL	2.14

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.952	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.115	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.122	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.739	90% Percentile (z)	0.932
95% UPL (t)	1.287	95% Percentile (z)	1.233
95% USL	3.258	99% Percentile (z)	2.084

Nonparametric Distribution Free Background Statistics

Data appear Approximate Gamma Distribution at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	44	95% UTL with 95% Coverage	1.586
Approx, f used to compute achieved CC	2.316	Approximate Actual Confidence Coefficient achieved by UTL	0.895
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	1.583	95% BCA Bootstrap UTL with 95% Coverage	1.562
95% UPL	1.451	90% Percentile	0.91
90% Chebyshev UPL	1.543	95% Percentile	1.098
95% Chebyshev UPL	2.036	99% Percentile	1.576
95% USL	1.586		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (cadmium [ug/l]_interwell_pooled-upgradient)

General Statistics			
Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	1	Number of Non-Detects	47
Number of Detects	0	Number of Distinct Non-Detects	1
Number of Distinct Detects	0	Minimum Non-Detect	1
Minimum Detect	N/A	Maximum Non-Detect	1
Maximum Detect	N/A	Percent Non-Detects	100%
Variance Detected	N/A	SD Detected	N/A
Mean Detected	N/A	SD of Detected Logged Data	N/A
Mean of Detected Logged Data	N/A		

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (calcium [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	44	Number of Distinct Observations	40
Minimum	59.2	First Quartile	81.8
Second Largest	113	Median	89.45
Maximum	124	Third Quartile	98.35
Mean	90.88	SD	13.09
Coefficient of Variation	0.144	Skewness	0.162
Mean of logged Data	4.499	SD of logged Data	0.146

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.091	d2max (for USL)	2.906
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Normal GOF Test

Shapiro Wilk Test Statistic	0.986
1% Shapiro Wilk Critical Value	0.924
Lilliefors Test Statistic	0.0978
1% Lilliefors Critical Value	0.154

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	118.3	90% Percentile (z)	107.7
95% UPL (t)	113.1	95% Percentile (z)	112.4
95% USL	128.9	99% Percentile (z)	121.3

Gamma GOF Test

A-D Test Statistic	0.267
5% A-D Critical Value	0.747
K-S Test Statistic	0.0849
5% K-S Critical Value	0.133

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	48.58	k star (bias corrected MLE)	45.28
Theta hat (MLE)	1.871	Theta star (bias corrected MLE)	2.007
nu hat (MLE)	4275	nu star (bias corrected)	3985
MLE Mean (bias corrected)	90.88	MLE Sd (bias corrected)	13.51

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	114.5	90% Percentile	108.6
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Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

95% Hawkins Wixley (HW) Approx. Gamma UPL	114.7	95% Percentile	114.2
95% WH Approx. Gamma UTL with 95% Coverage	120.6	99% Percentile	125.2
95% HW Approx. Gamma UTL with 95% Coverage	121		
95% WH USL	134	95% HW USL	134.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.982	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.952	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0909	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.122	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	122.2	90% Percentile (z)	108.5
95% UPL (t)	115.4	95% Percentile (z)	114.5
95% USL	137.7	99% Percentile (z)	126.5

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	44	95% UTL with 95% Coverage	124
Approx, f used to compute achieved CC	2.316	Approximate Actual Confidence Coefficient achieved by UTL	0.895
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	122.4	95% BCA Bootstrap UTL with 95% Coverage	122.4
95% UPL	113	90% Percentile	107.7
90% Chebyshev UPL	130.6	95% Percentile	112.6
95% Chebyshev UPL	148.6	99% Percentile	119.3
95% USL	124		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (chloride [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	25		
Number of Detects	41	Number of Non-Detects	6
Number of Distinct Detects	24	Number of Distinct Non-Detects	2
Minimum Detect	2	Minimum Non-Detect	4
Maximum Detect	12.84	Maximum Non-Detect	5
Variance Detected	5.126	Percent Non-Detects	12.77%
Mean Detected	10.39	SD Detected	2.264
Mean of Detected Logged Data	2.303	SD of Detected Logged Data	0.328

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.79	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.92	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.255	Lilliefors GOF Test
1% Lilliefors Critical Value	0.16	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	9.322	KM SD	3.494
95% UTL95% Coverage	16.57	95% KM UPL (t)	15.25
90% KM Percentile (z)	13.8	95% KM Percentile (z)	15.07
99% KM Percentile (z)	17.45	95% KM USL	19.57

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	9.375	SD	3.421
95% UTL	16.47	95% UPL (t)	15.18
90% Percentile (z)	13.76	95% Percentile (z)	15
99% Percentile (z)	17.33	95% USL	19.41

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.066	Anderson-Darling GOF Test
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.269	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.138	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	13.11	k star (bias corrected MLE)	12.17
Theta hat (MLE)	0.793	Theta star (bias corrected MLE)	0.854
nu hat (MLE)	1075	nu star (bias corrected)	997.6
MLE Mean (bias corrected)	10.39		
MLE Sd (bias corrected)	2.98	95% Percentile of Chisquare (2kstar)	36.83

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2	Mean	9.965
Maximum	12.84	Median	11
SD	2.401	CV	0.241
k hat (MLE)	12.18	k star (bias corrected MLE)	11.41
Theta hat (MLE)	0.818	Theta star (bias corrected MLE)	0.873
nu hat (MLE)	1145	nu star (bias corrected)	1073
MLE Mean (bias corrected)	9.965	MLE Sd (bias corrected)	2.95
95% Percentile of Chisquare (2kstar)	34.95	90% Percentile	13.88
95% Percentile	15.26	99% Percentile	18.07

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	16.81	17.22	95% Approx. Gamma UPL	15.32	15.6
95% Gamma USL	20.55	21.37			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	9.322	SD (KM)	3.494
Variance (KM)	12.21	SE of Mean (KM)	0.516
k hat (KM)	7.118	k star (KM)	6.678
nu hat (KM)	669.1	nu star (KM)	627.7
theta hat (KM)	1.31	theta star (KM)	1.396
80% gamma percentile (KM)	12.15	90% gamma percentile (KM)	14.14
95% gamma percentile (KM)	15.94	99% gamma percentile (KM)	19.69

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	21.62	22.91	95% Approx. Gamma UPL	18.65	19.46
95% KM Gamma Percentile	18.27	19.02	95% Gamma USL	29.52	32.44

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.624	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.95	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.267	Lilliefors GOF Test
10% Lilliefors Critical Value	0.126	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	9.832	Mean in Log Scale	2.237
SD in Original Scale	2.586	SD in Log Scale	0.353
95% UTL95% Coverage	19.47	95% BCA UTL95% Coverage	12.74
95% Bootstrap (%) UTL95% Coverage	12.81	95% UPL (t)	17.04
90% Percentile (z)	14.72	95% Percentile (z)	16.74
99% Percentile (z)	21.29	95% USL	26.37

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	2.097	95% KM UTL (Lognormal)95% Coverage	29.25
KM SD of Logged Data	0.617	95% KM UPL (Lognormal)	23.17
95% KM Percentile Lognormal (z)	22.45	95% KM USL (Lognormal)	49.66

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	9.375	Mean in Log Scale	2.121
SD in Original Scale	3.421	SD in Log Scale	0.57
95% UTL95% Coverage	27.2	95% UPL (t)	21.94
90% Percentile (z)	17.32	95% Percentile (z)	21.3
99% Percentile (z)	31.42	95% USL	44.39

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with95% Coverage	12.84
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	12.48
95% USL	12.84	95% KM Chebyshev UPL	24.71

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (chromium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	24	Number of Non-Detects	16
Number of Detects	31	Number of Distinct Non-Detects	3
Number of Distinct Detects	22	Minimum Non-Detect	1
Minimum Detect	1.1	Maximum Non-Detect	2
Maximum Detect	25.1	Percent Non-Detects	34.04%
Variance Detected	22.29	SD Detected	4.722
Mean Detected	3.856	SD of Detected Logged Data	0.679
Mean of Detected Logged Data	1.035		

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.512	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.902	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.334	Lilliefors GOF Test
1% Lilliefors Critical Value	0.182	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	2.891	KM SD	4.005
95% UTL95% Coverage	11.2	95% KM UPL (t)	9.685
90% KM Percentile (z)	8.023	95% KM Percentile (z)	9.478

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

99% KM Percentile (z) 12.21 95% KM USL 14.64

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.762	SD	4.113
95% UTL	95% Coverage 11.29	95% UPL (t)	9.74
90% Percentile (z)	8.033	95% Percentile (z)	9.527
99% Percentile (z)	12.33	95% USL	14.82

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.582	Anderson-Darling GOF Test
5% A-D Critical Value	0.761	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.216	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.16	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.736	k star (bias corrected MLE)	1.589
Theta hat (MLE)	2.222	Theta star (bias corrected MLE)	2.426
nu hat (MLE)	107.6	nu star (bias corrected)	98.54
MLE Mean (bias corrected)	3.856		
MLE Sd (bias corrected)	3.059	95% Percentile of Chisquare (2kstar)	8.122

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.547
Maximum	25.1	Median	1.7
SD	4.235	CV	1.663
k hat (MLE)	0.367	k star (bias corrected MLE)	0.357
Theta hat (MLE)	6.946	Theta star (bias corrected MLE)	7.126
nu hat (MLE)	34.47	nu star (bias corrected)	33.6
MLE Mean (bias corrected)	2.547	MLE Sd (bias corrected)	4.26
95% Percentile of Chisquare (2kstar)	3.087	90% Percentile	7.331
95% Percentile	11	99% Percentile	20.33

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	14.3	17.87	95% Approx. Gamma UPL	10.26	11.95
95% Gamma USL	27.14	39.3			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.891	SD (KM)	4.005
Variance (KM)	16.04	SE of Mean (KM)	0.594
k hat (KM)	0.521	k star (KM)	0.502
nu hat (KM)	48.96	nu star (KM)	47.17
theta hat (KM)	5.549	theta star (KM)	5.76
80% gamma percentile (KM)	4.748	90% gamma percentile (KM)	7.815
95% gamma percentile (KM)	11.09	99% gamma percentile (KM)	19.14

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	9.133	9.017	95% Approx. Gamma UPL	7.374	7.191
95% KM Gamma Percentile	7.153	6.965	95% Gamma USL	14.13	14.45

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.861	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.94	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.145	Lilliefors GOF Test
10% Lilliefors Critical Value	0.143	Data Not Lognormal at 10% Significance Level

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Data Not Lognormal at 10% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.761	Mean in Log Scale	0.506
SD in Original Scale	4.115	SD in Log Scale	0.954
95% UTL95% Coverage	11.98	95% BCA UTL95% Coverage	20.12
95% Bootstrap (%) UTL95% Coverage	22.01	95% UPL (t)	8.361
90% Percentile (z)	5.629	95% Percentile (z)	7.96
99% Percentile (z)	15.25	95% USL	27.18

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.688	95% KM UTL (Lognormal)95% Coverage	8.99
KM SD of Logged Data	0.727	95% KM UPL (Lognormal)	6.832
95% KM Percentile Lognormal (z)	6.581	95% KM USL (Lognormal)	16.79

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.762	Mean in Log Scale	0.522
SD in Original Scale	4.113	SD in Log Scale	0.917
95% UTL95% Coverage	11.27	95% UPL (t)	7.977
90% Percentile (z)	5.454	95% Percentile (z)	7.608
99% Percentile (z)	14.21	95% USL	24.77

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with95% Coverage	25.1
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	12.28
95% USL	25.1	95% KM Chebyshev UPL	20.53

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.

Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (cobalt [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	10	Number of Non-Detects	33
Number of Detects	14	Number of Distinct Non-Detects	2
Number of Distinct Detects	9	Minimum Non-Detect	1
Minimum Detect	1	Maximum Non-Detect	2
Maximum Detect	4.1	Percent Non-Detects	70.21%
Variance Detected	0.929	SD Detected	0.964
Mean Detected	1.964	SD of Detected Logged Data	0.459
Mean of Detected Logged Data	0.573		

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.86	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.251	Lilliefors GOF Test
1% Lilliefors Critical Value	0.263	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.292	KM SD	0.672
95% UTL95% Coverage	2.685	95% KM UPL (t)	2.431

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

90% KM Percentile (z)	2.153	95% KM Percentile (z)	2.397
99% KM Percentile (z)	2.854	95% KM USL	3.262

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.968	SD	0.841
95% UTL/95% Coverage	2.712	95% UPL (t)	2.395
90% Percentile (z)	2.046	95% Percentile (z)	2.352
99% Percentile (z)	2.925	95% USL	3.435

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.658	Anderson-Darling GOF Test
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.065	k star (bias corrected MLE)	4.028
Theta hat (MLE)	0.388	Theta star (bias corrected MLE)	0.488
nu hat (MLE)	141.8	nu star (bias corrected)	112.8
MLE Mean (bias corrected)	1.964		
MLE Sd (bias corrected)	0.979	95% Percentile of Chisquare (2kstar)	15.59

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.67
Maximum	4.1	Median	0.0108
SD	1.01	CV	1.507
k hat (MLE)	0.341	k star (bias corrected MLE)	0.333
Theta hat (MLE)	1.966	Theta star (bias corrected MLE)	2.011
nu hat (MLE)	32.05	nu star (bias corrected)	31.34
MLE Mean (bias corrected)	0.67	MLE Sd (bias corrected)	1.161
95% Percentile of Chisquare (2kstar)	2.947	90% Percentile	1.95
95% Percentile	2.962	99% Percentile	5.561

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.867	4.504	95% Approx. Gamma UPL	2.717	2.956
95% Gamma USL	7.596	10.22			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.292	SD (KM)	0.672
Variance (KM)	0.451	SE of Mean (KM)	0.102
k hat (KM)	3.702	k star (KM)	3.48
nu hat (KM)	348	nu star (KM)	327.1
theta hat (KM)	0.349	theta star (KM)	0.371
80% gamma percentile (KM)	1.811	90% gamma percentile (KM)	2.221
95% gamma percentile (KM)	2.601	99% gamma percentile (KM)	3.418

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.555	2.54	95% Approx. Gamma UPL	2.262	2.241
95% KM Gamma Percentile	2.224	2.203	95% Gamma USL	3.314	3.329

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.913	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.197	Lilliefors GOF Test

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	ProUCL 5.2 1/27/2025 9:06:47 AM		
From File	filec805d916c.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Coverage	95%		
Different or Future K Observations	1		
Number of Bootstrap Operations	2000		
10% Lilliefors Critical Value	0.208	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.909	Mean in Log Scale	-0.483
SD in Original Scale	0.886	SD in Log Scale	0.893
95% UTL95% Coverage	3.937	95% BCA UTL95% Coverage	3.8
95% Bootstrap (%) UTL95% Coverage	3.8	95% UPL (t)	2.81
90% Percentile (z)	1.94	95% Percentile (z)	2.683
99% Percentile (z)	4.933	95% USL	8.48

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.175	95% KM UTL (Lognormal)95% Coverage	2.495
KM SD of Logged Data	0.357	95% KM UPL (Lognormal)	2.181
95% KM Percentile Lognormal (z)	2.141	95% KM USL (Lognormal)	3.389

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.968	Mean in Log Scale	-0.272
SD in Original Scale	0.841	SD in Log Scale	0.63
95% UTL95% Coverage	2.817	95% UPL (t)	2.221
90% Percentile (z)	1.71	95% Percentile (z)	2.15
99% Percentile (z)	3.303	95% USL	4.841

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with95% Coverage	4.1
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.1
95% USL	4.1	95% KM Chebyshev UPL	4.25

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (dissolved solids, total [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	45	Number of Distinct Observations	40
Minimum	278	First Quartile	354
Second Largest	514	Median	380
Maximum	528	Third Quartile	430
Mean	394	SD	57.9
Coefficient of Variation	0.147	Skewness	0.345
Mean of logged Data	5.966	SD of logged Data	0.147

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.085	d2max (for USL)	2.915
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Normal GOF Test

Shapiro Wilk Test Statistic	0.976	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.926	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.111	Lilliefors GOF Test
1% Lilliefors Critical Value	0.153	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	514.7	90% Percentile (z)	468.2
95% UPL (t)	492.4	95% Percentile (z)	489.2
95% USL	562.8	99% Percentile (z)	528.7

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Gamma GOF Test

A-D Test Statistic	0.239	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0927	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.131	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	47.82	k star (bias corrected MLE)	44.65
Theta hat (MLE)	8.24	Theta star (bias corrected MLE)	8.825
nu hat (MLE)	4304	nu star (bias corrected)	4018
MLE Mean (bias corrected)	394	MLE Sd (bias corrected)	58.97

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	497	90% Percentile	471.2
95% Hawkins Wixley (HW) Approx. Gamma UPL	497.7	95% Percentile	495.8
95% WH Approx. Gamma UTL with 95% Coverage	523.5	99% Percentile	544
95% HW Approx. Gamma UTL with 95% Coverage	524.8		
95% WH USL	583.4	95% HW USL	586.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.985	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.953	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0829	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.12	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	529.2	90% Percentile (z)	470.4
95% UPL (t)	500.1	95% Percentile (z)	496.2
95% USL	597.7	99% Percentile (z)	548.3

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	45	95% UTL with 95% Coverage	528
Approx, f used to compute achieved CC	2.368	Approximate Actual Confidence Coefficient achieved by UTL	0.901
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	525.2	95% BCA Bootstrap UTL with 95% Coverage	520.8
95% UPL	507.4	90% Percentile	474.4
90% Chebyshev UPL	569.6	95% Percentile	490.4
95% Chebyshev UPL	649.2	99% Percentile	521.8
95% USL	528		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (fluoride [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	28
Minimum	0.12	First Quartile	0.161
Second Largest	0.22	Median	0.171
Maximum	0.23	Third Quartile	0.197
Mean	0.177	SD	0.0237
Coefficient of Variation	0.134	Skewness	0.0922
Mean of logged Data	-1.741	SD of logged Data	0.136

Critical Values for Background Threshold Values (BTVs)

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Tolerance Factor K (For UTL) 2.074 d2max (for USL) 2.933

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.928	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.124	Lilliefors GOF Test
1% Lilliefors Critical Value	0.15	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.226	90% Percentile (z)	0.207
95% UPL (t)	0.217	95% Percentile (z)	0.216
95% USL	0.246	99% Percentile (z)	0.232

Gamma GOF Test

A-D Test Statistic	0.386	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.108	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	55.95	k star (bias corrected MLE)	52.39
Theta hat (MLE)	0.00316	Theta star (bias corrected MLE)	0.00338
nu hat (MLE)	5259	nu star (bias corrected)	4925
MLE Mean (bias corrected)	0.177	MLE Sd (bias corrected)	0.0244

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.219	90% Percentile	0.209
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.22	95% Percentile	0.219
95% WH Approx. Gamma UTL with 95% Coverage	0.23	99% Percentile	0.239
95% HW Approx. Gamma UTL with 95% Coverage	0.231		
95% WH USL	0.255	95% HW USL	0.257

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.954	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.098	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.118	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.232	90% Percentile (z)	0.209
95% UPL (t)	0.221	95% Percentile (z)	0.219
95% USL	0.261	99% Percentile (z)	0.241

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	47	95% UTL with 95% Coverage	0.23
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	0.227	95% BCA Bootstrap UTL with 95% Coverage	0.22
95% UPL	0.22	90% Percentile	0.204
90% Chebyshev UPL	0.249	95% Percentile	0.217
95% Chebyshev UPL	0.281	99% Percentile	0.225
95% USL	0.23		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

x_ols (iron [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
Minimum	0.179	First Quartile	0.428
Second Largest	0.709	Median	0.53
Maximum	1.42	Third Quartile	0.673
Mean	0.629	SD	0.426
Coefficient of Variation	0.677	Skewness	1.52
Mean of logged Data	-0.649	SD of logged Data	0.68

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	3.708	d2max (for USL)	1.822
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Normal GOF Test

Shapiro Wilk Test Statistic	0.872	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.259	Lilliefors GOF Test
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	2.208	90% Percentile (z)	1.174
95% UPL (t)	1.556	95% Percentile (z)	1.329
95% USL	1.405	99% Percentile (z)	1.619

Gamma GOF Test

A-D Test Statistic	0.248	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.702	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.176	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.335	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	2.863	k star (bias corrected MLE)	1.543
Theta hat (MLE)	0.22	Theta star (bias corrected MLE)	0.408
nu hat (MLE)	34.35	nu star (bias corrected)	18.51
MLE Mean (bias corrected)	0.629	MLE Sd (bias corrected)	0.506

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.837	90% Percentile	1.301
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.914	95% Percentile	1.622
95% WH Approx. Gamma UTL with 95% Coverage	3.426	99% Percentile	2.347
95% HW Approx. Gamma UTL with 95% Coverage	3.824		
95% WH USL	1.558	95% HW USL	1.601

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.973	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.187	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	6.51	90% Percentile (z)	1.25
95% UPL (t)	2.297	95% Percentile (z)	1.6
95% USL	1.805	99% Percentile (z)	2.544

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

**Nonparametric Distribution Free Background Statistics
 Data appear Normal at 1% Significance Level**

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	6	95% UTL with 95% Coverage	1.42
Approx, f used to compute achieved CC	0.316	Approximate Actual Confidence Coefficient achieved by UTL	0.265
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	1.42	95% BCA Bootstrap UTL with 95% Coverage	1.42
	95% UPL	90% Percentile	1.065
	90% Chebyshev UPL	95% Percentile	1.242
	95% Chebyshev UPL	99% Percentile	1.384
	95% USL		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (lead [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	8		
Number of Detects	7	Number of Non-Detects	40
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	1.3	Minimum Non-Detect	1
Maximum Detect	6.2	Maximum Non-Detect	2
Variance Detected	3.175	Percent Non-Detects	85.11%
Mean Detected	2.714	SD Detected	1.782
Mean of Detected Logged Data	0.843	SD of Detected Logged Data	0.577

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.82	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.24	Lilliefors GOF Test
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.257	KM SD	0.882
95% UTL95% Coverage	3.086	95% KM UPL (t)	2.753
90% KM Percentile (z)	2.388	95% KM Percentile (z)	2.708
99% KM Percentile (z)	3.309	95% KM USL	3.844

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.862	SD	1.021
95% UTL95% Coverage	2.98	95% UPL (t)	2.594
90% Percentile (z)	2.17	95% Percentile (z)	2.541
99% Percentile (z)	3.237	95% USL	3.856

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.415	Anderson-Darling GOF Test
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.207	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

k hat (MLE)	3.378	k star (bias corrected MLE)	2.026
Theta hat (MLE)	0.803	Theta star (bias corrected MLE)	1.34
nu hat (MLE)	47.3	nu star (bias corrected)	28.36
MLE Mean (bias corrected)	2.714		
MLE Sd (bias corrected)	1.907	95% Percentile of Chisquare (2kstar)	9.571

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.417
Maximum	6.2	Median	0.01
SD	1.166	CV	2.797
k hat (MLE)	0.249	k star (bias corrected MLE)	0.247
Theta hat (MLE)	1.674	Theta star (bias corrected MLE)	1.685
nu hat (MLE)	23.4	nu star (bias corrected)	23.24
MLE Mean (bias corrected)	0.417	MLE Sd (bias corrected)	0.838
95% Percentile of Chisquare (2kstar)	2.401	90% Percentile	1.252
95% Percentile	2.024	99% Percentile	4.082

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.004	1.884	95% Approx. Gamma UPL	1.34	1.181
95% Gamma USL	4.256	4.612			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.257	SD (KM)	0.882
Variance (KM)	0.778	SE of Mean (KM)	0.139
k hat (KM)	2.033	k star (KM)	1.917
nu hat (KM)	191.1	nu star (KM)	180.2
theta hat (KM)	0.619	theta star (KM)	0.656
80% gamma percentile (KM)	1.892	90% gamma percentile (KM)	2.47
95% gamma percentile (KM)	3.023	99% gamma percentile (KM)	4.252

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.621	2.568	95% Approx. Gamma UPL	2.297	2.247
95% KM Gamma Percentile	2.254	2.205	95% Gamma USL	3.47	3.428

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.914	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.174	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.62	Mean in Log Scale	-1.485
SD in Original Scale	1.117	SD in Log Scale	1.454
95% UTL95% Coverage	4.622	95% BCA UTL95% Coverage	5.12
95% Bootstrap (%) UTL95% Coverage	5.51	95% UPL (t)	2.67
90% Percentile (z)	1.46	95% Percentile (z)	2.477
99% Percentile (z)	6.673	95% USL	16.11

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.127	95% KM UTL (Lognormal)95% Coverage	2.419
KM SD of Logged Data	0.365	95% KM UPL (Lognormal)	2.108
95% KM Percentile Lognormal (z)	2.069	95% KM USL (Lognormal)	3.308

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.862	Mean in Log Scale	-0.42
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Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

SD in Original Scale	1.021	SD in Log Scale	0.598
95% UTL95% Coverage	2.272	95% UPL (t)	1.813
90% Percentile (z)	1.414	95% Percentile (z)	1.757
99% Percentile (z)	2.642	95% USL	3.797

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

**Nonparametric Distribution Free Background Statistics
 Data appear to follow a Discernible Distribution**

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with95% Coverage	6.2
Approx. f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.38
95% USL	6.2	95% KM Chebyshev UPL	5.142

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (lithium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	47
Minimum	12.65	First Quartile	14.75
Second Largest	31.34	Median	16.31
Maximum	33.16	Third Quartile	29
Mean	20.31	SD	7.193
Coefficient of Variation	0.354	Skewness	0.593
Mean of logged Data	2.953	SD of logged Data	0.337

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test

Shapiro Wilk Test Statistic 0.762
 1% Shapiro Wilk Critical Value 0.928
 Lilliefors Test Statistic 0.304
 1% Lilliefors Critical Value 0.15

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	35.23	90% Percentile (z)	29.53
95% UPL (t)	32.51	95% Percentile (z)	32.14
95% USL	41.4	99% Percentile (z)	37.04

Gamma GOF Test

A-D Test Statistic 4.496
 5% A-D Critical Value 0.75
 K-S Test Statistic 0.283
 5% K-S Critical Value 0.129

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.817	k star (bias corrected MLE)	8.268
Theta hat (MLE)	2.304	Theta star (bias corrected MLE)	2.457
nu hat (MLE)	828.8	nu star (bias corrected)	777.2
MLE Mean (bias corrected)	20.31	MLE Sd (bias corrected)	7.064

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	33.36	90% Percentile	29.73
95% Hawkins Wixley (HW) Approx. Gamma UPL	33.5	95% Percentile	33.15
95% WH Approx. Gamma UTL with 95% Coverage	37.14	99% Percentile	40.23

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	ProUCL 5.2 1/27/2025 9:06:47 AM			
From File	filec805d916c.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Coverage	95%			
Different or Future K Observations	1			
Number of Bootstrap Operations	2000			
95% HW Approx. Gamma UTL with 95% Coverage	37.46		95% HW USL	47.76
	95% WH USL	46.76		

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.79	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.954	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.268	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.118	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	38.6	90% Percentile (z)	29.54
95% UPL (t)	33.98	95% Percentile (z)	33.4
95% USL	51.57	99% Percentile (z)	42.03

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	47	95% UTL with 95% Coverage	33.16
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	32.48	95% BCA Bootstrap UTL with 95% Coverage	32.48
95% UPL	31.17	90% Percentile	30.35
90% Chebyshev UPL	42.12	95% Percentile	30.84
95% Chebyshev UPL	51.99	99% Percentile	32.32
95% USL	33.16		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (manganese [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
Minimum	0.0791	First Quartile	0.128
Second Largest	0.21	Median	0.166
Maximum	0.599	Third Quartile	0.206
Mean	0.224	SD	0.19
Coefficient of Variation	0.848	Skewness	2.112
Mean of logged Data	-1.72	SD of logged Data	0.686

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	3.708	d2max (for USL)	1.822
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Normal GOF Test

Shapiro Wilk Test Statistic	0.732	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.362	Lilliefors GOF Test
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.928	90% Percentile (z)	0.467
95% UPL (t)	0.637	95% Percentile (z)	0.536
95% USL	0.57	99% Percentile (z)	0.665

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Gamma GOF Test

A-D Test Statistic	0.483	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.703	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.285	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.335	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	2.391	k star (bias corrected MLE)	1.307
Theta hat (MLE)	0.0936	Theta star (bias corrected MLE)	0.171
nu hat (MLE)	28.7	nu star (bias corrected)	15.68
MLE Mean (bias corrected)	0.224	MLE Sd (bias corrected)	0.196

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.701	90% Percentile	0.482
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.718	95% Percentile	0.611
95% WH Approx. Gamma UTL with 95% Coverage	1.359	99% Percentile	0.904
95% HW Approx. Gamma UTL with 95% Coverage	1.489		
95% WH USL	0.588	95% HW USL	0.594

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.928	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.241	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2.281	90% Percentile (z)	0.431
95% UPL (t)	0.797	95% Percentile (z)	0.554
95% USL	0.625	99% Percentile (z)	0.884

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	6	95% UTL with 95% Coverage	0.599
Approx, f used to compute achieved CC	0.316	Approximate Actual Confidence Coefficient achieved by UTL	0.265
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	0.599	95% BCA Bootstrap UTL with 95% Coverage	0.599
95% UPL	0.599	90% Percentile	0.405
90% Chebyshev UPL	0.839	95% Percentile	0.502
95% Chebyshev UPL	1.117	99% Percentile	0.58
95% USL	0.599		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (mercury [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	47
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.2
Maximum Detect	N/A	Maximum Non-Detect	0.2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	ProUCL 5.2 1/27/2025 9:06:47 AM		
From File	filec805d916c.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Coverage	95%		
Different or Future K Observations	1		
Number of Bootstrap Operations	2000		
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

The data set for variable x_ols (mercury [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (molybdenum [ug/l]_interwell_pooled-upgradient)

General Statistics			
Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	34	Number of Non-Detects	16
Number of Detects	31	Number of Distinct Non-Detects	3
Number of Distinct Detects	31	Minimum Non-Detect	1
Minimum Detect	13.74	Maximum Non-Detect	5
Maximum Detect	69.2	Percent Non-Detects	34.04%
Variance Detected	179.6	SD Detected	13.4
Mean Detected	29.14	SD of Detected Logged Data	0.443
Mean of Detected Logged Data	3.276		

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.889	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.902	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.17	Lilliefors GOF Test
1% Lilliefors Critical Value	0.182	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	19.56	KM SD	17.1
95% UTL95% Coverage	55.02	95% KM UPL (t)	48.57
90% KM Percentile (z)	41.47	95% KM Percentile (z)	47.68
99% KM Percentile (z)	59.34	95% KM USL	69.71

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	19.47	SD	17.39
95% UTL95% Coverage	55.52	95% UPL (t)	48.96
90% Percentile (z)	41.75	95% Percentile (z)	48.07
99% Percentile (z)	59.91	95% USL	70.45

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.934	Anderson-Darling GOF Test
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.158	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.348	k star (bias corrected MLE)	4.852
Theta hat (MLE)	5.448	Theta star (bias corrected MLE)	6.005
nu hat (MLE)	331.6	nu star (bias corrected)	300.8
MLE Mean (bias corrected)	29.14		
MLE Sd (bias corrected)	13.23	95% Percentile of Chisquare (2kstar)	17.9

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	20.74
Maximum	69.2	Median	17.76
SD	16.16	CV	0.779
k hat (MLE)	0.712	k star (bias corrected MLE)	0.681
Theta hat (MLE)	29.11	Theta star (bias corrected MLE)	30.45
nu hat (MLE)	66.95	nu star (bias corrected)	64.01
MLE Mean (bias corrected)	20.74	MLE Sd (bias corrected)	25.13
95% Percentile of Chisquare (2kstar)	4.682	90% Percentile	52.39
95% Percentile	71.29	99% Percentile	116.5

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	88.47	110.8	95% Approx. Gamma UPL	68.48	81.38
95% Gamma USL	147.6	207			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	19.56	SD (KM)	17.1
Variance (KM)	292.4	SE of Mean (KM)	2.535
k hat (KM)	1.308	k star (KM)	1.239
nu hat (KM)	123	nu star (KM)	116.5
theta hat (KM)	14.95	theta star (KM)	15.79
80% gamma percentile (KM)	30.87	90% gamma percentile (KM)	42.71
95% gamma percentile (KM)	54.37	99% gamma percentile (KM)	81.02

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	87.56	101.5	95% Approx. Gamma UPL	66.72	73.92
95% KM Gamma Percentile	64.16	70.65	95% Gamma USL	150.2	192.4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.926	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.94	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.172	Lilliefors GOF Test
10% Lilliefors Critical Value	0.143	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	22.42	Mean in Log Scale	2.912
SD in Original Scale	14.43	SD in Log Scale	0.642
95% UTL95% Coverage	69.74	95% BCA UTL95% Coverage	62.13
95% Bootstrap (%) UTL95% Coverage	63.55	95% UPL (t)	54.72
90% Percentile (z)	41.92	95% Percentile (z)	52.94
99% Percentile (z)	82.02	95% USL	121.1

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	2.161	95% KM UTL (Lognormal)95% Coverage	235.6
KM SD of Logged Data	1.592	95% KM UPL (Lognormal)	129.2
95% KM Percentile Lognormal (z)	119	95% KM USL (Lognormal)	924.4

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	19.47	Mean in Log Scale	2.019
SD in Original Scale	17.39	SD in Log Scale	1.819
95% UTL95% Coverage	327.3	95% UPL (t)	164.7
90% Percentile (z)	77.47	95% Percentile (z)	150
99% Percentile (z)	518	95% USL	1560

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with95% Coverage	69.2
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Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	ProUCL 5.2 1/27/2025 9:06:47 AM		
From File	filec805d916c.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Coverage	95%		
Different or Future K Observations	1		
Number of Bootstrap Operations	2000		
Approx. f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	48.48
	95% USL	69.2	95% KM Chebyshev UPL 94.88

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (nickel [ug/l]_interwell_pooled-upgradient)

General Statistics			
Total Number of Observations	29	Number of Missing Observations	0
Number of Distinct Observations	23		
Number of Detects	26	Number of Non-Detects	3
Number of Distinct Detects	23	Number of Distinct Non-Detects	1
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	12	Maximum Non-Detect	1
Variance Detected	7.667	Percent Non-Detects	10.34%
Mean Detected	4.562	SD Detected	2.769
Mean of Detected Logged Data	1.352	SD of Detected Logged Data	0.602

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.232	d2max (for USL)	2.73
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Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.858	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.891	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.154	Lilliefors GOF Test
1% Lilliefors Critical Value	0.199	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	4.193	KM SD	2.79
95% UTL95% Coverage	10.42	95% KM UPL (t)	9.021
90% KM Percentile (z)	7.769	95% KM Percentile (z)	8.783
99% KM Percentile (z)	10.68	95% KM USL	11.81

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	4.141	SD	2.904
95% UTL95% Coverage	10.62	95% UPL (t)	9.165
90% Percentile (z)	7.862	95% Percentile (z)	8.917
99% Percentile (z)	10.9	95% USL	12.07

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.299	Anderson-Darling GOF Test
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.083	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.17	k star (bias corrected MLE)	2.83
Theta hat (MLE)	1.439	Theta star (bias corrected MLE)	1.612
nu hat (MLE)	164.8	nu star (bias corrected)	147.1
MLE Mean (bias corrected)	4.562		
MLE Sd (bias corrected)	2.712	95% Percentile of Chisquare (2kstar)	12.08

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.112
Maximum	12	Median	3.9
SD	2.943	CV	0.716
k hat (MLE)	1.257	k star (bias corrected MLE)	1.15
Theta hat (MLE)	3.27	Theta star (bias corrected MLE)	3.575
nu hat (MLE)	72.93	nu star (bias corrected)	66.72
MLE Mean (bias corrected)	4.112	MLE Sd (bias corrected)	3.834
95% Percentile of Chisquare (2kstar)	6.562	90% Percentile	9.147
95% Percentile	11.73	99% Percentile	17.66

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	15.7	18.34	95% Approx. Gamma UPL	11.78	13.13
95% Gamma USL	20.37	24.91			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.193	SD (KM)	2.79
Variance (KM)	7.786	SE of Mean (KM)	0.528
k hat (KM)	2.258	k star (KM)	2.048
nu hat (KM)	131	nu star (KM)	118.8
theta hat (KM)	1.857	theta star (KM)	2.048
80% gamma percentile (KM)	6.26	90% gamma percentile (KM)	8.11
95% gamma percentile (KM)	9.872	99% gamma percentile (KM)	13.78

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	12.3	12.87	95% Approx. Gamma UPL	9.734	9.975
95% KM Gamma Percentile	9.336	9.536	95% Gamma USL	15.26	16.33

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.971	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.933	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.104	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.156	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	4.191	Mean in Log Scale	1.209
SD in Original Scale	2.842	SD in Log Scale	0.713
95% UTL95% Coverage	16.47	95% BCA UTL95% Coverage	12
95% Bootstrap (%) UTL95% Coverage	12	95% UPL (t)	11.51
90% Percentile (z)	8.358	95% Percentile (z)	10.83
99% Percentile (z)	17.61	95% USL	23.49

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.212	95% KM UTL (Lognormal)95% Coverage	15.81
KM SD of Logged Data	0.694	95% KM UPL (Lognormal)	11.16
95% KM Percentile Lognormal (z)	10.52	95% KM USL (Lognormal)	22.34

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	4.141	Mean in Log Scale	1.14
SD in Original Scale	2.904	SD in Log Scale	0.851
95% UTL95% Coverage	20.91	95% UPL (t)	13.64
90% Percentile (z)	9.311	95% Percentile (z)	12.69
99% Percentile (z)	22.66	95% USL	31.96

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Order of Statistic, r	29	95% UTL with 95% Coverage	12
Approx, f used to compute achieved CC	1.526	Approximate Actual Confidence Coefficient achieved by UTL	0.774
Approximate Sample Size needed to achieve specified CC	59	95% UPL	12
95% USL	12	95% KM Chebyshev UPL	16.56

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (ph, lab [su]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	44
Minimum	6.43	First Quartile	6.97
Second Largest	8.03	Median	7.33
Maximum	8.17	Third Quartile	7.532
Mean	7.243	SD	0.42
Coefficient of Variation	0.058	Skewness	-0.326
Mean of logged Data	1.978	SD of logged Data	0.0587

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test

Shapiro Wilk Test Statistic	0.937	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.928	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.159	Lilliefors GOF Test
1% Lilliefors Critical Value	0.15	Data Not Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	8.113	90% Percentile (z)	7.781
95% UPL (t)	7.955	95% Percentile (z)	7.933
95% USL	8.474	99% Percentile (z)	8.219

Gamma GOF Test

A-D Test Statistic	1.267	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.167	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	299.5	k star (bias corrected MLE)	280.4
Theta hat (MLE)	0.0242	Theta star (bias corrected MLE)	0.0258
nu hat (MLE)	28157	nu star (bias corrected)	26361
MLE Mean (bias corrected)	7.243	MLE Sd (bias corrected)	0.433

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	7.976	90% Percentile	7.802
95% Hawkins Wixley (HW) Approx. Gamma UPL	7.979	95% Percentile	7.969
95% WH Approx. Gamma UTL with 95% Coverage	8.147	99% Percentile	8.287
95% HW Approx. Gamma UTL with 95% Coverage	8.152		
95% WH USL	8.547	95% HW USL	8.557

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.954	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.169	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.118	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	8.166	90% Percentile (z)	7.796
95% UPL (t)	7.988	95% Percentile (z)	7.963
95% USL	8.588	99% Percentile (z)	8.288

**Nonparametric Distribution Free Background Statistics
 Data appear Approximate Normal at 1% Significance Level**

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	47	95% UTL with 95% Coverage	8.17
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	8.043	95% BCA Bootstrap UTL with 95% Coverage	8.043
95% UPL	7.917	90% Percentile	7.658
90% Chebyshev UPL	8.516	95% Percentile	7.748
95% Chebyshev UPL	9.092	99% Percentile	8.106
95% USL	8.17		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (radium-226/228 [pci/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	14
Minimum	0.497	First Quartile	2
Second Largest	2.54	Median	2
Maximum	2.65	Third Quartile	2
Mean	1.792	SD	0.51
Coefficient of Variation	0.284	Skewness	-1.521
Mean of logged Data	0.518	SD of logged Data	0.418

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test

Shapiro Wilk Test Statistic	0.671
1% Shapiro Wilk Critical Value	0.928
Lilliefors Test Statistic	0.424
1% Lilliefors Critical Value	0.15

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	2.849	90% Percentile (z)	2.445
95% UPL (t)	2.657	95% Percentile (z)	2.63
95% USL	3.287	99% Percentile (z)	2.978

Gamma GOF Test

A-D Test Statistic	8.73
5% A-D Critical Value	0.751
K-S Test Statistic	0.433
5% K-S Critical Value	0.129

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.801	k star (bias corrected MLE)	7.317
Theta hat (MLE)	0.23	Theta star (bias corrected MLE)	0.245
nu hat (MLE)	733.3	nu star (bias corrected)	687.8
MLE Mean (bias corrected)	1.792	MLE Sd (bias corrected)	0.663

Background Statistics Assuming Gamma Distribution

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

95% Wilson Hilferty (WH) Approx. Gamma UPL	3.024	90% Percentile	2.676
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.101	95% Percentile	3.002
95% WH Approx. Gamma UTL with 95% Coverage	3.383	99% Percentile	3.68
95% HW Approx. Gamma UTL with 95% Coverage	3.499		
95% WH USL	4.302	95% HW USL	4.548

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.596	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.954	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.428	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.118	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	3.993	90% Percentile (z)	2.868
95% UPL (t)	3.41	95% Percentile (z)	3.338
95% USL	5.717	99% Percentile (z)	4.437

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	47	95% UTL with 95% Coverage	2.65
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	2.617	95% BCA Bootstrap UTL with 95% Coverage	2.54
95% UPL	2.396	90% Percentile	2
90% Chebyshev UPL	3.337	95% Percentile	2.126
95% Chebyshev UPL	4.037	99% Percentile	2.599
95% USL	2.65		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (selenium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	41
Minimum	2.8	First Quartile	4.05
Second Largest	22.95	Median	13
Maximum	23.01	Third Quartile	16.79
Mean	11.8	SD	6.697
Coefficient of Variation	0.568	Skewness	0.0621
Mean of logged Data	2.259	SD of logged Data	0.703

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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Normal GOF Test

Shapiro Wilk Test Statistic	0.888	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.928	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.171	Lilliefors GOF Test
1% Lilliefors Critical Value	0.15	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	25.69	90% Percentile (z)	20.38
95% UPL (t)	23.16	95% Percentile (z)	22.82
95% USL	31.44	99% Percentile (z)	27.38

Gamma GOF Test

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

A-D Test Statistic	2.174	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.168	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.13	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	2.546	k star (bias corrected MLE)	2.398
Theta hat (MLE)	4.634	Theta star (bias corrected MLE)	4.921
nu hat (MLE)	239.3	nu star (bias corrected)	225.4
MLE Mean (bias corrected)	11.8	MLE Sd (bias corrected)	7.62

Background Statistics Assuming Gamma Distribution			
95% Wilson Hilferty (WH) Approx. Gamma UPL	26.89	90% Percentile	22
95% Hawkins Wixley (HW) Approx. Gamma UPL	27.75	95% Percentile	26.46
95% WH Approx. Gamma UTL with 95% Coverage	32.08	99% Percentile	36.23
95% HW Approx. Gamma UTL with 95% Coverage	33.66		
95% WH USL	46.31	95% HW USL	50.59

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.848	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.954	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.179	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.118	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution			
95% UTL with 95% Coverage	41.11	90% Percentile (z)	23.56
95% UPL (t)	31.54	95% Percentile (z)	30.41
95% USL	75.18	99% Percentile (z)	49.1

Nonparametric Distribution Free Background Statistics
Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values			
Order of Statistic, order	47	95% UTL with 95% Coverage	23.01
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	22.99	95% BCA Bootstrap UTL with 95% Coverage	22.99
	95% UPL 22.77	90% Percentile	20.72
90% Chebyshev UPL	32.1	95% Percentile	22.19
95% Chebyshev UPL	41.3	99% Percentile	22.98
95% USL	23.01		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (sulfate [mg/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	47	Number of Distinct Observations	44
Minimum	19.71	First Quartile	41.26
Second Largest	88	Median	56.45
Maximum	101.8	Third Quartile	70.04
Mean	56.56	SD	17.69
Coefficient of Variation	0.313	Skewness	0.176
Mean of logged Data	3.983	SD of logged Data	0.338

Critical Values for Background Threshold Values (BTVs)			
Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.928	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.0832	Lilliefors GOF Test
1% Lilliefors Critical Value	0.15	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	93.25	90% Percentile (z)	79.24
95% UPL (t)	86.58	95% Percentile (z)	85.66
95% USL	108.4	99% Percentile (z)	97.72

Gamma GOF Test

A-D Test Statistic	0.489	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0826	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.694	k star (bias corrected MLE)	9.089
Theta hat (MLE)	5.835	Theta star (bias corrected MLE)	6.223
nu hat (MLE)	911.2	nu star (bias corrected)	854.4
MLE Mean (bias corrected)	56.56	MLE Sd (bias corrected)	18.76

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	91.11	90% Percentile	81.54
95% Hawkins Wixley (HW) Approx. Gamma UPL	91.99	95% Percentile	90.54
95% WH Approx. Gamma UTL with 95% Coverage	101	99% Percentile	109.1
95% HW Approx. Gamma UTL with 95% Coverage	102.5		
95% WH USL	126	95% HW USL	129.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.954	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0973	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.118	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	108.2	90% Percentile (z)	82.8
95% UPL (t)	95.27	95% Percentile (z)	93.62
95% USL	144.7	99% Percentile (z)	117.9

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	47	95% UTL with 95% Coverage	101.8
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	97.67	95% BCA Bootstrap UTL with 95% Coverage	88
95% UPL	85.42	90% Percentile	78.4
90% Chebyshev UPL	110.2	95% Percentile	80.78
95% Chebyshev UPL	134.5	99% Percentile	95.46
95% USL	101.8		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	47	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	45
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	1.4	Maximum Non-Detect	2
Variance Detected	0.08	Percent Non-Detects	95.74%
Mean Detected	1.2	SD Detected	0.283
Mean of Detected Logged Data	0.168	SD of Detected Logged Data	0.238

**Warning: Data set has only 2 Detected Values.
 This is not enough to compute meaningful or reliable statistics and estimates.**

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.074	d2max (for USL)	2.933
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**Normal GOF Test on Detects Only
 Not Enough Data to Perform GOF Test**

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.017	KM SD	0.0816
95% UTL95% Coverage	1.187	95% KM UPL (t)	1.156
90% KM Percentile (z)	1.122	95% KM Percentile (z)	1.152
99% KM Percentile (z)	1.207	95% KM USL	1.257

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.785	SD	0.265
95% UTL95% Coverage	1.335	95% UPL (t)	1.235
90% Percentile (z)	1.125	95% Percentile (z)	1.222
99% Percentile (z)	1.402	95% USL	1.563

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

**Gamma GOF Tests on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Gamma Statistics on Detected Data Only

k hat (MLE)	35.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0336	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	142.7	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2kstar)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.017	SD (KM)	0.0816
Variance (KM)	0.00665	SE of Mean (KM)	0.0241
k hat (KM)	155.6	k star (KM)	145.6
nu hat (KM)	14622	nu star (KM)	13690
theta hat (KM)	0.00654	theta star (KM)	0.00699
80% gamma percentile (KM)	1.088	90% gamma percentile (KM)	1.127
95% gamma percentile (KM)	1.16	99% gamma percentile (KM)	1.224

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.175	1.174	95% Approx. Gamma UPL	1.145	1.144
95% KM Gamma Percentile	1.141	1.14	95% Gamma USL	1.246	1.245

**Lognormal GOF Test on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

Mean in Original Scale	0.3	Mean in Log Scale	-1.628
SD in Original Scale	0.303	SD in Log Scale	0.941
95% UTL95% Coverage	1.381	95% BCA UTL95% Coverage	1.232
95% Bootstrap (%) UTL95% Coverage	1.341	95% UPL (t)	0.968
90% Percentile (z)	0.655	95% Percentile (z)	0.923
99% Percentile (z)	1.752	95% USL	3.098

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.0146	95% KM UTL (Lognormal)95% Coverage	1.17
KM SD of Logged Data	0.0686	95% KM UPL (Lognormal)	1.14
95% KM Percentile Lognormal (z)	1.136	95% KM USL (Lognormal)	1.241

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.785	Mean in Log Scale	-0.303
SD in Original Scale	0.265	SD in Log Scale	0.358
95% UTL95% Coverage	1.553	95% UPL (t)	1.357
90% Percentile (z)	1.169	95% Percentile (z)	1.332
99% Percentile (z)	1.7	95% USL	2.112

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	47	95% UTL with95% Coverage	2
Approx, f used to compute achieved CC	2.474	Approximate Actual Confidence Coefficient achieved by UTL	0.91
Approximate Sample Size needed to achieve specified CC	59	95% UPL	2
95% USL	2	95% KM Chebyshev UPL	1.377

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

x_ols (turbidity, field [ntu]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	23
Minimum	3.82	First Quartile	18.9
Second Largest	95.6	Median	26.05
Maximum	133	Third Quartile	34.98
Mean	35.76	SD	32.11
Coefficient of Variation	0.898	Skewness	1.802
Mean of logged Data	3.233	SD of logged Data	0.878

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.309	d2max (for USL)	2.644
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Normal GOF Test

Shapiro Wilk Test Statistic	0.769	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.884	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.297	Lilliefors GOF Test
1% Lilliefors Critical Value	0.205	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	109.9	90% Percentile (z)	76.91
95% UPL (t)	91.93	95% Percentile (z)	88.58
95% USL	120.7	99% Percentile (z)	110.5

Gamma GOF Test

A-D Test Statistic	0.746	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 9:06:47 AM
 From File filec805d916c.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Coverage 95%
 Different or Future K Observations 1
 Number of Bootstrap Operations 2000

K-S Test Statistic 0.191 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.181 Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.599	k star (bias corrected MLE)	1.427
Theta hat (MLE)	22.36	Theta star (bias corrected MLE)	25.05
nu hat (MLE)	76.77	nu star (bias corrected)	68.51
MLE Mean (bias corrected)	35.76	MLE Sd (bias corrected)	29.93

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	97.22	90% Percentile	75.43
95% Hawkins Wixley (HW) Approx. Gamma UPL	100.1	95% Percentile	94.72
95% WH Approx. Gamma UTL with 95% Coverage	132	99% Percentile	138.4
95% HW Approx. Gamma UTL with 95% Coverage	140.2		
95% WH USL	156.2	95% HW USL	169.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.948	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.93	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.148	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.162	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	192.4	90% Percentile (z)	78.09
95% UPL (t)	117.7	95% Percentile (z)	107.4
95% USL	258.2	99% Percentile (z)	195.4

Nonparametric Distribution Free Background Statistics

Data appear Approximate Gamma Distribution at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	24	95% UTL with 95% Coverage	133
Approx, f used to compute achieved CC	1.263	Approximate Actual Confidence Coefficient achieved by UTL	0.708
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	133	95% BCA Bootstrap UTL with 95% Coverage	133
95% UPL	123.7	90% Percentile	87.61
90% Chebyshev UPL	134.1	95% Percentile	94.69
95% Chebyshev UPL	178.6	99% Percentile	124.4
95% USL	133		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

group	D x ols	x ols
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.64
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.54
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.6
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.8
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.11
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.96
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.09
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.52
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.98
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.91
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.43
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.57
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.53
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.66
pH, Lab [SU] Interwell_POOLED-Upgradient	1	6.59
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.19
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	334.667949
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	363.2880116
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	311.8798895
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	349.0072761
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	411.8810007
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	372.444694
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	331.0365719
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	325.8220029
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	406.414992
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	373.5570264
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	374.3608449
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	322.4476212
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	351.8433176
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	298.8162441
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	385
Chloride [mg/L] Interwell_POOLED-Upgradient	0	5
Chloride [mg/L] Interwell_POOLED-Upgradient	0	5
Chloride [mg/L] Interwell_POOLED-Upgradient	0	5
Chloride [mg/L] Interwell_POOLED-Upgradient	0	5
Chloride [mg/L] Interwell_POOLED-Upgradient	0	5
Chloride [mg/L] Interwell_POOLED-Upgradient	1	9
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	10
Chloride [mg/L] Interwell_POOLED-Upgradient	1	2
Chloride [mg/L] Interwell_POOLED-Upgradient	1	7
Chloride [mg/L] Interwell_POOLED-Upgradient	1	7
Chloride [mg/L] Interwell_POOLED-Upgradient	1	7
Chloride [mg/L] Interwell_POOLED-Upgradient	0	4
Chloride [mg/L] Interwell_POOLED-Upgradient	1	5
Chloride [mg/L] Interwell_POOLED-Upgradient	1	7
Chloride [mg/L] Interwell_POOLED-Upgradient	1	9.07
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.15
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.17
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.16
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.12
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.14
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.15

group	D x ols	x ols
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.18
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.16
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.21
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.15
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.18
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.17
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.14
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.17
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.17
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.183
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	41
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	65
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	65
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	54
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	58
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	88
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	78
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	79
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	33
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	73
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	69
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	74
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	37
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	79
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	73
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	68.9
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	1	1.3
Lead [ug/L] Interwell_POOLED-Upgradient	1	6.2
Lead [ug/L] Interwell_POOLED-Upgradient	1	1.4
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	1	2.6
Lead [ug/L] Interwell_POOLED-Upgradient	1	2
Lead [ug/L] Interwell_POOLED-Upgradient	0	2
Lithium [ug/L] Interwell_POOLED-Upgradient	1	14.27138183
Lithium [ug/L] Interwell_POOLED-Upgradient	1	16.78304257
Lithium [ug/L] Interwell_POOLED-Upgradient	1	16.09417328
Lithium [ug/L] Interwell_POOLED-Upgradient	1	16.30530399
Lithium [ug/L] Interwell_POOLED-Upgradient	1	16.81537463
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Lithium [ug/L] Interwell_POOLED-Upgradient	1	15.24240635
Lithium [ug/L] Interwell_POOLED-Upgradient	1	14.75353706
Lithium [ug/L] Interwell_POOLED-Upgradient	1	16.79576064
Lithium [ug/L] Interwell_POOLED-Upgradient	1	16.64452375
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Lithium [ug/L] Interwell_POOLED-Upgradient	1	14.09558336
Lithium [ug/L] Interwell_POOLED-Upgradient	1	14.64063622
Lithium [ug/L] Interwell_POOLED-Upgradient	1	18.87773858
Lithium [ug/L] Interwell_POOLED-Upgradient	1	15.3
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	1	1.4
Thallium [ug/L] Interwell_POOLED-Upgradient	0	1
Thallium [ug/L] Interwell_POOLED-Upgradient	0	2
Thallium [ug/L] Interwell_POOLED-Upgradient	0	2
Thallium [ug/L] Interwell_POOLED-Upgradient	0	2

group	D x ols	x ols
Selenium [ug/L] Interwell_POOLED-Upgradient	1	4
Selenium [ug/L] Interwell_POOLED-Upgradient	1	3.7
Selenium [ug/L] Interwell_POOLED-Upgradient	1	2.8
Selenium [ug/L] Interwell_POOLED-Upgradient	1	3.8
Selenium [ug/L] Interwell_POOLED-Upgradient	1	3.5
Selenium [ug/L] Interwell_POOLED-Upgradient	1	3.7
Selenium [ug/L] Interwell_POOLED-Upgradient	1	3.3
Selenium [ug/L] Interwell_POOLED-Upgradient	1	3.7
Selenium [ug/L] Interwell_POOLED-Upgradient	1	5.4
Selenium [ug/L] Interwell_POOLED-Upgradient	1	5.14
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	1.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	0	5
Nickel [ug/L] Interwell_POOLED-Upgradient	1	4.4
Nickel [ug/L] Interwell_POOLED-Upgradient	1	6.2
Nickel [ug/L] Interwell_POOLED-Upgradient	1	5.4
Nickel [ug/L] Interwell_POOLED-Upgradient	1	4
Nickel [ug/L] Interwell_POOLED-Upgradient	1	3.8
Nickel [ug/L] Interwell_POOLED-Upgradient	1	4.6
Nickel [ug/L] Interwell_POOLED-Upgradient	1	5
Nickel [ug/L] Interwell_POOLED-Upgradient	1	5.7
Nickel [ug/L] Interwell_POOLED-Upgradient	1	8.3
Nickel [ug/L] Interwell_POOLED-Upgradient	1	12
Calcium [mg/L] Interwell_POOLED-Upgradient	1	84.3
Calcium [mg/L] Interwell_POOLED-Upgradient	1	93
Calcium [mg/L] Interwell_POOLED-Upgradient	1	86.2
Calcium [mg/L] Interwell_POOLED-Upgradient	1	88.2
Calcium [mg/L] Interwell_POOLED-Upgradient	1	91.2
Calcium [mg/L] Interwell_POOLED-Upgradient	1	91
Calcium [mg/L] Interwell_POOLED-Upgradient	1	97.1
Calcium [mg/L] Interwell_POOLED-Upgradient	1	85.8
Calcium [mg/L] Interwell_POOLED-Upgradient	1	90.3
Calcium [mg/L] Interwell_POOLED-Upgradient	1	91.4
Calcium [mg/L] Interwell_POOLED-Upgradient	1	79.7
Calcium [mg/L] Interwell_POOLED-Upgradient	1	75.5
Calcium [mg/L] Interwell_POOLED-Upgradient	1	66.8
Calcium [mg/L] Interwell_POOLED-Upgradient	1	59.2
Calcium [mg/L] Interwell_POOLED-Upgradient	1	94.3
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2.54
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	1.31
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	0.693
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	0.691
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2.18
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.498630361
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.536840854

group	D x ols	x ols
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.575132687
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.573424521
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.701879037
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.599357459
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.747730634
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.526771219
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.629450507
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.353105889
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.74798139
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.336105568
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.569191561
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.503497674
pH, Lab [SU] Interwell_POOLED-Upgradient	1	8.03
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.93494218
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.94504622
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.95469099
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.96433575
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.97306197
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.98729948
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.99648498
Chloride [mg/L] Interwell_POOLED-Upgradient	1	12.7359171
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.77725181
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.81307523
Chloride [mg/L] Interwell_POOLED-Upgradient	1	12.84200953
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.90906363
Chloride [mg/L] Interwell_POOLED-Upgradient	1	10.94810197
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11.98025119
Chloride [mg/L] Interwell_POOLED-Upgradient	1	12.1
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.19
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.22
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.21
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.2
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.2
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.2
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.22
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.23
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.19
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.2
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.2
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.197
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	56.20653365
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	38.28995592
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	44.36958628
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	56.44921663
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	41.52126314
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	33.63881272
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	19.71465115
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	101.819645
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	37.16091799
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	34.45668788
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	36.69557895

group	D x ols	x ols
Chromium [ug/L] Interwell_POOLED-Upgradient	1	14.8
Chromium [ug/L] Interwell_POOLED-Upgradient	1	2.1
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1
Chromium [ug/L] Interwell_POOLED-Upgradient	1	1.1
Chromium [ug/L] Interwell_POOLED-Upgradient	1	1.6
Chromium [ug/L] Interwell_POOLED-Upgradient	1	1.5
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1.5
Chromium [ug/L] Interwell_POOLED-Upgradient	1	1.5
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1.5
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1.5
Chromium [ug/L] Interwell_POOLED-Upgradient	1	1.8
Chromium [ug/L] Interwell_POOLED-Upgradient	0	1.5
Chromium [ug/L] Interwell_POOLED-Upgradient	0	2
Cobalt [ug/L] Interwell_POOLED-Upgradient	1	3.1
Cobalt [ug/L] Interwell_POOLED-Upgradient	1	1.4
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	1	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	2
Calcium [mg/L] Interwell_POOLED-Upgradient	1	85.9
Calcium [mg/L] Interwell_POOLED-Upgradient	1	85.3
Calcium [mg/L] Interwell_POOLED-Upgradient	1	76.5
Calcium [mg/L] Interwell_POOLED-Upgradient	1	81.9
Calcium [mg/L] Interwell_POOLED-Upgradient	1	85.6
Calcium [mg/L] Interwell_POOLED-Upgradient	1	81.5
Calcium [mg/L] Interwell_POOLED-Upgradient	1	80.3
Calcium [mg/L] Interwell_POOLED-Upgradient	1	110
Calcium [mg/L] Interwell_POOLED-Upgradient	1	89.5
Calcium [mg/L] Interwell_POOLED-Upgradient	1	80.5
Calcium [mg/L] Interwell_POOLED-Upgradient	1	80.3
Calcium [mg/L] Interwell_POOLED-Upgradient	1	86.9
Calcium [mg/L] Interwell_POOLED-Upgradient	1	69.5
Calcium [mg/L] Interwell_POOLED-Upgradient	1	80.9
Selenium [ug/L] Interwell_POOLED-Upgradient	1	17.07717972
Selenium [ug/L] Interwell_POOLED-Upgradient	1	18.3347054
Selenium [ug/L] Interwell_POOLED-Upgradient	1	21.39416173
Selenium [ug/L] Interwell_POOLED-Upgradient	1	22.95361806
Selenium [ug/L] Interwell_POOLED-Upgradient	1	18.11693569
Selenium [ug/L] Interwell_POOLED-Upgradient	1	18.55708551
Selenium [ug/L] Interwell_POOLED-Upgradient	1	18.91847249
Selenium [ug/L] Interwell_POOLED-Upgradient	1	23.01012434
Selenium [ug/L] Interwell_POOLED-Upgradient	1	16.03636575
Selenium [ug/L] Interwell_POOLED-Upgradient	1	14.58577497
Selenium [ug/L] Interwell_POOLED-Upgradient	1	20.26414395
Selenium [ug/L] Interwell_POOLED-Upgradient	1	20.1822689
Selenium [ug/L] Interwell_POOLED-Upgradient	1	15.51816357
Selenium [ug/L] Interwell_POOLED-Upgradient	1	21.48301799
Selenium [ug/L] Interwell_POOLED-Upgradient	1	22.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	15.0989984
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	18.06731321
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	25.63252279
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	23.29773238
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	17.75673153
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	17.7529933
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	15.51509767
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	43.71449939
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	17.89396905
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	13.73617609

group	D x ols	x ols
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	16.23180485
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	18.28516675
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	15.84911031
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	18.66647561
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	16.3
Nickel [ug/L] Interwell_POOLED-Upgradient	1	12
Nickel [ug/L] Interwell_POOLED-Upgradient	1	3.2
Nickel [ug/L] Interwell_POOLED-Upgradient	0	1
Nickel [ug/L] Interwell_POOLED-Upgradient	1	1
Nickel [ug/L] Interwell_POOLED-Upgradient	0	1
Nickel [ug/L] Interwell_POOLED-Upgradient	0	1
Nickel [ug/L] Interwell_POOLED-Upgradient	1	1.2
Nickel [ug/L] Interwell_POOLED-Upgradient	1	4
Nickel [ug/L] Interwell_POOLED-Upgradient	1	1.9
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	1.57
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	0.503
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	0.512
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell_POOLED-Upgradient	1	1.29
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.31
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.33
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.31
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.42
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.32
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.33
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.25
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.2
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.41
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.51
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.34
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.21
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.39
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.56
pH, Lab [SU] Interwell_POOLED-Upgradient	1	7.31
pH, Lab [SU] Interwell_POOLED-Upgradient	1	8.17
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L] Interwell_POOLED-Upgradient	0	0.2
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	460
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	484
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	452
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	472
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	492
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	514
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	424
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	528

group	D x ols	x ols
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	430
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	436
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	446
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	416
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	432
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	476
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	430
Dissolved Solids, Total [mg/L] Interwell_POOLED-Upgradient	1	418
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.171037664
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.181118964
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.171196392
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.16127382
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.171351249
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.161467391
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.161552563
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.151629991
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.197777805
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.168133976
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.168420461
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.148675975
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.15923733
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.149566401
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.179841272
Fluoride [mg/L] Interwell_POOLED-Upgradient	1	0.17
Chloride [mg/L] Interwell_POOLED-Upgradient	1	12
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	10
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	12
Chloride [mg/L] Interwell_POOLED-Upgradient	1	10
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	10
Chloride [mg/L] Interwell_POOLED-Upgradient	1	12
Chloride [mg/L] Interwell_POOLED-Upgradient	1	9
Chloride [mg/L] Interwell_POOLED-Upgradient	1	11
Chloride [mg/L] Interwell_POOLED-Upgradient	1	9.21
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	75.76376116
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	66.21946786
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	59.65347424
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	71.08748063
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	58.52148701
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	52.17249658
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	51.6499036
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	45.08390999
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	81.54401681
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	72.54044617
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	59.14626978
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	54.57849085
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	60.72503713
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	63.56956425
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	53.11028691
Sulfate [mg/L] Interwell_POOLED-Upgradient	1	50.9
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	1	1.6
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1
Lead [ug/L] Interwell_POOLED-Upgradient	0	1

group	D x ols	x ols
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	1	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	1	2.5
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	1
Cobalt [ug/L] Interwell_POOLED-Upgradient	1	1.2
Cobalt [ug/L] Interwell_POOLED-Upgradient	0	2
Selenium [ug/L] Interwell_POOLED-Upgradient	1	15.8
Selenium [ug/L] Interwell_POOLED-Upgradient	1	15
Selenium [ug/L] Interwell_POOLED-Upgradient	1	14.9
Selenium [ug/L] Interwell_POOLED-Upgradient	1	16.1
Selenium [ug/L] Interwell_POOLED-Upgradient	1	14
Selenium [ug/L] Interwell_POOLED-Upgradient	1	13
Selenium [ug/L] Interwell_POOLED-Upgradient	1	10.1
Selenium [ug/L] Interwell_POOLED-Upgradient	1	10.2
Selenium [ug/L] Interwell_POOLED-Upgradient	1	13.3
Selenium [ug/L] Interwell_POOLED-Upgradient	1	11.1
Selenium [ug/L] Interwell_POOLED-Upgradient	1	8.5
Selenium [ug/L] Interwell_POOLED-Upgradient	1	9.9
Selenium [ug/L] Interwell_POOLED-Upgradient	1	16.5
Selenium [ug/L] Interwell_POOLED-Upgradient	1	9
Selenium [ug/L] Interwell_POOLED-Upgradient	1	15
Selenium [ug/L] Interwell_POOLED-Upgradient	1	10.5
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	50.3820988
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	45.6333195
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	41.26781541
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	43.50231131
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	37.43680722
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	34.53855108
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	22.70649658
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	20.84099248
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	69.19996748
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	41.33864865
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	33.7762835
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	31.98012
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	41.60521532
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	28.02682292
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	34.01428339
Molybdenum [ug/L] Interwell_POOLED-Upgradient	1	33.2
Nickel [ug/L] Interwell_POOLED-Upgradient	1	6.5
Nickel [ug/L] Interwell_POOLED-Upgradient	1	3.4
Nickel [ug/L] Interwell_POOLED-Upgradient	1	2.9
Nickel [ug/L] Interwell_POOLED-Upgradient	1	2
Nickel [ug/L] Interwell_POOLED-Upgradient	1	2
Nickel [ug/L] Interwell_POOLED-Upgradient	1	2.6
Nickel [ug/L] Interwell_POOLED-Upgradient	1	3.9
Nickel [ug/L] Interwell_POOLED-Upgradient	1	3
Nickel [ug/L] Interwell_POOLED-Upgradient	1	4.5
Nickel [ug/L] Interwell_POOLED-Upgradient	1	5.1
Boron [mg/L] Interwell_POOLED-Upgradient	1	1.116938204
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.918510015
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.889530787
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.990551559
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.821572331
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.50810349
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.150226339
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.025
Boron [mg/L] Interwell_POOLED-Upgradient	1	1.586296422
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.729991974
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.450768831
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.484137379
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.790037977
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.532876259
Boron [mg/L] Interwell_POOLED-Upgradient	1	0.559
Calcium [mg/L] Interwell_POOLED-Upgradient	1	101
Calcium [mg/L] Interwell_POOLED-Upgradient	1	105
Calcium [mg/L] Interwell_POOLED-Upgradient	1	89.4

group	D x ols	x ols
Calcium [mg/L] Interwell POOLED-Upgradient	1	97.5
Calcium [mg/L] Interwell POOLED-Upgradient	1	107
Calcium [mg/L] Interwell POOLED-Upgradient	1	107
Calcium [mg/L] Interwell POOLED-Upgradient	1	113
Calcium [mg/L] Interwell POOLED-Upgradient	1	113
Calcium [mg/L] Interwell POOLED-Upgradient	1	97.8
Calcium [mg/L] Interwell POOLED-Upgradient	1	108
Calcium [mg/L] Interwell POOLED-Upgradient	1	102
Calcium [mg/L] Interwell POOLED-Upgradient	1	100
Calcium [mg/L] Interwell POOLED-Upgradient	1	97.5
Calcium [mg/L] Interwell POOLED-Upgradient	1	87.9
Calcium [mg/L] Interwell POOLED-Upgradient	1	124
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	1.63
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	0.497
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2.65
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	1.31
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	2
Radium-226/228 [pCi/L] Interwell POOLED-Upgradient	1	0.852
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	372
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	324
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	366
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	392
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	278
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	348
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	424
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	380
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	372
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	360
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	386
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	372
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	380
Dissolved Solids, Total [mg/L] Interwell POOLED-Upgradient	1	354
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	19.1
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	18.3
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	26.5
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	37.3
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	38.7
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	21.6
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	22.8
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	29.8
Iron [mg/L] Interwell POOLED-Upgradient	1	0.563
Iron [mg/L] Interwell POOLED-Upgradient	1	0.709
Manganese [mg/L] Interwell POOLED-Upgradient	1	0.192
Manganese [mg/L] Interwell POOLED-Upgradient	1	0.21
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	33.9
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	31.7
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	31.7
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	89.5
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	83.2
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	133
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	95.6
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	25.6
Iron [mg/L] Interwell POOLED-Upgradient	1	1.42
Iron [mg/L] Interwell POOLED-Upgradient	1	0.405
Manganese [mg/L] Interwell POOLED-Upgradient	1	0.139
Manganese [mg/L] Interwell POOLED-Upgradient	1	0.0791
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	34.2
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	7.3
Turbidity, Field [NTU] Interwell POOLED-Upgradient	1	7.28

group	D	x	ols	x	ols
Turbidity, Field [NTU] Interwell_POOLED-Upgradient			1		23.6
Turbidity, Field [NTU] Interwell_POOLED-Upgradient			1		24.7
Turbidity, Field [NTU] Interwell_POOLED-Upgradient			1		5.64
Turbidity, Field [NTU] Interwell_POOLED-Upgradient			1		3.82
Turbidity, Field [NTU] Interwell_POOLED-Upgradient			1		13.4
Iron [mg/L] Interwell_POOLED-Upgradient			1		0.496
Iron [mg/L] Interwell_POOLED-Upgradient			1		0.179
Manganese [mg/L] Interwell_POOLED-Upgradient			1		0.599
Manganese [mg/L] Interwell_POOLED-Upgradient			1		0.124

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (antimony [ug/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	2.1	Maximum Non-Detect	4
Variance Detects	0.605	Percent Non-Detects	89.47%
Mean Detects	1.55	SD Detects	0.778
Median Detects	1.55	CV Detects	0.502
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.371	SD of Logged Detects	0.525

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.073	KM Standard Error of Mean	0.1
90KM SD	0.274	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.247	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.238	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.374	95% KM Chebyshev UCL	1.51
97.5% KM Chebyshev UCL	1.699	99% KM Chebyshev UCL	2.07

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	7.594	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.204	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	30.38	nu star (bias corrected)	N/A
Mean (detects)	1.55		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.073	SD (KM)	0.274
Variance (KM)	0.0753	SE of Mean (KM)	0.1
k hat (KM)	15.3	k star (KM)	12.92
nu hat (KM)	581.5	nu star (KM)	491
theta hat (KM)	0.0701	theta star (KM)	0.0831
80% gamma percentile (KM)	1.313	90% gamma percentile (KM)	1.469
95% gamma percentile (KM)	1.607	99% gamma percentile (KM)	1.887

Gamma Kaplan-Meier (KM) Statistics

Adjusted Level of Significance (β) 0.0369

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Approximate Chi Square Value (490.99, α)	440.6	Adjusted Chi Square Value (490.99, β)	436.4
95% KM Approximate Gamma UCL	1.196	95% KM Adjusted Gamma UCL	1.207

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.248	Mean in Log Scale	-2.805
SD in Original Scale	0.506	SD in Log Scale	1.79
95% t UCL (assumes normality of ROS data)	0.449	95% Percentile Bootstrap UCL	0.448
95% BCA Bootstrap UCL	0.572	95% Bootstrap t UCL	1.001
95% H-UCL (Log ROS)	1.544		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0495	KM Geo Mean	1.051
KM SD (logged)	0.185	95% Critical H Value (KM-Log)	1.772
KM Standard Error of Mean (logged)	0.0676	95% H-UCL (KM -Log)	1.155
KM SD (logged)	0.185	95% Critical H Value (KM-Log)	1.772
KM Standard Error of Mean (logged)	0.0676		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 0.926
 SD in Original Scale 0.681
 95% t UCL (Assumes normality) 1.197

DL/2 Log-Transformed

Mean in Log Scale -0.289
 SD in Log Scale 0.629
 95% H-Stat UCL 1.254

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 1.247

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (antimony [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-03) was not processed!

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (antimony [ug/l]_intrawell_apw-05/05r)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-05/05r) was not processed!

x_ols (antimony [ug/l]_intrawell_apw-06d)

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	18
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-06d) was not processed!

x_ols (antimony [ug/l]_intrawell_apw-06s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-06s) was not processed!

x_ols (antimony [ug/l]_intrawell_apw-07)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-07) was not processed!

x_ols (antimony [ug/l]_intrawell_apw-08)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-08) was not processed!

x_ols (antimony [ug/l]_intrawell_apw-10d)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-10d) was not processed!

x_ols (antimony [ug/l]_intrawell_apw-10s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (antimony [ug/l]_intrawell_apw-10s) was not processed!

x_ols (arsenic [ug/l]_intrawell_apw-02)

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	9.3	Mean	17.92
Maximum	26.7	Median	17
SD	5.109	Std. Error of Mean	1.172
Coefficient of Variation	0.285	Skewness	0.11

Normal GOF Test

Shapiro Wilk Test Statistic	0.965	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.107	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	19.95	95% Adjusted-CLT UCL (Chen-1995)	19.88
		95% Modified-t UCL (Johnson-1978)	19.95

Gamma GOF Test

A-D Test Statistic	0.26	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.125	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.24	k star (bias corrected MLE)	10.34
Theta hat (MLE)	1.464	Theta star (bias corrected MLE)	1.732
nu hat (MLE)	465.1	nu star (bias corrected)	393
MLE Mean (bias corrected)	17.92	MLE Sd (bias corrected)	5.571
		Approximate Chi Square Value (0.05)	348
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	344.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	20.23	95% Adjusted Gamma UCL	20.45
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.952	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.145	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.23	Mean of logged Data	2.844
Maximum of Logged Data	3.285	SD of logged Data	0.303

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	20.53	90% Chebyshev (MVUE) UCL	21.74
95% Chebyshev (MVUE) UCL	23.46	97.5% Chebyshev (MVUE) UCL	25.84
99% Chebyshev (MVUE) UCL	30.52		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	19.84	95% BCA Bootstrap UCL	19.83
95% Standard Bootstrap UCL	19.81	95% Bootstrap-t UCL	20.01
95% Hall's Bootstrap UCL	19.92	95% Percentile Bootstrap UCL	19.86
90% Chebyshev(Mean, Sd) UCL	21.43	95% Chebyshev(Mean, Sd) UCL	23.03
97.5% Chebyshev(Mean, Sd) UCL	25.24	99% Chebyshev(Mean, Sd) UCL	29.58

Suggested UCL to Use

95% Student's-t UCL 19.95

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intraWell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	14
Number of Detects	16	Number of Non-Detects	3
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	1.7	Minimum Non-Detect	2
Maximum Detect	5.9	Maximum Non-Detect	2
Variance Detects	1.341	Percent Non-Detects	15.79%
Mean Detects	2.753	SD Detects	1.158
Median Detects	2.35	CV Detects	0.421
Skewness Detects	1.722	Kurtosis Detects	2.718
Mean of Logged Detects	0.946	SD of Logged Detects	0.356

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.802
1% Shapiro Wilk Critical Value	0.844
Lilliefors Test Statistic	0.228
1% Lilliefors Critical Value	0.248

Shapiro Wilk GOF Test

Detected Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.597	KM Standard Error of Mean	0.258
90KM SD	1.09	95% KM (BCA) UCL	3.068
95% KM (t) UCL	3.045	95% KM (Percentile Bootstrap) UCL	3.058
95% KM (z) UCL	3.022	95% KM Bootstrap t UCL	3.332
90% KM Chebyshev UCL	3.372	95% KM Chebyshev UCL	3.723
97.5% KM Chebyshev UCL	4.211	99% KM Chebyshev UCL	5.168

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 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic 0.778
 5% A-D Critical Value 0.74
 K-S Test Statistic 0.171
 5% K-S Critical Value 0.215

Anderson-Darling GOF Test

Detected Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov GOF

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.735	k star (bias corrected MLE)	6.327
Theta hat (MLE)	0.356	Theta star (bias corrected MLE)	0.435
nu hat (MLE)	247.5	nu star (bias corrected)	202.4
Mean (detects)	2.753		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.958	Mean	2.522
Maximum	5.9	Median	2.2
SD	1.195	CV	0.474
k hat (MLE)	5.663	k star (bias corrected MLE)	4.804
Theta hat (MLE)	0.445	Theta star (bias corrected MLE)	0.525
nu hat (MLE)	215.2	nu star (bias corrected)	182.5
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (182.53, α)	152.3	Adjusted Chi Square Value (182.53, β)	149.9
95% Gamma Approximate UCL	3.023	95% Gamma Adjusted UCL	3.072

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.597	SD (KM)	1.09
Variance (KM)	1.189	SE of Mean (KM)	0.258
k hat (KM)	5.674	k star (KM)	4.813
nu hat (KM)	215.6	nu star (KM)	182.9
theta hat (KM)	0.458	theta star (KM)	0.54
80% gamma percentile (KM)	3.506	90% gamma percentile (KM)	4.182
95% gamma percentile (KM)	4.799	99% gamma percentile (KM)	6.107

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (182.89, α)	152.6	Adjusted Chi Square Value (182.89, β)	150.2
95% KM Approximate Gamma UCL	3.112	95% KM Adjusted Gamma UCL	3.162

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic 0.901
 10% Shapiro Wilk Critical Value 0.906
 Lilliefors Test Statistic 0.147
 10% Lilliefors Critical Value 0.196

Shapiro Wilk GOF Test

Detected Data Not Lognormal at 10% Significance Level

Lilliefors GOF Test

Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.567	Mean in Log Scale	0.868
SD in Original Scale	1.148	SD in Log Scale	0.378
95% t UCL (assumes normality of ROS data)	3.023	95% Percentile Bootstrap UCL	3.032
95% BCA Bootstrap UCL	3.102	95% Bootstrap t UCL	3.225
95% H-UCL (Log ROS)	3.03		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.887	KM Geo Mean	2.427
KM SD (logged)	0.345	95% Critical H Value (KM-Log)	1.878
KM Standard Error of Mean (logged)	0.0819	95% H-UCL (KM -Log)	3.002
KM SD (logged)	0.345	95% Critical H Value (KM-Log)	1.878
KM Standard Error of Mean (logged)	0.0819		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.476
SD in Original Scale	1.245
95% t UCL (Assumes normality)	2.971

DL/2 Log-Transformed

Mean in Log Scale	0.797
SD in Log Scale	0.481
95% H-Stat UCL	3.122

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	3.045
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When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intraWell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	1.5	Mean	2.531
Maximum	4.8	Median	2.36
SD	0.848	Std. Error of Mean	0.194
Coefficient of Variation	0.335	Skewness	1.365

Normal GOF Test

Shapiro Wilk Test Statistic	0.882
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.152
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 2.868

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 2.916

95% Modified-t UCL (Johnson-1978) 2.878

Gamma GOF Test

A-D Test Statistic 0.38

5% A-D Critical Value 0.741

K-S Test Statistic 0.109

5% K-S Critical Value 0.199

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 10.87

Theta hat (MLE) 0.233

nu hat (MLE) 413

MLE Mean (bias corrected) 2.531

Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 9.188

Theta star (bias corrected MLE) 0.275

nu star (bias corrected) 349.1

MLE Sd (bias corrected) 0.835

Approximate Chi Square Value (0.05) 306.8

Adjusted Chi Square Value 303.4

Assuming Gamma Distribution

95% Approximate Gamma UCL 2.88

95% Adjusted Gamma UCL 2.913

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.96

10% Shapiro Wilk Critical Value 0.917

Lilliefors Test Statistic 0.103

10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 0.405

Maximum of Logged Data 1.569

Mean of logged Data 0.882

SD of logged Data 0.307

Assuming Lognormal Distribution

95% H-UCL 2.894

95% Chebyshev (MVUE) UCL 3.31

99% Chebyshev (MVUE) UCL 4.318

90% Chebyshev (MVUE) UCL 3.066

97.5% Chebyshev (MVUE) UCL 3.65

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 2.851

95% Standard Bootstrap UCL 2.842

95% Hall's Bootstrap UCL 3.166

90% Chebyshev(Mean, Sd) UCL 3.114

97.5% Chebyshev(Mean, Sd) UCL 3.745

95% BCA Bootstrap UCL 2.924

95% Bootstrap-t UCL 2.996

95% Percentile Bootstrap UCL 2.86

95% Chebyshev(Mean, Sd) UCL 3.379

99% Chebyshev(Mean, Sd) UCL 4.466

UCL Statistics for Data Sets with Non-Detects

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 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% Student's-t UCL 2.868

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intraWell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	9.342	Mean	11.31
Maximum	13.82	Median	11.3
SD	1.159	Std. Error of Mean	0.273
Coefficient of Variation	0.102	Skewness	0.355

Normal GOF Test

Shapiro Wilk Test Statistic	0.98	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.858	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.113	Lilliefors GOF Test
1% Lilliefors Critical Value	0.235	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	11.79	95% Adjusted-CLT UCL (Chen-1995)	11.79
		95% Modified-t UCL (Johnson-1978)	11.79

Gamma GOF Test

A-D Test Statistic	0.166	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.102	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.203	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	101.9	k star (bias corrected MLE)	84.94
Theta hat (MLE)	0.111	Theta star (bias corrected MLE)	0.133
nu hat (MLE)	3668	nu star (bias corrected)	3058
MLE Mean (bias corrected)	11.31	MLE Sd (bias corrected)	1.227
		Approximate Chi Square Value (0.05)	2930
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	2919

Assuming Gamma Distribution

95% Approximate Gamma UCL	11.8	95% Adjusted Gamma UCL	11.85
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Lognormal GOF Test

UCL Statistics for Data Sets with Non-Detects

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 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.986	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.101	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.185	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.234	Mean of logged Data	2.421
Maximum of Logged Data	2.626	SD of logged Data	0.102

Assuming Lognormal Distribution

95% H-UCL	11.81	90% Chebyshev (MVUE) UCL	12.13
95% Chebyshev (MVUE) UCL	12.5	97.5% Chebyshev (MVUE) UCL	13.01
99% Chebyshev (MVUE) UCL	14.02		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	11.76	95% BCA Bootstrap UCL	11.78
95% Standard Bootstrap UCL	11.76	95% Bootstrap-t UCL	11.82
95% Hall's Bootstrap UCL	11.81	95% Percentile Bootstrap UCL	11.78
90% Chebyshev(Mean, Sd) UCL	12.13	95% Chebyshev(Mean, Sd) UCL	12.5
97.5% Chebyshev(Mean, Sd) UCL	13.02	99% Chebyshev(Mean, Sd) UCL	14.03

Suggested UCL to Use

95% Student's-t UCL 11.79

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
Number of Detects	14	Number of Non-Detects	5
Number of Distinct Detects	14	Number of Distinct Non-Detects	2
Minimum Detect	1.031	Minimum Non-Detect	1
Maximum Detect	2.113	Maximum Non-Detect	2
Variance Detects	0.12	Percent Non-Detects	26.32%
Mean Detects	1.426	SD Detects	0.347
Median Detects	1.272	CV Detects	0.243
Skewness Detects	0.745	Kurtosis Detects	-0.682
Mean of Logged Detects	0.329	SD of Logged Detects	0.233

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.898	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.21	Lilliefors GOF Test

User Selected Options

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 Number of Bootstrap Operations 2000

1% Lilliefors Critical Value 0.263 Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.386	KM Standard Error of Mean	0.0866
90KM SD	0.331	95% KM (BCA) UCL	1.527
95% KM (t) UCL	1.537	95% KM (Percentile Bootstrap) UCL	1.536
95% KM (z) UCL	1.529	95% KM Bootstrap t UCL	1.574
90% KM Chebyshev UCL	1.646	95% KM Chebyshev UCL	1.764
97.5% KM Chebyshev UCL	1.927	99% KM Chebyshev UCL	2.248

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.553	Anderson-Darling GOF Test
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.207	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.228	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	19.42	k star (bias corrected MLE)	15.3
Theta hat (MLE)	0.0734	Theta star (bias corrected MLE)	0.0932
nu hat (MLE)	543.7	nu star (bias corrected)	428.5
Mean (detects)	1.426		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.747	Mean	1.369
Maximum	2.113	Median	1.234
SD	0.349	CV	0.255
k hat (MLE)	16.44	k star (bias corrected MLE)	13.88
Theta hat (MLE)	0.0832	Theta star (bias corrected MLE)	0.0986
nu hat (MLE)	624.9	nu star (bias corrected)	527.5
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (527.54, α)	475.3	Adjusted Chi Square Value (527.54, β)	470.9
95% Gamma Approximate UCL	1.519	95% Gamma Adjusted UCL	1.533

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.386	SD (KM)	0.331
Variance (KM)	0.109	SE of Mean (KM)	0.0866
k hat (KM)	17.57	k star (KM)	14.83
nu hat (KM)	667.5	nu star (KM)	563.5
theta hat (KM)	0.0789	theta star (KM)	0.0935
80% gamma percentile (KM)	1.677	90% gamma percentile (KM)	1.863
95% gamma percentile (KM)	2.027	99% gamma percentile (KM)	2.358

Gamma Kaplan-Meier (KM) Statistics

UCL Statistics for Data Sets with Non-Detects

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 Number of Bootstrap Operations 2000

Approximate Chi Square Value (563.48, α)	509.4	Adjusted Chi Square Value (563.48, β)	504.9
95% KM Approximate Gamma UCL	1.534	95% KM Adjusted Gamma UCL	1.547

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.922	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.194	Lilliefors GOF Test
10% Lilliefors Critical Value	0.208	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.371	Mean in Log Scale	0.287
SD in Original Scale	0.341	SD in Log Scale	0.244
95% t UCL (assumes normality of ROS data)	1.506	95% Percentile Bootstrap UCL	1.5
95% BCA Bootstrap UCL	1.499	95% Bootstrap t UCL	1.522
95% H-UCL (Log ROS)	1.523		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.3	KM Geo Mean	1.35
KM SD (logged)	0.228	95% Critical H Value (KM-Log)	1.797
KM Standard Error of Mean (logged)	0.0599	95% H-UCL (KM -Log)	1.525
KM SD (logged)	0.228	95% Critical H Value (KM-Log)	1.797
KM Standard Error of Mean (logged)	0.0599		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.287
SD in Original Scale	0.393
95% t UCL (Assumes normality)	1.444

DL/2 Log-Transformed

Mean in Log Scale	0.206
SD in Log Scale	0.325
95% H-Stat UCL	1.493

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.537

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
Number of Detects	9	Number of Non-Detects	10
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	2.3	Maximum Non-Detect	2
Variance Detects	0.178	Percent Non-Detects	52.63%

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean Detects	1.6	SD Detects	0.421
Median Detects	1.4	CV Detects	0.263
Skewness Detects	0.761	Kurtosis Detects	-0.625
Mean of Logged Detects	0.441	SD of Logged Detects	0.254

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.898	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.238	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.331	KM Standard Error of Mean	0.103
90KM SD	0.4	95% KM (BCA) UCL	1.488
95% KM (t) UCL	1.51	95% KM (Percentile Bootstrap) UCL	1.492
95% KM (z) UCL	1.501	95% KM Bootstrap t UCL	1.531
90% KM Chebyshev UCL	1.64	95% KM Chebyshev UCL	1.78
97.5% KM Chebyshev UCL	1.974	99% KM Chebyshev UCL	2.356

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.395	Anderson-Darling GOF Test	
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.233	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	17.22	k star (bias corrected MLE)	11.56
Theta hat (MLE)	0.0929	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	310	nu star (bias corrected)	208
Mean (detects)	1.6		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.376	Mean	1.208
Maximum	2.3	Median	1.2
SD	0.528	CV	0.438
k hat (MLE)	5.224	k star (bias corrected MLE)	4.434
Theta hat (MLE)	0.231	Theta star (bias corrected MLE)	0.272
nu hat (MLE)	198.5	nu star (bias corrected)	168.5
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (168.51, α)	139.5	Adjusted Chi Square Value (168.51, β)	137.2
95% Gamma Approximate UCL	1.459	95% Gamma Adjusted UCL	1.483

UCL Statistics for Data Sets with Non-Detects

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.331	SD (KM)	0.4
Variance (KM)	0.16	SE of Mean (KM)	0.103
k hat (KM)	11.05	k star (KM)	9.34
nu hat (KM)	419.9	nu star (KM)	354.9
theta hat (KM)	0.12	theta star (KM)	0.143
80% gamma percentile (KM)	1.677	90% gamma percentile (KM)	1.911
95% gamma percentile (KM)	2.119	99% gamma percentile (KM)	2.547

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (354.93, α)	312.3	Adjusted Chi Square Value (354.93, β)	308.8
95% KM Approximate Gamma UCL	1.513	95% KM Adjusted Gamma UCL	1.53

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.932	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.215	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.264	Mean in Log Scale	0.174
SD in Original Scale	0.465	SD in Log Scale	0.355
95% t UCL (assumes normality of ROS data)	1.449	95% Percentile Bootstrap UCL	1.445
95% BCA Bootstrap UCL	1.462	95% Bootstrap t UCL	1.488
95% H-UCL (Log ROS)	1.484		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.247	KM Geo Mean	1.28
KM SD (logged)	0.271	95% Critical H Value (KM-Log)	1.825
KM Standard Error of Mean (logged)	0.0708	95% H-UCL (KM -Log)	1.492
KM SD (logged)	0.271	95% Critical H Value (KM-Log)	1.825
KM Standard Error of Mean (logged)	0.0708		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.126
SD in Original Scale	0.57
95% t UCL (Assumes normality)	1.353

DL/2 Log-Transformed

Mean in Log Scale	-0.0101
SD in Log Scale	0.535
95% H-Stat UCL	1.477

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.51
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
Number of Detects	9	Number of Non-Detects	10
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	2.5	Maximum Non-Detect	2
Variance Detects	0.236	Percent Non-Detects	52.63%
Mean Detects	1.711	SD Detects	0.486
Median Detects	1.7	CV Detects	0.284
Skewness Detects	0.0477	Kurtosis Detects	-0.493
Mean of Logged Detects	0.499	SD of Logged Detects	0.301

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.976	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.118	Lilliefors GOF Test
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.384	KM Standard Error of Mean	0.121
90KM SD	0.471	95% KM (BCA) UCL	1.582
95% KM (t) UCL	1.595	95% KM (Percentile Bootstrap) UCL	1.587
95% KM (z) UCL	1.584	95% KM Bootstrap t UCL	1.622
90% KM Chebyshev UCL	1.748	95% KM Chebyshev UCL	1.913
97.5% KM Chebyshev UCL	2.142	99% KM Chebyshev UCL	2.592

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.209	Anderson-Darling GOF Test
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.141	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	13.13	k star (bias corrected MLE)	8.824
Theta hat (MLE)	0.13	Theta star (bias corrected MLE)	0.194
nu hat (MLE)	236.3	nu star (bias corrected)	158.8
Mean (detects)	1.711		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.31	Mean	1.245
Maximum	2.5	Median	1.1
SD	0.609	CV	0.489
k hat (MLE)	4.041	k star (bias corrected MLE)	3.438
Theta hat (MLE)	0.308	Theta star (bias corrected MLE)	0.362
nu hat (MLE)	153.6	nu star (bias corrected)	130.7
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (130.65, α)	105.2	Adjusted Chi Square Value (130.65, β)	103.3
95% Gamma Approximate UCL	1.545	95% Gamma Adjusted UCL	1.575

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.384	SD (KM)	0.471
Variance (KM)	0.222	SE of Mean (KM)	0.121
k hat (KM)	8.63	k star (KM)	7.302
nu hat (KM)	327.9	nu star (KM)	277.5
theta hat (KM)	0.16	theta star (KM)	0.19
80% gamma percentile (KM)	1.787	90% gamma percentile (KM)	2.068
95% gamma percentile (KM)	2.32	99% gamma percentile (KM)	2.845

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (277.48, α)	239.9	Adjusted Chi Square Value (277.48, β)	236.9
95% KM Approximate Gamma UCL	1.601	95% KM Adjusted Gamma UCL	1.622

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.954	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.156	Lilliefors GOF Test
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.296	Mean in Log Scale	0.177
SD in Original Scale	0.549	SD in Log Scale	0.418
95% t UCL (assumes normality of ROS data)	1.515	95% Percentile Bootstrap UCL	1.503
95% BCA Bootstrap UCL	1.528	95% Bootstrap t UCL	1.545
95% H-UCL (Log ROS)	1.576		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.273	KM Geo Mean	1.314
KM SD (logged)	0.315	95% Critical H Value (KM-Log)	1.856
KM Standard Error of Mean (logged)	0.0825	95% H-UCL (KM -Log)	1.585
KM SD (logged)	0.315	95% Critical H Value (KM-Log)	1.856
KM Standard Error of Mean (logged)	0.0825		

DL/2 Statistics

DL/2 Normal

DL/2 Log-Transformed

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean in Original Scale	1.179	Mean in Log Scale	0.0173
SD in Original Scale	0.638	SD in Log Scale	0.57
95% t UCL (Assumes normality)	1.433	95% H-Stat UCL	1.582

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.595

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intraWell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	11
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	5.7	Maximum Non-Detect	2
Variance Detects	2.18	Percent Non-Detects	57.89%
Mean Detects	2.138	SD Detects	1.476
Median Detects	1.7	CV Detects	0.691
Skewness Detects	2.545	Kurtosis Detects	6.876
Mean of Logged Detects	0.624	SD of Logged Detects	0.503

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic 0.637
 1% Shapiro Wilk Critical Value 0.749
 Lilliefors Test Statistic 0.385
 1% Lilliefors Critical Value 0.333

Shapiro Wilk GOF Test

Detected Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.532	KM Standard Error of Mean	0.261
90KM SD	1.05	95% KM (BCA) UCL	1.971
95% KM (t) UCL	1.985	95% KM (Percentile Bootstrap) UCL	1.968
95% KM (z) UCL	1.962	95% KM Bootstrap t UCL	2.467
90% KM Chebyshev UCL	2.316	95% KM Chebyshev UCL	2.67
97.5% KM Chebyshev UCL	3.163	99% KM Chebyshev UCL	4.13

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic 0.941
 5% A-D Critical Value 0.719
 K-S Test Statistic 0.321
 5% K-S Critical Value 0.295

Anderson-Darling GOF Test

Detected Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov GOF

Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma Statistics on Detected Data Only

k hat (MLE)	3.845	k star (bias corrected MLE)	2.486
Theta hat (MLE)	0.556	Theta star (bias corrected MLE)	0.86
nu hat (MLE)	61.52	nu star (bias corrected)	39.78
Mean (detects)	2.138		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.063
Maximum	5.7	Median	0.796
SD	1.369	CV	1.287
k hat (MLE)	0.433	k star (bias corrected MLE)	0.399
Theta hat (MLE)	2.458	Theta star (bias corrected MLE)	2.663
nu hat (MLE)	16.44	nu star (bias corrected)	15.18
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (15.18, α)	7.386	Adjusted Chi Square Value (15.18, β)	6.914
95% Gamma Approximate UCL	2.186	95% Gamma Adjusted UCL	2.335

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.532	SD (KM)	1.05
Variance (KM)	1.102	SE of Mean (KM)	0.261
k hat (KM)	2.131	k star (KM)	1.83
nu hat (KM)	80.98	nu star (KM)	69.53
theta hat (KM)	0.719	theta star (KM)	0.837
80% gamma percentile (KM)	2.318	90% gamma percentile (KM)	3.044
95% gamma percentile (KM)	3.739	99% gamma percentile (KM)	5.291

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (69.53, α)	51.33	Adjusted Chi Square Value (69.53, β)	49.97
95% KM Approximate Gamma UCL	2.076	95% KM Adjusted Gamma UCL	2.132

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.827	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.851	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.282	Lilliefors GOF Test
10% Lilliefors Critical Value	0.265	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.33	Mean in Log Scale	0.0357
SD in Original Scale	1.191	SD in Log Scale	0.691
95% t UCL (assumes normality of ROS data)	1.803	95% Percentile Bootstrap UCL	1.815
95% BCA Bootstrap UCL	1.995	95% Bootstrap t UCL	2.229
95% H-UCL (Log ROS)	1.885		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.303	KM Geo Mean	1.354
KM SD (logged)	0.432	95% Critical H Value (KM-Log)	1.948
KM Standard Error of Mean (logged)	0.111	95% H-UCL (KM -Log)	1.813
KM SD (logged)	0.432	95% Critical H Value (KM-Log)	1.948
KM Standard Error of Mean (logged)	0.111		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.295
SD in Original Scale	1.195
95% t UCL (Assumes normality)	1.77

DL/2 Log-Transformed

Mean in Log Scale	0.00737
SD in Log Scale	0.677
95% H-Stat UCL	1.798

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 1.985

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (arsenic [ug/l]_intraWell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	174	Mean	196.4
Maximum	276	Median	190
SD	22.73	Std. Error of Mean	5.214
Coefficient of Variation	0.116	Skewness	2.749

Normal GOF Test

Shapiro Wilk Test Statistic	0.68
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.313
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 205.4

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 208.5
 95% Modified-t UCL (Johnson-1978) 206

Gamma GOF Test

A-D Test Statistic	1.866
5% A-D Critical Value	0.738

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

K-S Test Statistic 0.297 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.198 Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	92.34	k star (bias corrected MLE)	77.8
Theta hat (MLE)	2.127	Theta star (bias corrected MLE)	2.524
nu hat (MLE)	3509	nu star (bias corrected)	2956
MLE Mean (bias corrected)	196.4	MLE Sd (bias corrected)	22.26
		Approximate Chi Square Value (0.05)	2831
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2820

Assuming Gamma Distribution

95% Approximate Gamma UCL 205.1 95% Adjusted Gamma UCL 205.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.738	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.289	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.159	Mean of logged Data	5.275
Maximum of Logged Data	5.62	SD of logged Data	0.103

Assuming Lognormal Distribution

95% H-UCL	204.8	90% Chebyshev (MVUE) UCL	210.2
95% Chebyshev (MVUE) UCL	216.5	97.5% Chebyshev (MVUE) UCL	225.3
99% Chebyshev (MVUE) UCL	242.5		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	204.9	95% BCA Bootstrap UCL	208.5
95% Standard Bootstrap UCL	204.7	95% Bootstrap-t UCL	218.5
95% Hall's Bootstrap UCL	248.4	95% Percentile Bootstrap UCL	205.4
90% Chebyshev(Mean, Sd) UCL	212	95% Chebyshev(Mean, Sd) UCL	219.1
97.5% Chebyshev(Mean, Sd) UCL	228.9	99% Chebyshev(Mean, Sd) UCL	248.2

Suggested UCL to Use

95% Student's-t UCL 205.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	24.32	Mean	160
Maximum	430.6	Median	129.4
SD	109.2	Std. Error of Mean	25.06
Coefficient of Variation	0.683	Skewness	1.21

Normal GOF Test

Shapiro Wilk Test Statistic 0.872
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.242
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 203.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 208.7
 95% Modified-t UCL (Johnson-1978) 204.6

Gamma GOF Test

A-D Test Statistic 0.507
 5% A-D Critical Value 0.751
 K-S Test Statistic 0.156
 5% K-S Critical Value 0.201

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.243	k star (bias corrected MLE)	1.924
Theta hat (MLE)	71.34	Theta star (bias corrected MLE)	83.17
nu hat (MLE)	85.24	nu star (bias corrected)	73.11
MLE Mean (bias corrected)	160	MLE Sd (bias corrected)	115.4
		Approximate Chi Square Value (0.05)	54.42
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	53.02

Assuming Gamma Distribution

95% Approximate Gamma UCL 215

95% Adjusted Gamma UCL 220.7

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.923
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.184
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.191	Mean of logged Data	4.836
Maximum of Logged Data	6.065	SD of logged Data	0.764

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	255.3	90% Chebyshev (MVUE) UCL	259.2
95% Chebyshev (MVUE) UCL	301.6	97.5% Chebyshev (MVUE) UCL	360.5
99% Chebyshev (MVUE) UCL	476.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	201.2	95% BCA Bootstrap UCL	208.3
95% Standard Bootstrap UCL	200.4	95% Bootstrap-t UCL	214.9
95% Hall's Bootstrap UCL	213.5	95% Percentile Bootstrap UCL	202.7
90% Chebyshev(Mean, Sd) UCL	235.2	95% Chebyshev(Mean, Sd) UCL	269.3
97.5% Chebyshev(Mean, Sd) UCL	316.5	99% Chebyshev(Mean, Sd) UCL	409.3

Suggested UCL to Use

95% Student's-t UCL 203.5

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (barium [ug/l]_intraWell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	80.6	Mean	130.7
Maximum	190	Median	123
SD	31.06	Std. Error of Mean	7.127
Coefficient of Variation	0.238	Skewness	0.23

Normal GOF Test

Shapiro Wilk Test Statistic 0.974
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.124
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 143

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 142.8
 95% Modified-t UCL (Johnson-1978) 143.1

Gamma GOF Test

A-D Test Statistic 0.168

Anderson-Darling Gamma GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

5% A-D Critical Value 0.74 Detected data appear Gamma Distributed at 5% Significance Level
 K-S Test Statistic 0.0971 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.198 Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	18.33	k star (bias corrected MLE)	15.47
Theta hat (MLE)	7.131	Theta star (bias corrected MLE)	8.449
nu hat (MLE)	696.4	nu star (bias corrected)	587.8
MLE Mean (bias corrected)	130.7	MLE Sd (bias corrected)	33.23
		Approximate Chi Square Value (0.05)	532.6
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	528

Assuming Gamma Distribution

95% Approximate Gamma UCL	144.2	95% Adjusted Gamma UCL	145.5
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.972	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0833	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.389	Mean of logged Data	4.845
Maximum of Logged Data	5.247	SD of logged Data	0.244

Assuming Lognormal Distribution

95% H-UCL	145.3	90% Chebyshev (MVUE) UCL	152.9
95% Chebyshev (MVUE) UCL	162.9	97.5% Chebyshev (MVUE) UCL	176.8
99% Chebyshev (MVUE) UCL	204.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	142.4	95% BCA Bootstrap UCL	142.8
95% Standard Bootstrap UCL	142.3	95% Bootstrap-t UCL	143.9
95% Hall's Bootstrap UCL	143.4	95% Percentile Bootstrap UCL	142.3
90% Chebyshev(Mean, Sd) UCL	152.1	95% Chebyshev(Mean, Sd) UCL	161.7
97.5% Chebyshev(Mean, Sd) UCL	175.2	99% Chebyshev(Mean, Sd) UCL	201.6

Suggested UCL to Use

95% Student's-t UCL 143

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (barium [ug/l]_intraWell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	101.1	Mean	155
Maximum	218.1	Median	158
SD	26.4	Std. Error of Mean	6.056
Coefficient of Variation	0.17	Skewness	0.325

Normal GOF Test

Shapiro Wilk Test Statistic	0.98
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.0927
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL	165.5
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95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	165.5
95% Modified-t UCL (Johnson-1978)	165.6

Gamma GOF Test

A-D Test Statistic	0.191
5% A-D Critical Value	0.74
K-S Test Statistic	0.0937
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	36.11	k star (bias corrected MLE)	30.44
Theta hat (MLE)	4.294	Theta star (bias corrected MLE)	5.093
nu hat (MLE)	1372	nu star (bias corrected)	1157
MLE Mean (bias corrected)	155	MLE Sd (bias corrected)	28.1
		Approximate Chi Square Value (0.05)	1079
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1072

Assuming Gamma Distribution

95% Approximate Gamma UCL	166.2	95% Adjusted Gamma UCL	167.3
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.98
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.102
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.616	Mean of logged Data	5.03
Maximum of Logged Data	5.385	SD of logged Data	0.173

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	166.7	90% Chebyshev (MVUE) UCL	173.6
95% Chebyshev (MVUE) UCL	182	97.5% Chebyshev (MVUE) UCL	193.6
99% Chebyshev (MVUE) UCL	216.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	165	95% BCA Bootstrap UCL	165.5
95% Standard Bootstrap UCL	164.2	95% Bootstrap-t UCL	165.8
95% Hall's Bootstrap UCL	166.4	95% Percentile Bootstrap UCL	164.4
90% Chebyshev(Mean, Sd) UCL	173.2	95% Chebyshev(Mean, Sd) UCL	181.4
97.5% Chebyshev(Mean, Sd) UCL	192.9	99% Chebyshev(Mean, Sd) UCL	215.3

Suggested UCL to Use

95% Student's-t UCL 165.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (barium [ug/l]_intraWell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	109	Mean	127.1
Maximum	146.8	Median	127.2
SD	10.57	Std. Error of Mean	2.491
Coefficient of Variation	0.0831	Skewness	0.0237

Normal GOF Test

Shapiro Wilk Test Statistic 0.975
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.104
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 131.4

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 131.2
 95% Modified-t UCL (Johnson-1978) 131.5

Gamma GOF Test

A-D Test Statistic 0.221
 5% A-D Critical Value 0.737
 K-S Test Statistic 0.115

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

5% K-S Critical Value 0.203 Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	152.5	k star (bias corrected MLE)	127.1
Theta hat (MLE)	0.834	Theta star (bias corrected MLE)	1
nu hat (MLE)	5489	nu star (bias corrected)	4576
MLE Mean (bias corrected)	127.1	MLE Sd (bias corrected)	11.28
		Approximate Chi Square Value (0.05)	4419
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	4405

Assuming Gamma Distribution

95% Approximate Gamma UCL	131.6	95% Adjusted Gamma UCL	132
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.112	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.185	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.691	Mean of logged Data	4.842
Maximum of Logged Data	4.989	SD of logged Data	0.0835

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	134.6
95% Chebyshev (MVUE) UCL	138	97.5% Chebyshev (MVUE) UCL	142.8
99% Chebyshev (MVUE) UCL	152		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	131.2	95% BCA Bootstrap UCL	131.2
95% Standard Bootstrap UCL	131	95% Bootstrap-t UCL	131.4
95% Hall's Bootstrap UCL	131.2	95% Percentile Bootstrap UCL	131.1
90% Chebyshev(Mean, Sd) UCL	134.6	95% Chebyshev(Mean, Sd) UCL	138
97.5% Chebyshev(Mean, Sd) UCL	142.7	99% Chebyshev(Mean, Sd) UCL	151.9

Suggested UCL to Use

95% Student's-t UCL	131.4
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	190	Mean	223.3
Maximum	305	Median	222
SD	24.61	Std. Error of Mean	5.646
Coefficient of Variation	0.11	Skewness	2.063

Normal GOF Test

Shapiro Wilk Test Statistic 0.818
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.189
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 233.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 235.5

95% Modified-t UCL (Johnson-1978) 233.6

Gamma GOF Test

A-D Test Statistic 0.756
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.167
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	96.89	k star (bias corrected MLE)	81.63
Theta hat (MLE)	2.305	Theta star (bias corrected MLE)	2.736
nu hat (MLE)	3682	nu star (bias corrected)	3102
MLE Mean (bias corrected)	223.3	MLE Sd (bias corrected)	24.72
		Approximate Chi Square Value (0.05)	2973
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2962

Assuming Gamma Distribution

95% Approximate Gamma UCL 233

95% Adjusted Gamma UCL 233.8

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.874
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.162
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.247	Mean of logged Data	5.403
Maximum of Logged Data	5.72	SD of logged Data	0.102

Assuming Lognormal Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% H-UCL	232.8	90% Chebyshev (MVUE) UCL	238.9
95% Chebyshev (MVUE) UCL	246	97.5% Chebyshev (MVUE) UCL	255.9
99% Chebyshev (MVUE) UCL	275.3		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	232.6	95% BCA Bootstrap UCL	234.9
95% Standard Bootstrap UCL	232	95% Bootstrap-t UCL	237.5
95% Hall's Bootstrap UCL	278.8	95% Percentile Bootstrap UCL	232.3
90% Chebyshev(Mean, Sd) UCL	240.3	95% Chebyshev(Mean, Sd) UCL	247.9
97.5% Chebyshev(Mean, Sd) UCL	258.6	99% Chebyshev(Mean, Sd) UCL	279.5

Suggested UCL to Use

95% Student's-t UCL 233.1

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (barium [ug/l]_intraWell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	296.1	Mean	356.3
Maximum	516.3	Median	351
SD	49.76	Std. Error of Mean	11.42
Coefficient of Variation	0.14	Skewness	1.943

Normal GOF Test

Shapiro Wilk Test Statistic	0.828
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.242
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 376.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	380.6
95% Modified-t UCL (Johnson-1978)	377

Gamma GOF Test

A-D Test Statistic	0.742
5% A-D Critical Value	0.74

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

K-S Test Statistic 0.218 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.198 Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	61.28	k star (bias corrected MLE)	51.64
Theta hat (MLE)	5.815	Theta star (bias corrected MLE)	6.9
nu hat (MLE)	2329	nu star (bias corrected)	1962
MLE Mean (bias corrected)	356.3	MLE Sd (bias corrected)	49.59
		Approximate Chi Square Value (0.05)	1860
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1852

Assuming Gamma Distribution

95% Approximate Gamma UCL	375.9	95% Adjusted Gamma UCL	377.6
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.89	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.21	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.691	Mean of logged Data	5.868
Maximum of Logged Data	6.247	SD of logged Data	0.128

Assuming Lognormal Distribution

95% H-UCL	375.5	90% Chebyshev (MVUE) UCL	387.6
95% Chebyshev (MVUE) UCL	401.8	97.5% Chebyshev (MVUE) UCL	421.6
99% Chebyshev (MVUE) UCL	460.4		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	375.1	95% BCA Bootstrap UCL	381
95% Standard Bootstrap UCL	374.3	95% Bootstrap-t UCL	386.3
95% Hall's Bootstrap UCL	474.6	95% Percentile Bootstrap UCL	375.2
90% Chebyshev(Mean, Sd) UCL	390.6	95% Chebyshev(Mean, Sd) UCL	406.1
97.5% Chebyshev(Mean, Sd) UCL	427.6	99% Chebyshev(Mean, Sd) UCL	469.9

Suggested UCL to Use

95% Student's-t UCL	376.1
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	159.1	Mean	193.6
Maximum	256.9	Median	191.6
SD	24.09	Std. Error of Mean	5.526
Coefficient of Variation	0.124	Skewness	1.033

Normal GOF Test

Shapiro Wilk Test Statistic	0.928	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.189	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 203.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 204.1
 95% Modified-t UCL (Johnson-1978) 203.4

Gamma GOF Test

A-D Test Statistic	0.384	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	72.22	k star (bias corrected MLE)	60.85
Theta hat (MLE)	2.68	Theta star (bias corrected MLE)	3.181
nu hat (MLE)	2744	nu star (bias corrected)	2312
MLE Mean (bias corrected)	193.6	MLE Sd (bias corrected)	24.82
		Approximate Chi Square Value (0.05)	2202
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2192

Assuming Gamma Distribution

95% Approximate Gamma UCL 203.3 95% Adjusted Gamma UCL 204.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.165	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.07	Mean of logged Data	5.259
Maximum of Logged Data	5.549	SD of logged Data	0.12

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	203.3	90% Chebyshev (MVUE) UCL	209.5
95% Chebyshev (MVUE) UCL	216.7	97.5% Chebyshev (MVUE) UCL	226.8
99% Chebyshev (MVUE) UCL	246.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	202.7	95% BCA Bootstrap UCL	203.5
95% Standard Bootstrap UCL	202.1	95% Bootstrap-t UCL	204.9
95% Hall's Bootstrap UCL	206	95% Percentile Bootstrap UCL	202.7
90% Chebyshev(Mean, Sd) UCL	210.2	95% Chebyshev(Mean, Sd) UCL	217.7
97.5% Chebyshev(Mean, Sd) UCL	228.1	99% Chebyshev(Mean, Sd) UCL	248.6

Suggested UCL to Use

95% Student's-t UCL 203.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (barium [ug/l]_intraWell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	220	Mean	351.4
Maximum	485	Median	343
SD	62.65	Std. Error of Mean	14.37
Coefficient of Variation	0.178	Skewness	0.0855

Normal GOF Test

Shapiro Wilk Test Statistic 0.987
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.111
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 376.3

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 375.3
 95% Modified-t UCL (Johnson-1978) 376.3

Gamma GOF Test

A-D Test Statistic 0.202
 5% A-D Critical Value 0.74
 K-S Test Statistic 0.127
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	32.14	k star (bias corrected MLE)	27.1
Theta hat (MLE)	10.93	Theta star (bias corrected MLE)	12.97
nu hat (MLE)	1221	nu star (bias corrected)	1030
MLE Mean (bias corrected)	351.4	MLE Sd (bias corrected)	67.5
		Approximate Chi Square Value (0.05)	956.2
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	950

Assuming Gamma Distribution

95% Approximate Gamma UCL	378.4	95% Adjusted Gamma UCL	380.8
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.975
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.141
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.394	Mean of logged Data	5.846
Maximum of Logged Data	6.184	SD of logged Data	0.184

Assuming Lognormal Distribution

95% H-UCL	380	90% Chebyshev (MVUE) UCL	396.3
95% Chebyshev (MVUE) UCL	416.6	97.5% Chebyshev (MVUE) UCL	444.8
99% Chebyshev (MVUE) UCL	500.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	375	95% BCA Bootstrap UCL	375.3
95% Standard Bootstrap UCL	374.6	95% Bootstrap-t UCL	376.9
95% Hall's Bootstrap UCL	377.4	95% Percentile Bootstrap UCL	374.6
90% Chebyshev(Mean, Sd) UCL	394.5	95% Chebyshev(Mean, Sd) UCL	414
97.5% Chebyshev(Mean, Sd) UCL	441.1	99% Chebyshev(Mean, Sd) UCL	494.4

Suggested UCL to Use

95% Student's-t UCL	376.3
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Total Number of Observations	19	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	474	Mean	599.4
Maximum	804	Median	589
SD	69.61	Std. Error of Mean	15.97
Coefficient of Variation	0.116	Skewness	1.376

Normal GOF Test

Shapiro Wilk Test Statistic 0.882
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.212
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 627.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 631

95% Modified-t UCL (Johnson-1978) 627.9

Gamma GOF Test

A-D Test Statistic 0.744
 5% A-D Critical Value 0.739
 K-S Test Statistic 0.193
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE) 83.96
 Theta hat (MLE) 7.139
 nu hat (MLE) 3190
 MLE Mean (bias corrected) 599.4
 Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 70.74
 Theta star (bias corrected MLE) 8.473
 nu star (bias corrected) 2688
 MLE Sd (bias corrected) 71.26
 Approximate Chi Square Value (0.05) 2569
 Adjusted Chi Square Value 2558

Assuming Gamma Distribution

95% Approximate Gamma UCL 627.2

95% Adjusted Gamma UCL 629.7

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.92
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.188
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 6.161
 Maximum of Logged Data 6.69

Mean of logged Data 6.39
 SD of logged Data 0.111

Assuming Lognormal Distribution

95% H-UCL 627.2

90% Chebyshev (MVUE) UCL 645

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

95% Chebyshev (MVUE) UCL 665.7

97.5% Chebyshev (MVUE) UCL 694.4

99% Chebyshev (MVUE) UCL 750.8

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	625.6	95% BCA Bootstrap UCL	629.5
95% Standard Bootstrap UCL	624.7	95% Bootstrap-t UCL	636.4
95% Hall's Bootstrap UCL	662.5	95% Percentile Bootstrap UCL	625.3
90% Chebyshev(Mean, Sd) UCL	647.3	95% Chebyshev(Mean, Sd) UCL	669
97.5% Chebyshev(Mean, Sd) UCL	699.1	99% Chebyshev(Mean, Sd) UCL	758.3

Suggested UCL to Use

95% Student's-t UCL 627.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (beryllium [ug/l]_inrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_inrawell_apw-02) was not processed!

x_ols (beryllium [ug/l]_inrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_inrawell_apw-03) was not processed!

x_ols (beryllium [ug/l]_inrawell_apw-05/05r)

General Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_intrawell_apw-05/05r) was not processed!

x_ols (beryllium [ug/l]_intrawell_apw-06d)

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	18
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_intrawell_apw-06d) was not processed!

x_ols (beryllium [ug/l]_intrawell_apw-06s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_intrawell_apw-06s) was not processed!

x_ols (beryllium [ug/l]_intrawell_apw-07)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

The data set for variable x_ols (beryllium [ug/l]_intraWell_apw-07) was not processed!

x_ols (beryllium [ug/l]_intraWell_apw-08)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_intraWell_apw-08) was not processed!

x_ols (beryllium [ug/l]_intraWell_apw-10d)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_intraWell_apw-10d) was not processed!

x_ols (beryllium [ug/l]_intraWell_apw-10s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (beryllium [ug/l]_intraWell_apw-10s) was not processed!

x_ols (boron [mg/l]_intraWell_apw-02)

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	16

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Number of Missing Observations 0
 Mean 8.691
 Median 8.56
 Std. Error of Mean 0.151
 Skewness 0.755

Minimum 7.75
 Maximum 10.2
 SD 0.642
 Coefficient of Variation 0.0739

Normal GOF Test

Shapiro Wilk Test Statistic 0.924
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.203
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 8.954

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 8.969
 95% Modified-t UCL (Johnson-1978) 8.959

Gamma GOF Test

A-D Test Statistic 0.606
 5% A-D Critical Value 0.737
 K-S Test Statistic 0.209
 5% K-S Critical Value 0.203

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE) 199.6
 Theta hat (MLE) 0.0435
 nu hat (MLE) 7185
 MLE Mean (bias corrected) 8.691
 Adjusted Level of Significance 0.0357

k star (bias corrected MLE) 166.4
 Theta star (bias corrected MLE) 0.0522
 nu star (bias corrected) 5989
 MLE Sd (bias corrected) 0.674
 Approximate Chi Square Value (0.05) 5810
 Adjusted Chi Square Value 5793

Assuming Gamma Distribution

95% Approximate Gamma UCL 8.959

95% Adjusted Gamma UCL 8.985

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.934
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.203
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 2.048
 Maximum of Logged Data 2.322

Mean of logged Data 2.16
 SD of logged Data 0.0724

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 9.338

90% Chebyshev (MVUE) UCL 9.136
 97.5% Chebyshev (MVUE) UCL 9.618

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000
 99% Chebyshev (MVUE) UCL 10.17

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	8.94	95% BCA Bootstrap UCL	8.954
95% Standard Bootstrap UCL	8.929	95% Bootstrap-t UCL	8.983
95% Hall's Bootstrap UCL	8.968	95% Percentile Bootstrap UCL	8.924
90% Chebyshev(Mean, Sd) UCL	9.145	95% Chebyshev(Mean, Sd) UCL	9.351
97.5% Chebyshev(Mean, Sd) UCL	9.636	99% Chebyshev(Mean, Sd) UCL	10.2

Suggested UCL to Use

95% Student's-t UCL 8.954

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (boron [mg/l]_inrawell_apw-03)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	1.84	Mean	4.129
Maximum	4.94	Median	4.275
SD	0.832	Std. Error of Mean	0.196
Coefficient of Variation	0.201	Skewness	-2.009

Normal GOF Test

Shapiro Wilk Test Statistic	0.737
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.31
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 4.471

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	4.353
95% Modified-t UCL (Johnson-1978)	4.455

Gamma GOF Test

A-D Test Statistic	2.381
5% A-D Critical Value	0.739
K-S Test Statistic	0.344
5% K-S Critical Value	0.203

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	18.52	k star (bias corrected MLE)	15.47
Theta hat (MLE)	0.223	Theta star (bias corrected MLE)	0.267
nu hat (MLE)	666.7	nu star (bias corrected)	556.9
MLE Mean (bias corrected)	4.129	MLE Sd (bias corrected)	1.05
		Approximate Chi Square Value (0.05)	503.2
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	498.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	4.57	95% Adjusted Gamma UCL	4.615
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Lognormal GOF Test

Shapiro Wilk Test Statistic 0.646
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.356
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.61	Mean of logged Data	1.391
Maximum of Logged Data	1.597	SD of logged Data	0.263

Assuming Lognormal Distribution

95% H-UCL	4.674	90% Chebyshev (MVUE) UCL	4.932
95% Chebyshev (MVUE) UCL	5.285	97.5% Chebyshev (MVUE) UCL	5.775
99% Chebyshev (MVUE) UCL	6.738		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	4.452	95% BCA Bootstrap UCL	4.366
95% Standard Bootstrap UCL	4.441	95% Bootstrap-t UCL	4.396
95% Hall's Bootstrap UCL	4.371	95% Percentile Bootstrap UCL	4.424
90% Chebyshev(Mean, Sd) UCL	4.718	95% Chebyshev(Mean, Sd) UCL	4.984
97.5% Chebyshev(Mean, Sd) UCL	5.354	99% Chebyshev(Mean, Sd) UCL	6.08

Suggested UCL to Use

95% Student's-t UCL 4.471

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	2.136	Mean	6.816
Maximum	9.276	Median	6.724
SD	1.49	Std. Error of Mean	0.351
Coefficient of Variation	0.219	Skewness	-1.462

Normal GOF Test

Shapiro Wilk Test Statistic 0.804
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.266
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.427

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.264
 95% Modified-t UCL (Johnson-1978) 7.407

Gamma GOF Test

A-D Test Statistic 1.902
 5% A-D Critical Value 0.739
 K-S Test Statistic 0.321
 5% K-S Critical Value 0.203

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.69	k star (bias corrected MLE)	12.28
Theta hat (MLE)	0.464	Theta star (bias corrected MLE)	0.555
nu hat (MLE)	528.9	nu star (bias corrected)	442.1
MLE Mean (bias corrected)	6.816	MLE Sd (bias corrected)	1.945
		Approximate Chi Square Value (0.05)	394.3
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	390

Assuming Gamma Distribution

95% Approximate Gamma UCL 7.641 95% Adjusted Gamma UCL 7.726

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.623
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.351
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.759	Mean of logged Data	1.885
Maximum of Logged Data	2.227	SD of logged Data	0.306

Assuming Lognormal Distribution

95% H-UCL 7.923 90% Chebyshev (MVUE) UCL 8.394

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Chebyshev (MVUE) UCL	9.079	97.5% Chebyshev (MVUE) UCL	10.03
99% Chebyshev (MVUE) UCL	11.9		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.394	95% BCA Bootstrap UCL	7.279
95% Standard Bootstrap UCL	7.38	95% Bootstrap-t UCL	7.35
95% Hall's Bootstrap UCL	7.356	95% Percentile Bootstrap UCL	7.325
90% Chebyshev(Mean, Sd) UCL	7.869	95% Chebyshev(Mean, Sd) UCL	8.347
97.5% Chebyshev(Mean, Sd) UCL	9.009	99% Chebyshev(Mean, Sd) UCL	10.31

Suggested UCL to Use

95% Student's-t UCL 7.427

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (boron [mg/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	3.09	Mean	3.919
Maximum	5.51	Median	3.84
SD	0.612	Std. Error of Mean	0.148
Coefficient of Variation	0.156	Skewness	1.224

Normal GOF Test

Shapiro Wilk Test Statistic 0.892
 1% Shapiro Wilk Critical Value 0.851
 Lilliefors Test Statistic 0.219
 1% Lilliefors Critical Value 0.241

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 4.179

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 4.211
 95% Modified-t UCL (Johnson-1978) 4.186

Gamma GOF Test

A-D Test Statistic 0.563
 5% A-D Critical Value 0.737
 K-S Test Statistic 0.197

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

5% K-S Critical Value 0.208 Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	47.18	k star (bias corrected MLE)	38.9
Theta hat (MLE)	0.0831	Theta star (bias corrected MLE)	0.101
nu hat (MLE)	1604	nu star (bias corrected)	1322
MLE Mean (bias corrected)	3.919	MLE Sd (bias corrected)	0.628
		Approximate Chi Square Value (0.05)	1239
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	1231

Assuming Gamma Distribution

95% Approximate Gamma UCL	4.183	95% Adjusted Gamma UCL	4.212
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.932	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.91	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.188	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.19	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.128	Mean of logged Data	1.355
Maximum of Logged Data	1.707	SD of logged Data	0.148

Assuming Lognormal Distribution

95% H-UCL	4.185	90% Chebyshev (MVUE) UCL	4.341
95% Chebyshev (MVUE) UCL	4.532	97.5% Chebyshev (MVUE) UCL	4.798
99% Chebyshev (MVUE) UCL	5.32		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	4.164	95% BCA Bootstrap UCL	4.208
95% Standard Bootstrap UCL	4.157	95% Bootstrap-t UCL	4.271
95% Hall's Bootstrap UCL	4.487	95% Percentile Bootstrap UCL	4.172
90% Chebyshev(Mean, Sd) UCL	4.365	95% Chebyshev(Mean, Sd) UCL	4.566
97.5% Chebyshev(Mean, Sd) UCL	4.846	99% Chebyshev(Mean, Sd) UCL	5.396

Suggested UCL to Use

95% Student's-t UCL	4.179
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	4.05	Mean	6.021
Maximum	9.19	Median	5.835
SD	1.196	Std. Error of Mean	0.282
Coefficient of Variation	0.199	Skewness	0.812

Normal GOF Test

Shapiro Wilk Test Statistic	0.941	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.858	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.141	Lilliefors GOF Test
1% Lilliefors Critical Value	0.235	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.511	95% Adjusted-CLT UCL (Chen-1995)	6.542
		95% Modified-t UCL (Johnson-1978)	6.52

Gamma GOF Test

A-D Test Statistic	0.344	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.133	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.203	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	27.96	k star (bias corrected MLE)	23.33
Theta hat (MLE)	0.215	Theta star (bias corrected MLE)	0.258
nu hat (MLE)	1006	nu star (bias corrected)	840
MLE Mean (bias corrected)	6.021	MLE Sd (bias corrected)	1.246
		Approximate Chi Square Value (0.05)	773.8
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	767.7

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.537	95% Adjusted Gamma UCL	6.589
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.146	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.185	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.399	Mean of logged Data	1.777
Maximum of Logged Data	2.218	SD of logged Data	0.195

Assuming Lognormal Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% H-UCL	6.556	90% Chebyshev (MVUE) UCL	6.853
95% Chebyshev (MVUE) UCL	7.23	97.5% Chebyshev (MVUE) UCL	7.754
99% Chebyshev (MVUE) UCL	8.782		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.485	95% BCA Bootstrap UCL	6.541
95% Standard Bootstrap UCL	6.48	95% Bootstrap-t UCL	6.579
95% Hall's Bootstrap UCL	6.695	95% Percentile Bootstrap UCL	6.488
90% Chebyshev(Mean, Sd) UCL	6.866	95% Chebyshev(Mean, Sd) UCL	7.249
97.5% Chebyshev(Mean, Sd) UCL	7.781	99% Chebyshev(Mean, Sd) UCL	8.825

Suggested UCL to Use

95% Student's-t UCL 6.511

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (boron [mg/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
Number of Detects	17	Number of Non-Detects	1
Number of Distinct Detects	17	Number of Distinct Non-Detects	1
Minimum Detect	0.168	Minimum Non-Detect	0.2
Maximum Detect	0.526	Maximum Non-Detect	0.2
Variance Detects	0.00666	Percent Non-Detects	5.556%
Mean Detects	0.274	SD Detects	0.0816
Median Detects	0.274	CV Detects	0.297
Skewness Detects	1.779	Kurtosis Detects	5.122
Mean of Logged Detects	-1.329	SD of Logged Detects	0.268

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.848	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.851	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.179	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.241	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.269	KM Standard Error of Mean	0.0195
90KM SD	0.0803	95% KM (BCA) UCL	0.305
95% KM (t) UCL	0.303	95% KM (Percentile Bootstrap) UCL	0.302
95% KM (z) UCL	0.301	95% KM Bootstrap t UCL	0.312
90% KM Chebyshev UCL	0.327	95% KM Chebyshev UCL	0.354
97.5% KM Chebyshev UCL	0.391	99% KM Chebyshev UCL	0.463

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.402	Anderson-Darling GOF Test
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.138	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.209	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	14.2	k star (bias corrected MLE)	11.73
Theta hat (MLE)	0.0193	Theta star (bias corrected MLE)	0.0234
nu hat (MLE)	482.6	nu star (bias corrected)	398.8
Mean (detects)	0.274		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.158	Mean	0.268
Maximum	0.526	Median	0.26
SD	0.0838	CV	0.313
k hat (MLE)	12.53	k star (bias corrected MLE)	10.48
Theta hat (MLE)	0.0214	Theta star (bias corrected MLE)	0.0256
nu hat (MLE)	451	nu star (bias corrected)	377.2
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (377.16, α)	333.2	Adjusted Chi Square Value (377.16, β)	329.2
95% Gamma Approximate UCL	0.303	95% Gamma Adjusted UCL	0.307

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.269	SD (KM)	0.0803
Variance (KM)	0.00645	SE of Mean (KM)	0.0195
k hat (KM)	11.22	k star (KM)	9.386
nu hat (KM)	403.9	nu star (KM)	337.9
theta hat (KM)	0.024	theta star (KM)	0.0287
80% gamma percentile (KM)	0.339	90% gamma percentile (KM)	0.386
95% gamma percentile (KM)	0.428	99% gamma percentile (KM)	0.514

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (337.89, α)	296.3	Adjusted Chi Square Value (337.89, β)	292.6
95% KM Approximate Gamma UCL	0.307	95% KM Adjusted Gamma UCL	0.311

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.949	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.91	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.13	Lilliefors GOF Test
10% Lilliefors Critical Value	0.19	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean in Original Scale	0.269	Mean in Log Scale	-1.353
SD in Original Scale	0.0828	SD in Log Scale	0.279
95% t UCL (assumes normality of ROS data)	0.303	95% Percentile Bootstrap UCL	0.302
95% BCA Bootstrap UCL	0.308	95% Bootstrap t UCL	0.314
95% H-UCL (Log ROS)	0.304		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.352	KM Geo Mean	0.259
KM SD (logged)	0.27	95% Critical H Value (KM-Log)	1.832
KM Standard Error of Mean (logged)	0.0657	95% H-UCL (KM -Log)	0.303
KM SD (logged)	0.27	95% Critical H Value (KM-Log)	1.832
KM Standard Error of Mean (logged)	0.0657		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.265
SD in Original Scale	0.0892
95% t UCL (Assumes normality)	0.301

DL/2 Log-Transformed

Mean in Log Scale	-1.383
SD in Log Scale	0.347
95% H-Stat UCL	0.312

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.303

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (boron [mg/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	16
Number of Detects	15	Number of Non-Detects	3
Number of Distinct Detects	15	Number of Distinct Non-Detects	1
Minimum Detect	0.0979	Minimum Non-Detect	0.2
Maximum Detect	0.166	Maximum Non-Detect	0.2
Variance Detects	5.4012E-4	Percent Non-Detects	16.67%
Mean Detects	0.136	SD Detects	0.0232
Median Detects	0.144	CV Detects	0.171
Skewness Detects	-0.38	Kurtosis Detects	-1.509
Mean of Logged Detects	-2.011	SD of Logged Detects	0.179

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.894
1% Shapiro Wilk Critical Value	0.835

Shapiro Wilk GOF Test

Detected Data appear Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lilliefors Test Statistic	0.226	Lilliefors GOF Test
1% Lilliefors Critical Value	0.255	Detected Data appear Normal at 1% Significance Level
Detected Data appear Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.136	KM Standard Error of Mean	0.006
90KM SD	0.0225	95% KM (BCA) UCL	0.145
95% KM (t) UCL	0.146	95% KM (Percentile Bootstrap) UCL	0.145
95% KM (z) UCL	0.146	95% KM Bootstrap t UCL	0.146
90% KM Chebyshev UCL	0.154	95% KM Chebyshev UCL	0.162
97.5% KM Chebyshev UCL	0.173	99% KM Chebyshev UCL	0.196

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.805	Anderson-Darling GOF Test
5% A-D Critical Value	0.735	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.221	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	34.65	k star (bias corrected MLE)	27.76
Theta hat (MLE)	0.00392	Theta star (bias corrected MLE)	0.00489
nu hat (MLE)	1040	nu star (bias corrected)	832.9
Mean (detects)	0.136		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0979	Mean	0.136
Maximum	0.166	Median	0.144
SD	0.0219	CV	0.161
k hat (MLE)	38.68	k star (bias corrected MLE)	32.27
Theta hat (MLE)	0.00351	Theta star (bias corrected MLE)	0.00421
nu hat (MLE)	1393	nu star (bias corrected)	1162
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (N/A, α)	1084	Adjusted Chi Square Value (N/A, β)	1076
95% Gamma Approximate UCL	0.146	95% Gamma Adjusted UCL	0.147

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.136	SD (KM)	0.0225
Variance (KM)	5.0411E-4	SE of Mean (KM)	0.006
k hat (KM)	36.62	k star (KM)	30.55
nu hat (KM)	1318	nu star (KM)	1100
theta hat (KM)	0.00371	theta star (KM)	0.00445
80% gamma percentile (KM)	0.156	90% gamma percentile (KM)	0.168
95% gamma percentile (KM)	0.179	99% gamma percentile (KM)	0.199

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1024	Adjusted Chi Square Value (N/A, β)	1017
95% KM Approximate Gamma UCL	0.146	95% KM Adjusted Gamma UCL	0.147

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.883	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.901	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.248	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.202	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.136	Mean in Log Scale	-2.011
SD in Original Scale	0.022	SD in Log Scale	0.169
95% t UCL (assumes normality of ROS data)	0.145	95% Percentile Bootstrap UCL	0.144
95% BCA Bootstrap UCL	0.143	95% Bootstrap t UCL	0.144
95% H-UCL (Log ROS)	0.146		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.011	KM Geo Mean	0.134
KM SD (logged)	0.173	95% Critical H Value (KM-Log)	1.771
KM Standard Error of Mean (logged)	0.0462	95% H-UCL (KM -Log)	0.146
KM SD (logged)	0.173	95% Critical H Value (KM-Log)	1.771
KM Standard Error of Mean (logged)	0.0462		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.13
SD in Original Scale	0.0252
95% t UCL (Assumes normality)	0.14

DL/2 Log-Transformed

Mean in Log Scale	-2.059
SD in Log Scale	0.197
95% H-Stat UCL	0.142

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.146

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (boron [mg/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	16
Number of Detects	15	Number of Non-Detects	3
Number of Distinct Detects	15	Number of Distinct Non-Detects	1
Minimum Detect	0.0635	Minimum Non-Detect	0.2
Maximum Detect	0.143	Maximum Non-Detect	0.2

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Variance Detects	8.4133E-4	Percent Non-Detects	16.67%
Mean Detects	0.11	SD Detects	0.029
Median Detects	0.126	CV Detects	0.264
Skewness Detects	-0.385	Kurtosis Detects	-1.726
Mean of Logged Detects	-2.247	SD of Logged Detects	0.287

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.847	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.835	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.251	Lilliefors GOF Test
1% Lilliefors Critical Value	0.255	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.11	KM Standard Error of Mean	0.00749
90KM SD	0.028	95% KM (BCA) UCL	0.121
95% KM (t) UCL	0.123	95% KM (Percentile Bootstrap) UCL	0.122
95% KM (z) UCL	0.122	95% KM Bootstrap t UCL	0.122
90% KM Chebyshev UCL	0.132	95% KM Chebyshev UCL	0.142
97.5% KM Chebyshev UCL	0.156	99% KM Chebyshev UCL	0.184

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.142	Anderson-Darling GOF Test
5% A-D Critical Value	0.736	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.269	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.221	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	13.88	k star (bias corrected MLE)	11.15
Theta hat (MLE)	0.0079	Theta star (bias corrected MLE)	0.00984
nu hat (MLE)	416.4	nu star (bias corrected)	334.4
Mean (detects)	0.11		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0635	Mean	0.109
Maximum	0.143	Median	0.12
SD	0.0273	CV	0.249
k hat (MLE)	15.59	k star (bias corrected MLE)	13.03
Theta hat (MLE)	0.00702	Theta star (bias corrected MLE)	0.00841
nu hat (MLE)	561.1	nu star (bias corrected)	468.9
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (468.91, α)	419.7	Adjusted Chi Square Value (468.91, β)	415.2
95% Gamma Approximate UCL	0.122	95% Gamma Adjusted UCL	0.124

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.11	SD (KM)	0.028
Variance (KM)	7.8524E-4	SE of Mean (KM)	0.00749
k hat (KM)	15.32	k star (KM)	12.8
nu hat (KM)	551.4	nu star (KM)	460.8
theta hat (KM)	0.00716	theta star (KM)	0.00857
80% gamma percentile (KM)	0.134	90% gamma percentile (KM)	0.15
95% gamma percentile (KM)	0.164	99% gamma percentile (KM)	0.193

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (460.83, α)	412.1	Adjusted Chi Square Value (460.83, β)	407.6
95% KM Approximate Gamma UCL	0.123	95% KM Adjusted Gamma UCL	0.124

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.841	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.901	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.266	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.202	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.109	Mean in Log Scale	-2.247
SD in Original Scale	0.0274	SD in Log Scale	0.27
95% t UCL (assumes normality of ROS data)	0.121	95% Percentile Bootstrap UCL	0.12
95% BCA Bootstrap UCL	0.119	95% Bootstrap t UCL	0.119
95% H-UCL (Log ROS)	0.124		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.247	KM Geo Mean	0.106
KM SD (logged)	0.277	95% Critical H Value (KM-Log)	1.837
KM Standard Error of Mean (logged)	0.0741	95% H-UCL (KM -Log)	0.124
KM SD (logged)	0.277	95% Critical H Value (KM-Log)	1.837
KM Standard Error of Mean (logged)	0.0741		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.108
SD in Original Scale	0.0266
95% t UCL (Assumes normality)	0.119

DL/2 Log-Transformed

Mean in Log Scale	-2.256
SD in Log Scale	0.261
95% H-Stat UCL	0.122

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.123
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (boron [mg/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	0.525	Mean	0.574
Maximum	0.683	Median	0.568
SD	0.0382	Std. Error of Mean	0.009
Coefficient of Variation	0.0665	Skewness	1.67

Normal GOF Test

Shapiro Wilk Test Statistic	0.849
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.197
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 0.59

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 0.593
 95% Modified-t UCL (Johnson-1978) 0.59

Gamma GOF Test

A-D Test Statistic	0.844
5% A-D Critical Value	0.737
K-S Test Statistic	0.185
5% K-S Critical Value	0.203

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	254.1	k star (bias corrected MLE)	211.8
Theta hat (MLE)	0.00226	Theta star (bias corrected MLE)	0.00271
nu hat (MLE)	9147	nu star (bias corrected)	7624
MLE Mean (bias corrected)	0.574	MLE Sd (bias corrected)	0.0395
		Approximate Chi Square Value (0.05)	7422
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	7403

Assuming Gamma Distribution

95% Approximate Gamma UCL 0.59 95% Adjusted Gamma UCL 0.591

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.876
10% Shapiro Wilk Critical Value	0.914
Lilliefors Test Statistic	0.182
10% Lilliefors Critical Value	0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Minimum of Logged Data	-0.644	Mean of logged Data	-0.557
Maximum of Logged Data	-0.381	SD of logged Data	0.0637

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	0.6
95% Chebyshev (MVUE) UCL	0.612	97.5% Chebyshev (MVUE) UCL	0.628
99% Chebyshev (MVUE) UCL	0.66		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.589	95% BCA Bootstrap UCL	0.593
95% Standard Bootstrap UCL	0.589	95% Bootstrap-t UCL	0.601
95% Hall's Bootstrap UCL	0.679	95% Percentile Bootstrap UCL	0.589
90% Chebyshev(Mean, Sd) UCL	0.601	95% Chebyshev(Mean, Sd) UCL	0.613
97.5% Chebyshev(Mean, Sd) UCL	0.63	99% Chebyshev(Mean, Sd) UCL	0.664

Suggested UCL to Use

95% Student's-t UCL 0.59

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cadmium [ug/l]_intraWell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intraWell_apw-02) was not processed!

x_ols (cadmium [ug/l]_intraWell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-03) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-05/05r)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-05/05r) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-06d)

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	18
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-06d) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-06s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-06s) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-07)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	1

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-07) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-08) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-10d) was not processed!

x_ols (cadmium [ug/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cadmium [ug/l]_intrawell_apw-10s) was not processed!

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (calcium [mg/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	132	Mean	155.6
Maximum	198	Median	156
SD	18.73	Std. Error of Mean	4.297
Coefficient of Variation	0.12	Skewness	0.726

Normal GOF Test

Shapiro Wilk Test Statistic	0.936
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.132
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 163.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 163.5
 95% Modified-t UCL (Johnson-1978) 163.2

Gamma GOF Test

A-D Test Statistic	0.342
5% A-D Critical Value	0.739
K-S Test Statistic	0.127
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	75.71	k star (bias corrected MLE)	63.79
Theta hat (MLE)	2.056	Theta star (bias corrected MLE)	2.44
nu hat (MLE)	2877	nu star (bias corrected)	2424
MLE Mean (bias corrected)	155.6	MLE Sd (bias corrected)	19.49
		Approximate Chi Square Value (0.05)	2311
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2301

Assuming Gamma Distribution

95% Approximate Gamma UCL 163.3

95% Adjusted Gamma UCL 164

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.95
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.119
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.883	Mean of logged Data	5.041
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Maximum of Logged Data 5.288

SD of logged Data 0.117

Assuming Lognormal Distribution

95% H-UCL	163.3	90% Chebyshev (MVUE) UCL	168.2
95% Chebyshev (MVUE) UCL	173.9	97.5% Chebyshev (MVUE) UCL	181.8
99% Chebyshev (MVUE) UCL	197.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	162.7	95% BCA Bootstrap UCL	163.4
95% Standard Bootstrap UCL	162.6	95% Bootstrap-t UCL	164.5
95% Hall's Bootstrap UCL	164.8	95% Percentile Bootstrap UCL	162.6
90% Chebyshev(Mean, Sd) UCL	168.5	95% Chebyshev(Mean, Sd) UCL	174.4
97.5% Chebyshev(Mean, Sd) UCL	182.5	99% Chebyshev(Mean, Sd) UCL	198.4

Suggested UCL to Use

95% Student's-t UCL 163.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (calcium [mg/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	111.8	Mean	131.3
Maximum	165.4	Median	125.6
SD	14.52	Std. Error of Mean	3.331
Coefficient of Variation	0.111	Skewness	0.951

Normal GOF Test

Shapiro Wilk Test Statistic	0.906
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.219
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 137.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 137.5

95% Modified-t UCL (Johnson-1978) 137.2

Gamma GOF Test

A-D Test Statistic	0.713
5% A-D Critical Value	0.738

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

K-S Test Statistic 0.215 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.198 Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	90.78	k star (bias corrected MLE)	76.48
Theta hat (MLE)	1.446	Theta star (bias corrected MLE)	1.717
nu hat (MLE)	3450	nu star (bias corrected)	2906
MLE Mean (bias corrected)	131.3	MLE Sd (bias corrected)	15.01
		Approximate Chi Square Value (0.05)	2782
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2772

Assuming Gamma Distribution

95% Approximate Gamma UCL 137.2 95% Adjusted Gamma UCL 137.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.926	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.208	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.717	Mean of logged Data	4.872
Maximum of Logged Data	5.109	SD of logged Data	0.107

Assuming Lognormal Distribution

95% H-UCL	137.2	90% Chebyshev (MVUE) UCL	140.9
95% Chebyshev (MVUE) UCL	145.3	97.5% Chebyshev (MVUE) UCL	151.4
99% Chebyshev (MVUE) UCL	163.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	136.8	95% BCA Bootstrap UCL	137.9
95% Standard Bootstrap UCL	136.6	95% Bootstrap-t UCL	137.8
95% Hall's Bootstrap UCL	137.4	95% Percentile Bootstrap UCL	137
90% Chebyshev(Mean, Sd) UCL	141.3	95% Chebyshev(Mean, Sd) UCL	145.8
97.5% Chebyshev(Mean, Sd) UCL	152.1	99% Chebyshev(Mean, Sd) UCL	164.4

Suggested UCL to Use

95% Student's-t UCL 137.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	73.71	Mean	110.8
Maximum	139.8	Median	111
SD	14.31	Std. Error of Mean	3.283
Coefficient of Variation	0.129	Skewness	-0.389

Normal GOF Test

Shapiro Wilk Test Statistic 0.954
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.137
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 116.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 115.9
 95% Modified-t UCL (Johnson-1978) 116.5

Gamma GOF Test

A-D Test Statistic 0.444
 5% A-D Critical Value 0.74
 K-S Test Statistic 0.145
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	59.42	k star (bias corrected MLE)	50.07
Theta hat (MLE)	1.865	Theta star (bias corrected MLE)	2.214
nu hat (MLE)	2258	nu star (bias corrected)	1903
MLE Mean (bias corrected)	110.8	MLE Sd (bias corrected)	15.66
		Approximate Chi Square Value (0.05)	1802
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1794

Assuming Gamma Distribution

95% Approximate Gamma UCL 117

95% Adjusted Gamma UCL 117.6

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.916
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.158
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.3	Mean of logged Data	4.7
Maximum of Logged Data	4.94	SD of logged Data	0.136

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	117.3	90% Chebyshev (MVUE) UCL	121.3
95% Chebyshev (MVUE) UCL	126	97.5% Chebyshev (MVUE) UCL	132.6
99% Chebyshev (MVUE) UCL	145.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	116.2	95% BCA Bootstrap UCL	116.2
95% Standard Bootstrap UCL	116.1	95% Bootstrap-t UCL	116.5
95% Hall's Bootstrap UCL	116.7	95% Percentile Bootstrap UCL	115.9
90% Chebyshev(Mean, Sd) UCL	120.7	95% Chebyshev(Mean, Sd) UCL	125.1
97.5% Chebyshev(Mean, Sd) UCL	131.3	99% Chebyshev(Mean, Sd) UCL	143.5

Suggested UCL to Use

95% Student's-t UCL 116.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (calcium [mg/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	100	Mean	116.8
Maximum	130.4	Median	117.1
SD	7.33	Std. Error of Mean	1.728
Coefficient of Variation	0.0628	Skewness	-0.299

Normal GOF Test

Shapiro Wilk Test Statistic 0.986
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.107
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 119.8

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 119.5
 95% Modified-t UCL (Johnson-1978) 119.8

Gamma GOF Test

A-D Test Statistic 0.168

Anderson-Darling Gamma GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

5% A-D Critical Value 0.737 Detected data appear Gamma Distributed at 5% Significance Level
 K-S Test Statistic 0.107 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.203 Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	264.5	k star (bias corrected MLE)	220.5
Theta hat (MLE)	0.442	Theta star (bias corrected MLE)	0.53
nu hat (MLE)	9523	nu star (bias corrected)	7937
MLE Mean (bias corrected)	116.8	MLE Sd (bias corrected)	7.866
		Approximate Chi Square Value (0.05)	7731
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	7712

Assuming Gamma Distribution

95% Approximate Gamma UCL	119.9	95% Adjusted Gamma UCL	120.2
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.116	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.185	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.605	Mean of logged Data	4.759
Maximum of Logged Data	4.87	SD of logged Data	0.0636

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	122.1
95% Chebyshev (MVUE) UCL	124.4	97.5% Chebyshev (MVUE) UCL	127.7
99% Chebyshev (MVUE) UCL	134.2		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	119.6	95% BCA Bootstrap UCL	119.5
95% Standard Bootstrap UCL	119.6	95% Bootstrap-t UCL	119.7
95% Hall's Bootstrap UCL	119.7	95% Percentile Bootstrap UCL	119.5
90% Chebyshev(Mean, Sd) UCL	122	95% Chebyshev(Mean, Sd) UCL	124.3
97.5% Chebyshev(Mean, Sd) UCL	127.6	99% Chebyshev(Mean, Sd) UCL	134

Suggested UCL to Use

95% Student's-t UCL 119.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (calcium [mg/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	91.91	Mean	111.2
Maximum	131.2	Median	111.9
SD	9.861	Std. Error of Mean	2.262
Coefficient of Variation	0.0887	Skewness	-0.0477

Normal GOF Test

Shapiro Wilk Test Statistic	0.974	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.156	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 115.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 114.9
 95% Modified-t UCL (Johnson-1978) 115.1

Gamma GOF Test

A-D Test Statistic	0.329	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.168	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	132.7	k star (bias corrected MLE)	111.7
Theta hat (MLE)	0.838	Theta star (bias corrected MLE)	0.995
nu hat (MLE)	5041	nu star (bias corrected)	4246
MLE Mean (bias corrected)	111.2	MLE Sd (bias corrected)	10.52
		Approximate Chi Square Value (0.05)	4096
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	4083

Assuming Gamma Distribution

95% Approximate Gamma UCL 115.3 95% Adjusted Gamma UCL 115.6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.173	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal Statistics

Minimum of Logged Data	4.521	Mean of logged Data	4.708
Maximum of Logged Data	4.877	SD of logged Data	0.0896

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	118.1
95% Chebyshev (MVUE) UCL	121.2	97.5% Chebyshev (MVUE) UCL	125.5
99% Chebyshev (MVUE) UCL	134		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	114.9	95% BCA Bootstrap UCL	114.8
95% Standard Bootstrap UCL	114.9	95% Bootstrap-t UCL	115.4
95% Hall's Bootstrap UCL	115.5	95% Percentile Bootstrap UCL	114.8
90% Chebyshev(Mean, Sd) UCL	118	95% Chebyshev(Mean, Sd) UCL	121.1
97.5% Chebyshev(Mean, Sd) UCL	125.3	99% Chebyshev(Mean, Sd) UCL	133.7

Suggested UCL to Use

95% Student's-t UCL 115.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (calcium [mg/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	161	Mean	196.3
Maximum	238	Median	193
SD	18.02	Std. Error of Mean	4.133
Coefficient of Variation	0.0918	Skewness	0.249

Normal GOF Test

Shapiro Wilk Test Statistic 0.985
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.0993
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 203.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 203.4

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Modified-t UCL (Johnson-1978) 203.5

Gamma GOF Test

A-D Test Statistic 0.167
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.0901
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 125.7
 Theta hat (MLE) 1.562
 nu hat (MLE) 4776
 MLE Mean (bias corrected) 196.3
 Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 105.9
 Theta star (bias corrected MLE) 1.854
 nu star (bias corrected) 4024
 MLE Sd (bias corrected) 19.08
 Approximate Chi Square Value (0.05) 3877
 Adjusted Chi Square Value 3865

Assuming Gamma Distribution

95% Approximate Gamma UCL 203.7

95% Adjusted Gamma UCL 204.4

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.988
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.0833
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 5.081
 Maximum of Logged Data 5.472

Mean of logged Data 5.276
 SD of logged Data 0.0918

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 214.4
 99% Chebyshev (MVUE) UCL 237.5

90% Chebyshev (MVUE) UCL 208.7
 97.5% Chebyshev (MVUE) UCL 222.2

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 203.1
 95% Standard Bootstrap UCL 203
 95% Hall's Bootstrap UCL 204.6
 90% Chebyshev(Mean, Sd) UCL 208.7
 97.5% Chebyshev(Mean, Sd) UCL 222.1

95% BCA Bootstrap UCL 203.2
 95% Bootstrap-t UCL 204.1
 95% Percentile Bootstrap UCL 202.9
 95% Chebyshev(Mean, Sd) UCL 214.3
 99% Chebyshev(Mean, Sd) UCL 237.4

Suggested UCL to Use

95% Student's-t UCL 203.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (calcium [mg/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	79.4	Mean	93.05
Maximum	105	Median	95
SD	8.105	Std. Error of Mean	1.859
Coefficient of Variation	0.0871	Skewness	-0.336

Normal GOF Test

Shapiro Wilk Test Statistic	0.922	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.178	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	96.27	95% Adjusted-CLT UCL (Chen-1995)	95.95
		95% Modified-t UCL (Johnson-1978)	96.25

Gamma GOF Test

A-D Test Statistic	0.684	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.188	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	136.1	k star (bias corrected MLE)	114.6
Theta hat (MLE)	0.684	Theta star (bias corrected MLE)	0.812
nu hat (MLE)	5170	nu star (bias corrected)	4355
MLE Mean (bias corrected)	93.05	MLE Sd (bias corrected)	8.691
		Approximate Chi Square Value (0.05)	4203
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	4190

Assuming Gamma Distribution

95% Approximate Gamma UCL	96.42	95% Adjusted Gamma UCL	96.72
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.915	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.185	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal Statistics

Minimum of Logged Data	4.374	Mean of logged Data	4.529
Maximum of Logged Data	4.654	SD of logged Data	0.0887

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	98.74
95% Chebyshev (MVUE) UCL	101.3	97.5% Chebyshev (MVUE) UCL	104.9
99% Chebyshev (MVUE) UCL	111.9		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	96.11	95% BCA Bootstrap UCL	95.92
95% Standard Bootstrap UCL	96.05	95% Bootstrap-t UCL	96.23
95% Hall's Bootstrap UCL	95.97	95% Percentile Bootstrap UCL	95.99
90% Chebyshev(Mean, Sd) UCL	98.63	95% Chebyshev(Mean, Sd) UCL	101.2
97.5% Chebyshev(Mean, Sd) UCL	104.7	99% Chebyshev(Mean, Sd) UCL	111.5

Suggested UCL to Use

95% Student's-t UCL 96.27

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (calcium [mg/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	98.5	Mean	163.3
Maximum	611	Median	124
SD	123	Std. Error of Mean	28.22
Coefficient of Variation	0.753	Skewness	3.266

Normal GOF Test

Shapiro Wilk Test Statistic 0.445
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.444
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% UCLs (Adjusted for Skewness)

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Student's-t UCL	212.3	95% Adjusted-CLT UCL (Chen-1995)	232.3
		95% Modified-t UCL (Johnson-1978)	215.8

Gamma GOF Test

A-D Test Statistic	4.157	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.404	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.199	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.932	k star (bias corrected MLE)	3.346
Theta hat (MLE)	41.54	Theta star (bias corrected MLE)	48.81
nu hat (MLE)	149.4	nu star (bias corrected)	127.2
MLE Mean (bias corrected)	163.3	MLE Sd (bias corrected)	89.29
		Approximate Chi Square Value (0.05)	102.1
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	100.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	203.4	95% Adjusted Gamma UCL	207.4
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.557	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.364	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.59	Mean of logged Data	4.963
Maximum of Logged Data	6.415	SD of logged Data	0.441

Assuming Lognormal Distribution

95% H-UCL	193.3	90% Chebyshev (MVUE) UCL	205.8
95% Chebyshev (MVUE) UCL	228	97.5% Chebyshev (MVUE) UCL	258.8
99% Chebyshev (MVUE) UCL	319.3		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	209.8	95% BCA Bootstrap UCL	239.3
95% Standard Bootstrap UCL	209.7	95% Bootstrap-t UCL	637.2
95% Hall's Bootstrap UCL	530.7	95% Percentile Bootstrap UCL	215.2
90% Chebyshev(Mean, Sd) UCL	248	95% Chebyshev(Mean, Sd) UCL	286.3
97.5% Chebyshev(Mean, Sd) UCL	339.5	99% Chebyshev(Mean, Sd) UCL	444.1

Suggested UCL to Use

95% Student's-t UCL 212.3

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (calcium [mg/l]_intraWell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	129	Mean	149.4
Maximum	171	Median	150
SD	12.05	Std. Error of Mean	2.765
Coefficient of Variation	0.0807	Skewness	0.0406

Normal GOF Test

Shapiro Wilk Test Statistic	0.956	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.147	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 154.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 154
 95% Modified-t UCL (Johnson-1978) 154.2

Gamma GOF Test

A-D Test Statistic	0.374	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	161.8	k star (bias corrected MLE)	136.3
Theta hat (MLE)	0.924	Theta star (bias corrected MLE)	1.096
nu hat (MLE)	6148	nu star (bias corrected)	5178
MLE Mean (bias corrected)	149.4	MLE Sd (bias corrected)	12.8
		Approximate Chi Square Value (0.05)	5012
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	4998

Assuming Gamma Distribution

95% Approximate Gamma UCL 154.4 95% Adjusted Gamma UCL 154.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.147	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level	

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.86	Mean of logged Data	5.004
Maximum of Logged Data	5.142	SD of logged Data	0.0809

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	157.8
95% Chebyshev (MVUE) UCL	161.5	97.5% Chebyshev (MVUE) UCL	166.8
99% Chebyshev (MVUE) UCL	177		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	154	95% BCA Bootstrap UCL	153.8
95% Standard Bootstrap UCL	153.9	95% Bootstrap-t UCL	154.7
95% Hall's Bootstrap UCL	154.3	95% Percentile Bootstrap UCL	153.8
90% Chebyshev(Mean, Sd) UCL	157.7	95% Chebyshev(Mean, Sd) UCL	161.5
97.5% Chebyshev(Mean, Sd) UCL	166.7	99% Chebyshev(Mean, Sd) UCL	176.9

Suggested UCL to Use

95% Student's-t UCL 154.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	5.093	Minimum Non-Detect	10
Maximum Detect	9.691	Maximum Non-Detect	10
Variance Detects	1.101	Percent Non-Detects	5.263%
Mean Detects	7.455	SD Detects	1.049
Median Detects	7.557	CV Detects	0.141
Skewness Detects	-0.112	Kurtosis Detects	1.055
Mean of Logged Detects	1.999	SD of Logged Detects	0.146

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.954	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.858	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.197	Lilliefors GOF Test
1% Lilliefors Critical Value	0.235	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM Mean	7.455	KM Standard Error of Mean	0.247
90KM SD	1.02	95% KM (BCA) UCL	7.836
95% KM (t) UCL	7.884	95% KM (Percentile Bootstrap) UCL	7.849
95% KM (z) UCL	7.862	95% KM Bootstrap t UCL	7.886
90% KM Chebyshev UCL	8.197	95% KM Chebyshev UCL	8.533
97.5% KM Chebyshev UCL	9	99% KM Chebyshev UCL	9.916

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.559	Anderson-Darling GOF Test	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.182	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.203	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only

k hat (MLE)	51.35	k star (bias corrected MLE)	42.83
Theta hat (MLE)	0.145	Theta star (bias corrected MLE)	0.174
nu hat (MLE)	1849	nu star (bias corrected)	1542
Mean (detects)	7.455		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.093	Mean	7.453
Maximum	9.691	Median	7.536
SD	1.02	CV	0.137
k hat (MLE)	54.19	k star (bias corrected MLE)	45.67
Theta hat (MLE)	0.138	Theta star (bias corrected MLE)	0.163
nu hat (MLE)	2059	nu star (bias corrected)	1735
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	1640	Adjusted Chi Square Value (N/A, β)	1632
95% Gamma Approximate UCL	7.888	95% Gamma Adjusted UCL	7.928

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	7.455	SD (KM)	1.02
Variance (KM)	1.04	SE of Mean (KM)	0.247
k hat (KM)	53.47	k star (KM)	45.06
nu hat (KM)	2032	nu star (KM)	1712
theta hat (KM)	0.139	theta star (KM)	0.165
80% gamma percentile (KM)	8.37	90% gamma percentile (KM)	8.909
95% gamma percentile (KM)	9.371	99% gamma percentile (KM)	10.28

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1617	Adjusted Chi Square Value (N/A, β)	1609
95% KM Approximate Gamma UCL	7.894	95% KM Adjusted Gamma UCL	7.933

Lognormal GOF Test on Detected Observations Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.936	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.192	Lilliefors GOF Test
10% Lilliefors Critical Value	0.185	Detected Data Not Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.451	Mean in Log Scale	1.999
SD in Original Scale	1.02	SD in Log Scale	0.142
95% t UCL (assumes normality of ROS data)	7.857	95% Percentile Bootstrap UCL	7.83
95% BCA Bootstrap UCL	7.804	95% Bootstrap t UCL	7.861
95% H-UCL (Log ROS)	7.906		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.999	KM Geo Mean	7.383
KM SD (logged)	0.142	95% Critical H Value (KM-Log)	1.749
KM Standard Error of Mean (logged)	0.0344	95% H-UCL (KM -Log)	7.906
KM SD (logged)	0.142	95% Critical H Value (KM-Log)	1.749
KM Standard Error of Mean (logged)	0.0344		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 7.326
 SD in Original Scale 1.165
 95% t UCL (Assumes normality) 7.789

DL/2 Log-Transformed

Mean in Log Scale 1.979
 SD in Log Scale 0.168
 95% H-Stat UCL 7.864

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 7.884

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	7.221	Mean	13.55
Maximum	19.17	Median	13.76
SD	3.106	Std. Error of Mean	0.713
Coefficient of Variation	0.229	Skewness	-0.206

Normal GOF Test

Shapiro Wilk Test Statistic 0.984

Shapiro Wilk GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.118	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 14.79

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	14.69
95% Modified-t UCL (Johnson-1978)	14.78

Gamma GOF Test

A-D Test Statistic	0.283
5% A-D Critical Value	0.74
K-S Test Statistic	0.15
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	18.33	k star (bias corrected MLE)	15.47
Theta hat (MLE)	0.739	Theta star (bias corrected MLE)	0.876
nu hat (MLE)	696.4	nu star (bias corrected)	587.8
MLE Mean (bias corrected)	13.55	MLE Sd (bias corrected)	3.445
Adjusted Level of Significance	0.0369	Approximate Chi Square Value (0.05)	532.6
		Adjusted Chi Square Value	528

Assuming Gamma Distribution

95% Approximate Gamma UCL	14.96	95% Adjusted Gamma UCL	15.09
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.951
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.163
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.977	Mean of logged Data	2.579
Maximum of Logged Data	2.953	SD of logged Data	0.249

Assuming Lognormal Distribution

95% H-UCL	15.12	90% Chebyshev (MVUE) UCL	15.92
95% Chebyshev (MVUE) UCL	16.98	97.5% Chebyshev (MVUE) UCL	18.45
99% Chebyshev (MVUE) UCL	21.35		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	14.72	95% BCA Bootstrap UCL	14.62
95% Standard Bootstrap UCL	14.69	95% Bootstrap-t UCL	14.79

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Hall's Bootstrap UCL	14.76	95% Percentile Bootstrap UCL	14.64
90% Chebyshev(Mean, Sd) UCL	15.69	95% Chebyshev(Mean, Sd) UCL	16.66
97.5% Chebyshev(Mean, Sd) UCL	18	99% Chebyshev(Mean, Sd) UCL	20.64

Suggested UCL to Use

95% Student's-t UCL 14.79

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (chloride [mg/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	14.53	Mean	18.66
Maximum	28.16	Median	18.54
SD	2.753	Std. Error of Mean	0.631
Coefficient of Variation	0.148	Skewness	2.209

Normal GOF Test

Shapiro Wilk Test Statistic	0.775
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.239
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 19.75

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	20.04
95% Modified-t UCL (Johnson-1978)	19.8

Gamma GOF Test

A-D Test Statistic	0.986
5% A-D Critical Value	0.74
K-S Test Statistic	0.211
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	55.77	k star (bias corrected MLE)	47
Theta hat (MLE)	0.335	Theta star (bias corrected MLE)	0.397
nu hat (MLE)	2119	nu star (bias corrected)	1786
MLE Mean (bias corrected)	18.66	MLE Sd (bias corrected)	2.721
		Approximate Chi Square Value (0.05)	1689

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Adjusted Level of Significance 0.0369 Adjusted Chi Square Value 1681

Assuming Gamma Distribution

95% Approximate Gamma UCL 19.73 95% Adjusted Gamma UCL 19.83

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.854
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.206
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 2.677 Mean of logged Data 2.917
 Maximum of Logged Data 3.338 SD of logged Data 0.134

Assuming Lognormal Distribution

95% H-UCL 19.71 90% Chebyshev (MVUE) UCL 20.37
 95% Chebyshev (MVUE) UCL 21.15 97.5% Chebyshev (MVUE) UCL 22.23
 99% Chebyshev (MVUE) UCL 24.36

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 19.7 95% BCA Bootstrap UCL 19.97
 95% Standard Bootstrap UCL 19.65 95% Bootstrap-t UCL 20.18
 95% Hall's Bootstrap UCL 25.15 95% Percentile Bootstrap UCL 19.73
 90% Chebyshev(Mean, Sd) UCL 20.55 95% Chebyshev(Mean, Sd) UCL 21.41
 97.5% Chebyshev(Mean, Sd) UCL 22.6 99% Chebyshev(Mean, Sd) UCL 24.94

Suggested UCL to Use

95% Student's-t UCL 19.75

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	14	Mean	16.91
Maximum	22	Median	16
SD	2.314	Std. Error of Mean	0.545
Coefficient of Variation	0.137	Skewness	1.353

Normal GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.798	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.858	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.318	Lilliefors GOF Test
1% Lilliefors Critical Value	0.235	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	17.86	95% Adjusted-CLT UCL (Chen-1995)	17.99
		95% Modified-t UCL (Johnson-1978)	17.89

Gamma GOF Test

A-D Test Statistic	1.454	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.738	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.3	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.203	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	61.91	k star (bias corrected MLE)	51.62
Theta hat (MLE)	0.273	Theta star (bias corrected MLE)	0.328
nu hat (MLE)	2229	nu star (bias corrected)	1858
MLE Mean (bias corrected)	16.91	MLE Sd (bias corrected)	2.354
		Approximate Chi Square Value (0.05)	1759
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	1750

Assuming Gamma Distribution

95% Approximate Gamma UCL	17.86	95% Adjusted Gamma UCL	17.96
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.836	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.914	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.292	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.185	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.639	Mean of logged Data	2.82
Maximum of Logged Data	3.091	SD of logged Data	0.128

Assuming Lognormal Distribution

95% H-UCL	17.86	90% Chebyshev (MVUE) UCL	18.44
95% Chebyshev (MVUE) UCL	19.14	97.5% Chebyshev (MVUE) UCL	20.1
99% Chebyshev (MVUE) UCL	22		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	17.81	95% BCA Bootstrap UCL	17.93
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Standard Bootstrap UCL	17.77	95% Bootstrap-t UCL	18.13
95% Hall's Bootstrap UCL	17.89	95% Percentile Bootstrap UCL	17.82
90% Chebyshev(Mean, Sd) UCL	18.55	95% Chebyshev(Mean, Sd) UCL	19.29
97.5% Chebyshev(Mean, Sd) UCL	20.32	99% Chebyshev(Mean, Sd) UCL	22.34

Suggested UCL to Use

95% Student's-t UCL 17.86

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	19.02	Mean	21.14
Maximum	24.64	Median	21
SD	1.424	Std. Error of Mean	0.327
Coefficient of Variation	0.0673	Skewness	0.596

Normal GOF Test

Shapiro Wilk Test Statistic	0.963
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.112
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 21.71

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	21.73
95% Modified-t UCL (Johnson-1978)	21.71

Gamma GOF Test

A-D Test Statistic	0.198
5% A-D Critical Value	0.738
K-S Test Statistic	0.103
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	237.1	k star (bias corrected MLE)	199.7
Theta hat (MLE)	0.0892	Theta star (bias corrected MLE)	0.106
nu hat (MLE)	9010	nu star (bias corrected)	7589
MLE Mean (bias corrected)	21.14	MLE Sd (bias corrected)	1.496
		Approximate Chi Square Value (0.05)	7387
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	7370

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
From File filec804af5b2f.xls
Full Precision OFF
Confidence Coefficient 95%
Number of Bootstrap Operations 2000

Assuming Gamma Distribution

95% Approximate Gamma UCL 21.72 95% Adjusted Gamma UCL 21.77

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.972	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0995	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.946	Mean of logged Data	3.049
Maximum of Logged Data	3.205	SD of logged Data	0.0665

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	22.11
95% Chebyshev (MVUE) UCL	22.55	97.5% Chebyshev (MVUE) UCL	23.16
99% Chebyshev (MVUE) UCL	24.35		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	21.68	95% BCA Bootstrap UCL	21.77
95% Standard Bootstrap UCL	21.66	95% Bootstrap-t UCL	21.78
95% Hall's Bootstrap UCL	21.82	95% Percentile Bootstrap UCL	21.66
90% Chebyshev(Mean, Sd) UCL	22.12	95% Chebyshev(Mean, Sd) UCL	22.56
97.5% Chebyshev(Mean, Sd) UCL	23.18	99% Chebyshev(Mean, Sd) UCL	24.39

Suggested UCL to Use

95% Student's-t UCL 21.71

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	8.252	Mean	10.22
Maximum	12.81	Median	10.27
SD	1.009	Std. Error of Mean	0.232
Coefficient of Variation	0.0988	Skewness	0.541

Normal GOF Test

Shapiro Wilk Test Statistic	0.962	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lilliefors Test Statistic 0.122 **Lilliefors GOF Test**
 1% Lilliefors Critical Value 0.229 Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 10.62

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 10.63
 95% Modified-t UCL (Johnson-1978) 10.62

Gamma GOF Test

A-D Test Statistic 0.292 **Anderson-Darling Gamma GOF Test**
 5% A-D Critical Value 0.738 Detected data appear Gamma Distributed at 5% Significance Level
 K-S Test Statistic 0.132 **Kolmogorov-Smirnov Gamma GOF Test**
 5% K-S Critical Value 0.198 Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	110	k star (bias corrected MLE)	92.66
Theta hat (MLE)	0.0929	Theta star (bias corrected MLE)	0.11
nu hat (MLE)	4180	nu star (bias corrected)	3521
MLE Mean (bias corrected)	10.22	MLE Sd (bias corrected)	1.061
		Approximate Chi Square Value (0.05)	3384
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	3372

Assuming Gamma Distribution

95% Approximate Gamma UCL 10.63 95% Adjusted Gamma UCL 10.67

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.974 **Shapiro Wilk Lognormal GOF Test**
 10% Shapiro Wilk Critical Value 0.917 Data appear Lognormal at 10% Significance Level
 Lilliefors Test Statistic 0.14 **Lilliefors Lognormal GOF Test**
 10% Lilliefors Critical Value 0.18 Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.11	Mean of logged Data	2.319
Maximum of Logged Data	2.55	SD of logged Data	0.0978

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	10.91
95% Chebyshev (MVUE) UCL	11.22	97.5% Chebyshev (MVUE) UCL	11.65
99% Chebyshev (MVUE) UCL	12.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	10.6	95% BCA Bootstrap UCL	10.64
95% Standard Bootstrap UCL	10.59	95% Bootstrap-t UCL	10.64
95% Hall's Bootstrap UCL	10.7	95% Percentile Bootstrap UCL	10.62

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

90% Chebyshev(Mean, Sd) UCL	10.91	95% Chebyshev(Mean, Sd) UCL	11.23
97.5% Chebyshev(Mean, Sd) UCL	11.66	99% Chebyshev(Mean, Sd) UCL	12.52

Suggested UCL to Use

95% Student's-t UCL 10.62

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	8.61	Mean	10.39
Maximum	13	Median	10
SD	1.143	Std. Error of Mean	0.262
Coefficient of Variation	0.11	Skewness	0.537

Normal GOF Test

Shapiro Wilk Test Statistic 0.938
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.159
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 10.84

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 10.85
 95% Modified-t UCL (Johnson-1978) 10.85

Gamma GOF Test

A-D Test Statistic 0.522
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.163
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	89.13	k star (bias corrected MLE)	75.09
Theta hat (MLE)	0.117	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	3387	nu star (bias corrected)	2853
MLE Mean (bias corrected)	10.39	MLE Sd (bias corrected)	1.199
		Approximate Chi Square Value (0.05)	2730
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2720

Assuming Gamma Distribution

95% Approximate Gamma UCL 10.86

95% Adjusted Gamma UCL 10.9

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.172	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.153	Mean of logged Data	2.335
Maximum of Logged Data	2.565	SD of logged Data	0.108

Assuming Lognormal Distribution

95% H-UCL	10.86	90% Chebyshev (MVUE) UCL	11.16
95% Chebyshev (MVUE) UCL	11.52	97.5% Chebyshev (MVUE) UCL	12.01
99% Chebyshev (MVUE) UCL	12.96		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	10.82	95% BCA Bootstrap UCL	10.85
95% Standard Bootstrap UCL	10.82	95% Bootstrap-t UCL	10.89
95% Hall's Bootstrap UCL	10.89	95% Percentile Bootstrap UCL	10.84
90% Chebyshev(Mean, Sd) UCL	11.18	95% Chebyshev(Mean, Sd) UCL	11.53
97.5% Chebyshev(Mean, Sd) UCL	12.03	99% Chebyshev(Mean, Sd) UCL	13

Suggested UCL to Use

95% Student's-t UCL 10.84

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	9.606	Mean	14.36
Maximum	25.46	Median	13.55
SD	3.794	Std. Error of Mean	0.87
Coefficient of Variation	0.264	Skewness	1.636

Normal GOF Test

Shapiro Wilk Test Statistic	0.844	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.261	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data Not Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 15.87

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 16.14
 95% Modified-t UCL (Johnson-1978) 15.93

Gamma GOF Test

A-D Test Statistic 0.694
 5% A-D Critical Value 0.74
 K-S Test Statistic 0.223
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.69	k star (bias corrected MLE)	14.93
Theta hat (MLE)	0.812	Theta star (bias corrected MLE)	0.962
nu hat (MLE)	672.3	nu star (bias corrected)	567.5
MLE Mean (bias corrected)	14.36	MLE Sd (bias corrected)	3.717
		Approximate Chi Square Value (0.05)	513.2
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	508.7

Assuming Gamma Distribution

95% Approximate Gamma UCL 15.88 95% Adjusted Gamma UCL 16.02

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.926
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.209
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.262	Mean of logged Data	2.636
Maximum of Logged Data	3.237	SD of logged Data	0.238

Assuming Lognormal Distribution

95% H-UCL	15.89	90% Chebyshev (MVUE) UCL	16.71
95% Chebyshev (MVUE) UCL	17.79	97.5% Chebyshev (MVUE) UCL	19.28
99% Chebyshev (MVUE) UCL	22.21		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	15.8	95% BCA Bootstrap UCL	16.22
95% Standard Bootstrap UCL	15.79	95% Bootstrap-t UCL	16.69
95% Hall's Bootstrap UCL	24.47	95% Percentile Bootstrap UCL	15.87
90% Chebyshev(Mean, Sd) UCL	16.97	95% Chebyshev(Mean, Sd) UCL	18.16
97.5% Chebyshev(Mean, Sd) UCL	19.8	99% Chebyshev(Mean, Sd) UCL	23.02

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% Adjusted Gamma UCL 16.02

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chloride [mg/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	10.45	Mean	16.46
Maximum	23.32	Median	15.55
SD	3.147	Std. Error of Mean	0.722
Coefficient of Variation	0.191	Skewness	0.385

Normal GOF Test

Shapiro Wilk Test Statistic	0.951
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.179
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 17.71

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	17.71
95% Modified-t UCL (Johnson-1978)	17.72

Gamma GOF Test

A-D Test Statistic	0.503
5% A-D Critical Value	0.74
K-S Test Statistic	0.193
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	28.83	k star (bias corrected MLE)	24.32
Theta hat (MLE)	0.571	Theta star (bias corrected MLE)	0.677
nu hat (MLE)	1096	nu star (bias corrected)	924
MLE Mean (bias corrected)	16.46	MLE Sd (bias corrected)	3.338
		Approximate Chi Square Value (0.05)	854.4
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	848.6

Assuming Gamma Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.507	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.851	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.395	Lilliefors GOF Test
1% Lilliefors Critical Value	0.241	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	9.299	KM Standard Error of Mean	4.656
90KM SD	19.69	95% KM (BCA) UCL	18.52
95% KM (t) UCL	17.37	95% KM (Percentile Bootstrap) UCL	17.64
95% KM (z) UCL	16.96	95% KM Bootstrap t UCL	42.33
90% KM Chebyshev UCL	23.27	95% KM Chebyshev UCL	29.59
97.5% KM Chebyshev UCL	38.38	99% KM Chebyshev UCL	55.63

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.927	Anderson-Darling GOF Test
5% A-D Critical Value	0.806	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.342	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.222	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.462	k star (bias corrected MLE)	0.419
Theta hat (MLE)	22.25	Theta star (bias corrected MLE)	24.49
nu hat (MLE)	15.69	nu star (bias corrected)	14.26
Mean (detects)	10.27		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	9.192
Maximum	72.27	Median	1
SD	20.28	CV	2.206
k hat (MLE)	0.369	k star (bias corrected MLE)	0.346
Theta hat (MLE)	24.93	Theta star (bias corrected MLE)	26.59
nu hat (MLE)	14.01	nu star (bias corrected)	13.13
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (13.13, α)	5.983	Adjusted Chi Square Value (13.13, β)	5.565
95% Gamma Approximate UCL	20.18	95% Gamma Adjusted UCL	21.69

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	9.299	SD (KM)	19.69
Variance (KM)	387.7	SE of Mean (KM)	4.656
k hat (KM)	0.223	k star (KM)	0.223
nu hat (KM)	8.475	nu star (KM)	8.47
theta hat (KM)	41.69	theta star (KM)	41.72
80% gamma percentile (KM)	12.91	90% gamma percentile (KM)	28.08

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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Full Precision OFF
Confidence Coefficient 95%
Number of Bootstrap Operations 2000

95% gamma percentile (KM) 46.53 99% gamma percentile (KM) 96.46

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (8.47, α) 3.01 Adjusted Chi Square Value (8.47, β) 2.732
95% KM Approximate Gamma UCL 26.16 95% KM Adjusted Gamma UCL 28.83

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.684	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.91	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.323	Lilliefors GOF Test
10% Lilliefors Critical Value	0.19	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.341	Mean in Log Scale	0.866
SD in Original Scale	20.21	SD in Log Scale	1.431
95% t UCL (assumes normality of ROS data)	17.38	95% Percentile Bootstrap UCL	17.35
95% BCA Bootstrap UCL	20.2	95% Bootstrap t UCL	42.36
95% H-UCL (Log ROS)	19.94		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.84	KM Geo Mean	2.317
KM SD (logged)	1.399	95% Critical H Value (KM-Log)	3.221
KM Standard Error of Mean (logged)	0.331	95% H-UCL (KM -Log)	17.82
KM SD (logged)	1.399	95% Critical H Value (KM-Log)	3.221
KM Standard Error of Mean (logged)	0.331		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	9.295	Mean in Log Scale	0.837
SD in Original Scale	20.23	SD in Log Scale	1.439
95% t UCL (Assumes normality)	17.34	95% H-Stat UCL	19.81

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 17.37

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	13
Number of Detects	10	Number of Non-Detects	9
Number of Distinct Detects	10	Number of Distinct Non-Detects	3
Minimum Detect	1.9	Minimum Non-Detect	1
Maximum Detect	24.1	Maximum Non-Detect	2
Variance Detects	44	Percent Non-Detects	47.37%
Mean Detects	7.4	SD Detects	6.633
Median Detects	5.15	CV Detects	0.896
Skewness Detects	2.046	Kurtosis Detects	4.714
Mean of Logged Detects	1.713	SD of Logged Detects	0.779

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.772	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.781	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.246	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.304	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.4	KM Standard Error of Mean	1.344
90KM SD	5.556	95% KM (BCA) UCL	6.918
95% KM (t) UCL	6.731	95% KM (Percentile Bootstrap) UCL	6.642
95% KM (z) UCL	6.611	95% KM Bootstrap t UCL	8.802
90% KM Chebyshev UCL	8.433	95% KM Chebyshev UCL	10.26
97.5% KM Chebyshev UCL	12.8	99% KM Chebyshev UCL	17.78

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.338	Anderson-Darling GOF Test	
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.173	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.883	k star (bias corrected MLE)	1.385
Theta hat (MLE)	3.929	Theta star (bias corrected MLE)	5.343
nu hat (MLE)	37.67	nu star (bias corrected)	27.7
Mean (detects)	7.4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.899
Maximum	24.1	Median	1.9
SD	6.031	CV	1.547

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	0.266	k star (bias corrected MLE)	0.259
Theta hat (MLE)	14.65	Theta star (bias corrected MLE)	15.04
nu hat (MLE)	10.12	nu star (bias corrected)	9.854
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (9.85, α)	3.85	Adjusted Chi Square Value (9.85, β)	3.528
95% Gamma Approximate UCL	9.979	95% Gamma Adjusted UCL	10.89

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.4	SD (KM)	5.556
Variance (KM)	30.87	SE of Mean (KM)	1.344
k hat (KM)	0.627	k star (KM)	0.563
nu hat (KM)	23.83	nu star (KM)	21.4
theta hat (KM)	7.016	theta star (KM)	7.812
80% gamma percentile (KM)	7.25	90% gamma percentile (KM)	11.61
95% gamma percentile (KM)	16.2	99% gamma percentile (KM)	27.37

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (21.40, α)	11.89	Adjusted Chi Square Value (21.40, β)	11.27
95% KM Approximate Gamma UCL	7.919	95% KM Adjusted Gamma UCL	8.353

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.135	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.241	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.251	Mean in Log Scale	0.709
SD in Original Scale	5.805	SD in Log Scale	1.27
95% t UCL (assumes normality of ROS data)	6.561	95% Percentile Bootstrap UCL	6.555
95% BCA Bootstrap UCL	7.362	95% Bootstrap t UCL	8.309
95% H-UCL (Log ROS)	11.21		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.924	KM Geo Mean	2.52
KM SD (logged)	0.996	95% Critical H Value (KM-Log)	2.605
KM Standard Error of Mean (logged)	0.243	95% H-UCL (KM -Log)	7.629
KM SD (logged)	0.996	95% Critical H Value (KM-Log)	2.605
KM Standard Error of Mean (logged)	0.243		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	4.263
SD in Original Scale	5.794
95% t UCL (Assumes normality)	6.568

DL/2 Log-Transformed

Mean in Log Scale	0.762
SD in Log Scale	1.187
95% H-Stat UCL	9.728

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% KM (t) UCL 6.731

When a data set follows an approximate distribution passing only one of the GOF tests,
 it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
Number of Detects	7	Number of Non-Detects	12
Number of Distinct Detects	7	Number of Distinct Non-Detects	3
Minimum Detect	2	Minimum Non-Detect	1
Maximum Detect	13.7	Maximum Non-Detect	2
Variance Detects	17.77	Percent Non-Detects	63.16%
Mean Detects	5.371	SD Detects	4.215
Median Detects	3.3	CV Detects	0.785
Skewness Detects	1.655	Kurtosis Detects	2.147
Mean of Logged Detects	1.468	SD of Logged Detects	0.669

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.772	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.333	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.611	KM Standard Error of Mean	0.786
90KM SD	3.171	95% KM (BCA) UCL	3.932
95% KM (t) UCL	3.973	95% KM (Percentile Bootstrap) UCL	3.868
95% KM (z) UCL	3.903	95% KM Bootstrap t UCL	5.705
90% KM Chebyshev UCL	4.968	95% KM Chebyshev UCL	6.036
97.5% KM Chebyshev UCL	7.518	99% KM Chebyshev UCL	10.43

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.599	Anderson-Darling GOF Test	
5% A-D Critical Value	0.714	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.29	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.314	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	2.497	k star (bias corrected MLE)	1.522
Theta hat (MLE)	2.151	Theta star (bias corrected MLE)	3.529
nu hat (MLE)	34.96	nu star (bias corrected)	21.31
Mean (detects)	5.371		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.985
Maximum	13.7	Median	0.01
SD	3.603	CV	1.815
k hat (MLE)	0.235	k star (bias corrected MLE)	0.233
Theta hat (MLE)	8.45	Theta star (bias corrected MLE)	8.523
nu hat (MLE)	8.928	nu star (bias corrected)	8.852
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (8.85, α)	3.238	Adjusted Chi Square Value (8.85, β)	2.947
95% Gamma Approximate UCL	5.428	95% Gamma Adjusted UCL	5.963

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.611	SD (KM)	3.171
Variance (KM)	10.06	SE of Mean (KM)	0.786
k hat (KM)	0.678	k star (KM)	0.606
nu hat (KM)	25.75	nu star (KM)	23.02
theta hat (KM)	3.852	theta star (KM)	4.31
80% gamma percentile (KM)	4.303	90% gamma percentile (KM)	6.775
95% gamma percentile (KM)	9.361	99% gamma percentile (KM)	15.61

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (23.02, α)	13.1	Adjusted Chi Square Value (23.02, β)	12.45
95% KM Approximate Gamma UCL	4.585	95% KM Adjusted Gamma UCL	4.826

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.895	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.248	Lilliefors GOF Test
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.325	Mean in Log Scale	0.0381
SD in Original Scale	3.421	SD in Log Scale	1.3
95% t UCL (assumes normality of ROS data)	3.686	95% Percentile Bootstrap UCL	3.671
95% BCA Bootstrap UCL	4.16	95% Bootstrap t UCL	5.273
95% H-UCL (Log ROS)	6.178		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM Mean (logged)	0.541	KM Geo Mean	1.717
KM SD (logged)	0.802	95% Critical H Value (KM-Log)	2.344
KM Standard Error of Mean (logged)	0.199	95% H-UCL (KM -Log)	3.687
KM SD (logged)	0.802	95% Critical H Value (KM-Log)	2.344
KM Standard Error of Mean (logged)	0.199		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.453
SD in Original Scale	3.346
95% t UCL (Assumes normality)	3.784

DL/2 Log-Transformed

Mean in Log Scale	0.334
SD in Log Scale	0.997
95% H-Stat UCL	4.237

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 3.973

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intraWell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	11
Number of Detects	8	Number of Non-Detects	10
Number of Distinct Detects	8	Number of Distinct Non-Detects	3
Minimum Detect	1.3	Minimum Non-Detect	1
Maximum Detect	72.7	Maximum Non-Detect	2
Variance Detects	597	Percent Non-Detects	55.56%
Mean Detects	12.59	SD Detects	24.43
Median Detects	4.35	CV Detects	1.941
Skewness Detects	2.762	Kurtosis Detects	7.714
Mean of Logged Detects	1.531	SD of Logged Detects	1.328

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.516	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.749	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.44	Lilliefors GOF Test
1% Lilliefors Critical Value	0.333	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.199	KM Standard Error of Mean	4.101
90KM SD	16.27	95% KM (BCA) UCL	14.34
95% KM (t) UCL	13.33	95% KM (Percentile Bootstrap) UCL	14.02
95% KM (z) UCL	12.94	95% KM Bootstrap t UCL	51.08
90% KM Chebyshev UCL	18.5	95% KM Chebyshev UCL	24.08

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

97.5% KM Chebyshev UCL 31.81 99% KM Chebyshev UCL 47

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.941	Anderson-Darling GOF Test
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.312	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.307	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.615	k star (bias corrected MLE)	0.467
Theta hat (MLE)	20.48	Theta star (bias corrected MLE)	26.93
nu hat (MLE)	9.834	nu star (bias corrected)	7.479
Mean (detects)	12.59		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.601
Maximum	72.7	Median	0.01
SD	16.95	CV	3.026
k hat (MLE)	0.204	k star (bias corrected MLE)	0.207
Theta hat (MLE)	27.48	Theta star (bias corrected MLE)	27.08
nu hat (MLE)	7.336	nu star (bias corrected)	7.447
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (7.45, α)	2.419	Adjusted Chi Square Value (7.45, β)	2.153
95% Gamma Approximate UCL	17.24	95% Gamma Adjusted UCL	19.37

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.199	SD (KM)	16.27
Variance (KM)	264.9	SE of Mean (KM)	4.101
k hat (KM)	0.145	k star (KM)	0.158
nu hat (KM)	5.223	nu star (KM)	5.686
theta hat (KM)	42.73	theta star (KM)	39.25
80% gamma percentile (KM)	7.029	90% gamma percentile (KM)	18.5
95% gamma percentile (KM)	33.77	99% gamma percentile (KM)	77.61

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (5.69, α)	1.482	Adjusted Chi Square Value (5.69, β)	1.287
95% KM Approximate Gamma UCL	23.79	95% KM Adjusted Gamma UCL	27.39

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.869	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.851	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.195	Lilliefors GOF Test
10% Lilliefors Critical Value	0.265	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.774	Mean in Log Scale	-0.187
SD in Original Scale	16.89	SD in Log Scale	1.941
95% t UCL (assumes normality of ROS data)	12.7	95% Percentile Bootstrap UCL	13.36
95% BCA Bootstrap UCL	17.8	95% Bootstrap t UCL	46.4
95% H-UCL (Log ROS)	39.55		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.721	KM Geo Mean	2.056
KM SD (logged)	1.105	95% Critical H Value (KM-Log)	2.795
KM Standard Error of Mean (logged)	0.28	95% H-UCL (KM -Log)	8.015
KM SD (logged)	1.105	95% Critical H Value (KM-Log)	2.795
KM Standard Error of Mean (logged)	0.28		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	5.998	Mean in Log Scale	0.478
SD in Original Scale	16.81	SD in Log Scale	1.309
95% t UCL (Assumes normality)	12.89	95% H-Stat UCL	10.23

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL 8.015

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	11
Number of Detects	9	Number of Non-Detects	10
Number of Distinct Detects	8	Number of Distinct Non-Detects	3
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	17.3	Maximum Non-Detect	2
Variance Detects	25.04	Percent Non-Detects	52.63%
Mean Detects	4.711	SD Detects	5.004
Median Detects	2.8	CV Detects	1.062
Skewness Detects	2.436	Kurtosis Detects	6.291

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean of Logged Detects 1.221 SD of Logged Detects 0.788

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.667	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.764	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.315	Lilliefors GOF Test
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.799	KM Standard Error of Mean	0.907
90KM SD	3.722	95% KM (BCA) UCL	4.332
95% KM (t) UCL	4.371	95% KM (Percentile Bootstrap) UCL	4.332
95% KM (z) UCL	4.29	95% KM Bootstrap t UCL	7.161
90% KM Chebyshev UCL	5.519	95% KM Chebyshev UCL	6.751
97.5% KM Chebyshev UCL	8.462	99% KM Chebyshev UCL	11.82

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.683	Anderson-Darling GOF Test
5% A-D Critical Value	0.733	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.303	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.283	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.666	k star (bias corrected MLE)	1.185
Theta hat (MLE)	2.828	Theta star (bias corrected MLE)	3.976
nu hat (MLE)	29.99	nu star (bias corrected)	21.33
Mean (detects)	4.711		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.237
Maximum	17.3	Median	0.01
SD	4.116	CV	1.84
k hat (MLE)	0.265	k star (bias corrected MLE)	0.259
Theta hat (MLE)	8.428	Theta star (bias corrected MLE)	8.651
nu hat (MLE)	10.09	nu star (bias corrected)	9.826
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (9.83, α)	3.833	Adjusted Chi Square Value (9.83, β)	3.512
95% Gamma Approximate UCL	5.734	95% Gamma Adjusted UCL	6.259

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.799	SD (KM)	3.722
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Variance (KM)	13.86	SE of Mean (KM)	0.907
k hat (KM)	0.565	k star (KM)	0.511
nu hat (KM)	21.48	nu star (KM)	19.42
theta hat (KM)	4.951	theta star (KM)	5.476
80% gamma percentile (KM)	4.601	90% gamma percentile (KM)	7.537
95% gamma percentile (KM)	10.67	99% gamma percentile (KM)	18.35

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (19.42, α)	10.43	Adjusted Chi Square Value (19.42, β)	9.852
95% KM Approximate Gamma UCL	5.213	95% KM Adjusted Gamma UCL	5.517

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.92	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.262	Lilliefors GOF Test
10% Lilliefors Critical Value	0.252	Detected Data Not Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.509	Mean in Log Scale	0.16
SD in Original Scale	3.973	SD in Log Scale	1.234
95% t UCL (assumes normality of ROS data)	4.09	95% Percentile Bootstrap UCL	4.13
95% BCA Bootstrap UCL	4.795	95% Bootstrap t UCL	6.367
95% H-UCL (Log ROS)	5.938		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.611	KM Geo Mean	1.842
KM SD (logged)	0.78	95% Critical H Value (KM-Log)	2.317
KM Standard Error of Mean (logged)	0.193	95% H-UCL (KM -Log)	3.821
KM SD (logged)	0.78	95% Critical H Value (KM-Log)	2.317
KM Standard Error of Mean (logged)	0.193		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.639
SD in Original Scale	3.903
95% t UCL (Assumes normality)	4.192

DL/2 Log-Transformed

Mean in Log Scale	0.423
SD in Log Scale	0.962
95% H-Stat UCL	4.333

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	4.371
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The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

When a data set follows an approximate distribution passing only one of the GOF tests,
 it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	12
Number of Detects	9	Number of Non-Detects	10
Number of Distinct Detects	9	Number of Distinct Non-Detects	3
Minimum Detect	1.7	Minimum Non-Detect	1
Maximum Detect	32.9	Maximum Non-Detect	2
Variance Detects	98.33	Percent Non-Detects	52.63%
Mean Detects	6.8	SD Detects	9.916
Median Detects	3.4	CV Detects	1.458
Skewness Detects	2.855	Kurtosis Detects	8.341
Mean of Logged Detects	1.424	SD of Logged Detects	0.893

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.536	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.764	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.409	Lilliefors GOF Test
1% Lilliefors Critical Value	0.316	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.768	KM Standard Error of Mean	1.716
90KM SD	7.049	95% KM (BCA) UCL	7.131
95% KM (t) UCL	6.743	95% KM (Percentile Bootstrap) UCL	6.937
95% KM (z) UCL	6.59	95% KM Bootstrap t UCL	14.9
90% KM Chebyshev UCL	8.915	95% KM Chebyshev UCL	11.25
97.5% KM Chebyshev UCL	14.48	99% KM Chebyshev UCL	20.84

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.07	Anderson-Darling GOF Test
5% A-D Critical Value	0.741	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.296	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.286	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.152	k star (bias corrected MLE)	0.842
Theta hat (MLE)	5.904	Theta star (bias corrected MLE)	8.077
nu hat (MLE)	20.73	nu star (bias corrected)	15.15
Mean (detects)	6.8		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.226
Maximum	32.9	Median	0.01
SD	7.472	CV	2.316
k hat (MLE)	0.244	k star (bias corrected MLE)	0.241
Theta hat (MLE)	13.22	Theta star (bias corrected MLE)	13.41
nu hat (MLE)	9.277	nu star (bias corrected)	9.145
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (9.15, α)	3.415	Adjusted Chi Square Value (9.15, β)	3.115
95% Gamma Approximate UCL	8.64	95% Gamma Adjusted UCL	9.473

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.768	SD (KM)	7.049
Variance (KM)	49.69	SE of Mean (KM)	1.716
k hat (KM)	0.286	k star (KM)	0.276
nu hat (KM)	10.86	nu star (KM)	10.48
theta hat (KM)	13.18	theta star (KM)	13.66
80% gamma percentile (KM)	5.65	90% gamma percentile (KM)	11.22
95% gamma percentile (KM)	17.7	99% gamma percentile (KM)	34.74

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (10.48, α)	4.244	Adjusted Chi Square Value (10.48, β)	3.902
95% KM Approximate Gamma UCL	9.306	95% KM Adjusted Gamma UCL	10.12

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.84	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.859	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.209	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.448	Mean in Log Scale	0.135
SD in Original Scale	7.376	SD in Log Scale	1.468
95% t UCL (assumes normality of ROS data)	6.383	95% Percentile Bootstrap UCL	6.665
95% BCA Bootstrap UCL	8.326	95% Bootstrap t UCL	13.3
95% H-UCL (Log ROS)	10.65		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.69	KM Geo Mean	1.994
KM SD (logged)	0.91	95% Critical H Value (KM-Log)	2.485
KM Standard Error of Mean (logged)	0.223	95% H-UCL (KM -Log)	5.141
KM SD (logged)	0.91	95% Critical H Value (KM-Log)	2.485
KM Standard Error of Mean (logged)	0.223		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	3.616	Mean in Log Scale	0.498
SD in Original Scale	7.305	SD in Log Scale	1.105
95% t UCL (Assumes normality)	6.522	95% H-Stat UCL	6.229

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL 5.141

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intraWell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	14
Number of Detects	12	Number of Non-Detects	7
Number of Distinct Detects	12	Number of Distinct Non-Detects	2
Minimum Detect	1.6	Minimum Non-Detect	1
Maximum Detect	8.2	Maximum Non-Detect	2
Variance Detects	5.011	Percent Non-Detects	36.84%
Mean Detects	4.082	SD Detects	2.239
Median Detects	3.35	CV Detects	0.548
Skewness Detects	0.684	Kurtosis Detects	-0.798
Mean of Logged Detects	1.266	SD of Logged Detects	0.558

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.907	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.805	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.169	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.281	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.983	KM Standard Error of Mean	0.537
90KM SD	2.234	95% KM (BCA) UCL	3.862
95% KM (t) UCL	3.914	95% KM (Percentile Bootstrap) UCL	3.888
95% KM (z) UCL	3.866	95% KM Bootstrap t UCL	4.135
90% KM Chebyshev UCL	4.594	95% KM Chebyshev UCL	5.323

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

97.5% KM Chebyshev UCL 6.336 99% KM Chebyshev UCL 8.325

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.322	Anderson-Darling GOF Test
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.131	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.247	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.716	k star (bias corrected MLE)	2.843
Theta hat (MLE)	1.098	Theta star (bias corrected MLE)	1.436
nu hat (MLE)	89.19	nu star (bias corrected)	68.23
Mean (detects)	4.082		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.675
Maximum	8.2	Median	2.1
SD	2.588	CV	0.968
k hat (MLE)	0.503	k star (bias corrected MLE)	0.459
Theta hat (MLE)	5.318	Theta star (bias corrected MLE)	5.832
nu hat (MLE)	19.11	nu star (bias corrected)	17.43
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (17.43, α)	8.977	Adjusted Chi Square Value (17.43, β)	8.45
95% Gamma Approximate UCL	5.192	95% Gamma Adjusted UCL	5.516

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.983	SD (KM)	2.234
Variance (KM)	4.993	SE of Mean (KM)	0.537
k hat (KM)	1.782	k star (KM)	1.536
nu hat (KM)	67.73	nu star (KM)	58.37
theta hat (KM)	1.674	theta star (KM)	1.942
80% gamma percentile (KM)	4.604	90% gamma percentile (KM)	6.18
95% gamma percentile (KM)	7.709	99% gamma percentile (KM)	11.16

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (58.37, α)	41.81	Adjusted Chi Square Value (58.37, β)	40.58
95% KM Approximate Gamma UCL	4.165	95% KM Adjusted Gamma UCL	4.291

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.946	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.883	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.135	Lilliefors GOF Test
10% Lilliefors Critical Value	0.223	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.937	Mean in Log Scale	0.771
SD in Original Scale	2.339	SD in Log Scale	0.822
95% t UCL (assumes normality of ROS data)	3.868	95% Percentile Bootstrap UCL	3.822
95% BCA Bootstrap UCL	3.907	95% Bootstrap t UCL	4.031
95% H-UCL (Log ROS)	4.794		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.827	KM Geo Mean	2.287
KM SD (logged)	0.723	95% Critical H Value (KM-Log)	2.248
KM Standard Error of Mean (logged)	0.176	95% H-UCL (KM -Log)	4.358
KM SD (logged)	0.723	95% Critical H Value (KM-Log)	2.248
KM Standard Error of Mean (logged)	0.176		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.841
SD in Original Scale	2.423
95% t UCL (Assumes normality)	3.805

DL/2 Log-Transformed

Mean in Log Scale	0.654
SD in Log Scale	0.956
95% H-Stat UCL	5.396

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 3.914

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	9
Number of Distinct Detects	9	Number of Distinct Non-Detects	3
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	14.8	Maximum Non-Detect	2
Variance Detects	17.1	Percent Non-Detects	47.37%
Mean Detects	4.39	SD Detects	4.135
Median Detects	3	CV Detects	0.942
Skewness Detects	2.116	Kurtosis Detects	4.72
Mean of Logged Detects	1.181	SD of Logged Detects	0.776

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.741
1% Shapiro Wilk Critical Value	0.781
Lilliefors Test Statistic	0.318

Shapiro Wilk GOF Test

Detected Data Not Normal at 1% Significance Level

Lilliefors GOF Test

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

1% Lilliefors Critical Value 0.304 Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.806	KM Standard Error of Mean	0.798
90KM SD	3.3	95% KM (BCA) UCL	4.103
95% KM (t) UCL	4.191	95% KM (Percentile Bootstrap) UCL	4.151
95% KM (z) UCL	4.12	95% KM Bootstrap t UCL	6.301
90% KM Chebyshev UCL	5.202	95% KM Chebyshev UCL	6.287
97.5% KM Chebyshev UCL	7.793	99% KM Chebyshev UCL	10.75

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.46	Anderson-Darling GOF Test
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.224	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.823	k star (bias corrected MLE)	1.343
Theta hat (MLE)	2.408	Theta star (bias corrected MLE)	3.269
nu hat (MLE)	36.46	nu star (bias corrected)	26.86
Mean (detects)	4.39		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.315
Maximum	14.8	Median	1.1
SD	3.687	CV	1.593
k hat (MLE)	0.289	k star (bias corrected MLE)	0.279
Theta hat (MLE)	8.008	Theta star (bias corrected MLE)	8.312
nu hat (MLE)	10.99	nu star (bias corrected)	10.58
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (10.58, α)	4.311	Adjusted Chi Square Value (10.58, β)	3.966
95% Gamma Approximate UCL	5.685	95% Gamma Adjusted UCL	6.18

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.806	SD (KM)	3.3
Variance (KM)	10.89	SE of Mean (KM)	0.798
k hat (KM)	0.723	k star (KM)	0.644
nu hat (KM)	27.48	nu star (KM)	24.47
theta hat (KM)	3.881	theta star (KM)	4.358
80% gamma percentile (KM)	4.623	90% gamma percentile (KM)	7.182
95% gamma percentile (KM)	9.844	99% gamma percentile (KM)	16.24

Gamma Kaplan-Meier (KM) Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Approximate Chi Square Value (24.47, α) 14.21

Adjusted Chi Square Value (24.47, β) 13.53

95% KM Approximate Gamma UCL 4.834

95% KM Adjusted Gamma UCL 5.077

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic 0.959

Shapiro Wilk GOF Test

10% Shapiro Wilk Critical Value 0.869

Detected Data appear Lognormal at 10% Significance Level

Lilliefors Test Statistic 0.171

Lilliefors GOF Test

10% Lilliefors Critical Value 0.241

Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale 2.561

Mean in Log Scale 0.259

SD in Original Scale 3.537

SD in Log Scale 1.195

95% t UCL (assumes normality of ROS data) 3.968

95% Percentile Bootstrap UCL 3.963

95% BCA Bootstrap UCL 4.518

95% Bootstrap t UCL 5.439

95% H-UCL (Log ROS) 5.987

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged) 0.64

KM Geo Mean 1.897

KM SD (logged) 0.784

95% Critical H Value (KM-Log) 2.321

KM Standard Error of Mean (logged) 0.191

95% H-UCL (KM -Log) 3.96

KM SD (logged) 0.784

95% Critical H Value (KM-Log) 2.321

KM Standard Error of Mean (logged) 0.191

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 2.679

SD in Original Scale 3.465

95% t UCL (Assumes normality) 4.057

DL/2 Log-Transformed

Mean in Log Scale 0.482

SD in Log Scale 0.959

95% H-Stat UCL 4.565

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL 5.077

95% GROS Adjusted Gamma UCL 6.18

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (chromium [ug/l]_intraWell_apw-10s)

General Statistics

Total Number of Observations 19

Number of Distinct Observations 11

Number of Detects 13

Number of Non-Detects 6

Number of Distinct Detects 10

Number of Distinct Non-Detects 2

Minimum Detect 1

Minimum Non-Detect 1

Maximum Detect 15

Maximum Non-Detect 2

Variance Detects 18.02

Percent Non-Detects 31.58%

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean Detects	3.992	SD Detects	4.245
Median Detects	1.9	CV Detects	1.063
Skewness Detects	1.881	Kurtosis Detects	2.919
Mean of Logged Detects	1.007	SD of Logged Detects	0.829

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.681	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.814	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.343	Lilliefors GOF Test
1% Lilliefors Critical Value	0.271	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.143	KM Standard Error of Mean	0.862
90KM SD	3.603	95% KM (BCA) UCL	4.505
95% KM (t) UCL	4.637	95% KM (Percentile Bootstrap) UCL	4.573
95% KM (z) UCL	4.56	95% KM Bootstrap t UCL	5.721
90% KM Chebyshev UCL	5.728	95% KM Chebyshev UCL	6.899
97.5% KM Chebyshev UCL	8.524	99% KM Chebyshev UCL	11.72

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.352	Anderson-Darling GOF Test
5% A-D Critical Value	0.751	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.287	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.241	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.469	k star (bias corrected MLE)	1.182
Theta hat (MLE)	2.717	Theta star (bias corrected MLE)	3.379
nu hat (MLE)	38.21	nu star (bias corrected)	30.72
Mean (detects)	3.992		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.897
Maximum	15	Median	1.6
SD	3.87	CV	1.336
k hat (MLE)	0.488	k star (bias corrected MLE)	0.446
Theta hat (MLE)	5.94	Theta star (bias corrected MLE)	6.499
nu hat (MLE)	18.53	nu star (bias corrected)	16.94
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (16.94, α)	8.63	Adjusted Chi Square Value (16.94, β)	8.114
95% Gamma Approximate UCL	5.687	95% Gamma Adjusted UCL	6.049

Estimates of Gamma Parameters using KM Estimates

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean (KM)	3.143	SD (KM)	3.603
Variance (KM)	12.98	SE of Mean (KM)	0.862
k hat (KM)	0.761	k star (KM)	0.676
nu hat (KM)	28.92	nu star (KM)	25.69
theta hat (KM)	4.13	theta star (KM)	4.65
80% gamma percentile (KM)	5.172	90% gamma percentile (KM)	7.955
95% gamma percentile (KM)	10.83	99% gamma percentile (KM)	17.73

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (25.69, α)	15.14	Adjusted Chi Square Value (25.69, β)	14.43
95% KM Approximate Gamma UCL	5.333	95% KM Adjusted Gamma UCL	5.594

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.843	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.889	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.236	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.215	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.057	Mean in Log Scale	0.641
SD in Original Scale	3.76	SD in Log Scale	0.942
95% t UCL (assumes normality of ROS data)	4.553	95% Percentile Bootstrap UCL	4.588
95% BCA Bootstrap UCL	5.051	95% Bootstrap t UCL	5.632
95% H-UCL (Log ROS)	5.188		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.762	KM Geo Mean	2.141
KM SD (logged)	0.766	95% Critical H Value (KM-Log)	2.3
KM Standard Error of Mean (logged)	0.186	95% H-UCL (KM -Log)	4.348
KM SD (logged)	0.766	95% Critical H Value (KM-Log)	2.3
KM Standard Error of Mean (logged)	0.186		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.995
SD in Original Scale	3.782
95% t UCL (Assumes normality)	4.499

DL/2 Log-Transformed

Mean in Log Scale	0.616
SD in Log Scale	0.918
95% H-Stat UCL	4.845

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	4.637
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The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_inrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	10
Number of Detects	14	Number of Non-Detects	5
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	8.018	Maximum Non-Detect	2
Variance Detects	5.656	Percent Non-Detects	26.32%
Mean Detects	2.706	SD Detects	2.378
Median Detects	1.64	CV Detects	0.879
Skewness Detects	1.338	Kurtosis Detects	0.605
Mean of Logged Detects	0.682	SD of Logged Detects	0.794

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.825	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.262	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.263	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.257	KM Standard Error of Mean	0.501
90KM SD	2.106	95% KM (BCA) UCL	3.122
95% KM (t) UCL	3.127	95% KM (Percentile Bootstrap) UCL	3.098
95% KM (z) UCL	3.082	95% KM Bootstrap t UCL	3.568
90% KM Chebyshev UCL	3.761	95% KM Chebyshev UCL	4.443
97.5% KM Chebyshev UCL	5.388	99% KM Chebyshev UCL	7.246

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.238	Anderson-Darling GOF Test	
5% A-D Critical Value	0.748	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.302	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.232	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.741	k star (bias corrected MLE)	1.416
Theta hat (MLE)	1.555	Theta star (bias corrected MLE)	1.912
nu hat (MLE)	48.75	nu star (bias corrected)	39.63
Mean (detects)	2.706		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.044
Maximum	8.018	Median	1
SD	2.327	CV	1.139
k hat (MLE)	0.53	k star (bias corrected MLE)	0.482
Theta hat (MLE)	3.855	Theta star (bias corrected MLE)	4.245
nu hat (MLE)	20.15	nu star (bias corrected)	18.3
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (18.30, α)	9.608	Adjusted Chi Square Value (18.30, β)	9.061
95% Gamma Approximate UCL	3.893	95% Gamma Adjusted UCL	4.129

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.257	SD (KM)	2.106
Variance (KM)	4.435	SE of Mean (KM)	0.501
k hat (KM)	1.149	k star (KM)	1.003
nu hat (KM)	43.67	nu star (KM)	38.11
theta hat (KM)	1.964	theta star (KM)	2.251
80% gamma percentile (KM)	3.632	90% gamma percentile (KM)	5.194
95% gamma percentile (KM)	6.756	99% gamma percentile (KM)	10.38

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (38.11, α)	24.97	Adjusted Chi Square Value (38.11, β)	24.04
95% KM Approximate Gamma UCL	3.445	95% KM Adjusted Gamma UCL	3.578

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.804	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.895	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.302	Lilliefors GOF Test
10% Lilliefors Critical Value	0.208	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.137	Mean in Log Scale	0.304
SD in Original Scale	2.252	SD in Log Scale	0.975
95% t UCL (assumes normality of ROS data)	3.032	95% Percentile Bootstrap UCL	3.025
95% BCA Bootstrap UCL	3.165	95% Bootstrap t UCL	3.406
95% H-UCL (Log ROS)	3.939		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.502	KM Geo Mean	1.653
KM SD (logged)	0.722	95% Critical H Value (KM-Log)	2.247
KM Standard Error of Mean (logged)	0.172	95% H-UCL (KM -Log)	3.143
KM SD (logged)	0.722	95% Critical H Value (KM-Log)	2.247
KM Standard Error of Mean (logged)	0.172		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 2.178

DL/2 Log-Transformed

Mean in Log Scale 0.393

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

SD in Original Scale	2.219	SD in Log Scale	0.857
95% t UCL (Assumes normality)	3.061	95% H-Stat UCL	3.48

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 3.127

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	14
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	2.1	Maximum Non-Detect	2
Variance Detects	0.157	Percent Non-Detects	73.68%
Mean Detects	1.48	SD Detects	0.396
Median Detects	1.4	CV Detects	0.268
Skewness Detects	0.849	Kurtosis Detects	2.19
Mean of Logged Detects	0.364	SD of Logged Detects	0.264

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.908	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.28	Lilliefors GOF Test
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.146	KM Standard Error of Mean	0.0768
90KM SD	0.285	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.279	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.272	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.376	95% KM Chebyshev UCL	1.481
97.5% KM Chebyshev UCL	1.626	99% KM Chebyshev UCL	1.91

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.372	Anderson-Darling GOF Test
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

K-S Test Statistic 0.246

Kolmogorov-Smirnov GOF

5% K-S Critical Value 0.357 Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	18.04	k star (bias corrected MLE)	7.349
Theta hat (MLE)	0.082	Theta star (bias corrected MLE)	0.201
nu hat (MLE)	180.4	nu star (bias corrected)	73.49
Mean (detects)	1.48		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.782
Maximum	2.1	Median	0.716
SD	0.549	CV	0.701
k hat (MLE)	1.349	k star (bias corrected MLE)	1.171
Theta hat (MLE)	0.58	Theta star (bias corrected MLE)	0.668
nu hat (MLE)	51.28	nu star (bias corrected)	44.51
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (44.51, α)	30.21	Adjusted Chi Square Value (44.51, β)	29.18
95% Gamma Approximate UCL	1.152	95% Gamma Adjusted UCL	1.193

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.146	SD (KM)	0.285
Variance (KM)	0.081	SE of Mean (KM)	0.0768
k hat (KM)	16.21	k star (KM)	13.69
nu hat (KM)	616.1	nu star (KM)	520.2
theta hat (KM)	0.0707	theta star (KM)	0.0837
80% gamma percentile (KM)	1.395	90% gamma percentile (KM)	1.556
95% gamma percentile (KM)	1.698	99% gamma percentile (KM)	1.986

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (520.19, α)	468.3	Adjusted Chi Square Value (520.19, β)	464
95% KM Approximate Gamma UCL	1.273	95% KM Adjusted Gamma UCL	1.285

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.933	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.258	Lilliefors GOF Test
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.93	Mean in Log Scale	-0.161
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

SD in Original Scale	0.426	SD in Log Scale	0.428
95% t UCL (assumes normality of ROS data)	1.1	95% Percentile Bootstrap UCL	1.094
95% BCA Bootstrap UCL	1.111	95% Bootstrap t UCL	1.145
95% H-UCL (Log ROS)	1.134		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.112	KM Geo Mean	1.119
KM SD (logged)	0.207	95% Critical H Value (KM-Log)	1.785
KM Standard Error of Mean (logged)	0.0567	95% H-UCL (KM -Log)	1.247
KM SD (logged)	0.207	95% Critical H Value (KM-Log)	1.785
KM Standard Error of Mean (logged)	0.0567		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.863
SD in Original Scale	0.467
95% t UCL (Assumes normality)	1.049

DL/2 Log-Transformed

Mean in Log Scale	-0.269
SD in Log Scale	0.493
95% H-Stat UCL	1.089

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.279
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cobalt [ug/l]_intrawell_apw-05/05r) was not processed!

x_ols (cobalt [ug/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	6
Number of Detects	7	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	5.4	Maximum Non-Detect	2

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Variance Detects	2.87	Percent Non-Detects	61.11%
Mean Detects	2.457	SD Detects	1.694
Median Detects	1.3	CV Detects	0.689
Skewness Detects	0.94	Kurtosis Detects	-0.415
Mean of Logged Detects	0.7	SD of Logged Detects	0.674

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.816	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.324	Lilliefors GOF Test
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.583	KM Standard Error of Mean	0.307
90KM SD	1.203	95% KM (BCA) UCL	2.136
95% KM (t) UCL	2.116	95% KM (Percentile Bootstrap) UCL	2.091
95% KM (z) UCL	2.087	95% KM Bootstrap t UCL	2.377
90% KM Chebyshev UCL	2.503	95% KM Chebyshev UCL	2.92
97.5% KM Chebyshev UCL	3.498	99% KM Chebyshev UCL	4.635

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.691	Anderson-Darling GOF Test
5% A-D Critical Value	0.713	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.337	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.314	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	2.666	k star (bias corrected MLE)	1.618
Theta hat (MLE)	0.922	Theta star (bias corrected MLE)	1.518
nu hat (MLE)	37.32	nu star (bias corrected)	22.66
Mean (detects)	2.457		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.032
Maximum	5.4	Median	0.0842
SD	1.564	CV	1.516
k hat (MLE)	0.317	k star (bias corrected MLE)	0.301
Theta hat (MLE)	3.257	Theta star (bias corrected MLE)	3.427
nu hat (MLE)	11.4	nu star (bias corrected)	10.84
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (10.84, α)	4.471	Adjusted Chi Square Value (10.84, β)	4.085

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Gamma Approximate UCL	2.5	95% Gamma Adjusted UCL	2.737
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Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.583	SD (KM)	1.203
Variance (KM)	1.447	SE of Mean (KM)	0.307
k hat (KM)	1.731	k star (KM)	1.48
nu hat (KM)	62.33	nu star (KM)	53.28
theta hat (KM)	0.914	theta star (KM)	1.07
80% gamma percentile (KM)	2.453	90% gamma percentile (KM)	3.309
95% gamma percentile (KM)	4.142	99% gamma percentile (KM)	6.024

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (53.28, α)	37.51	Adjusted Chi Square Value (53.28, β)	36.24
95% KM Approximate Gamma UCL	2.248	95% KM Adjusted Gamma UCL	2.327

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.842	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.313	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data Not Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.234	Mean in Log Scale	-0.326
SD in Original Scale	1.441	SD in Log Scale	1.06
95% t UCL (assumes normality of ROS data)	1.824	95% Percentile Bootstrap UCL	1.799
95% BCA Bootstrap UCL	1.948	95% Bootstrap t UCL	2.204
95% H-UCL (Log ROS)	2.552		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.286	KM Geo Mean	1.332
KM SD (logged)	0.513	95% Critical H Value (KM-Log)	2.034
KM Standard Error of Mean (logged)	0.131	95% H-UCL (KM -Log)	1.957
KM SD (logged)	0.513	95% Critical H Value (KM-Log)	2.034
KM Standard Error of Mean (logged)	0.131		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.372	Mean in Log Scale	0.00261
SD in Original Scale	1.358	SD in Log Scale	0.748
95% t UCL (Assumes normality)	1.929	95% H-Stat UCL	2.012

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	2.116
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_intrawell_apw-06s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (cobalt [ug/l]_intrawell_apw-06s) was not processed!

x_ols (cobalt [ug/l]_intrawell_apw-07)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	1.3	Maximum Non-Detect	2
Variance Detects	0.045	Percent Non-Detects	89.47%
Mean Detects	1.15	SD Detects	0.212
Median Detects	1.15	CV Detects	0.184
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.131	SD of Logged Detects	0.186

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

**Normal GOF Test on Detects Only
 Not Enough Data to Perform GOF Test**

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.02	KM Standard Error of Mean	0.0273
90KM SD	0.0748	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.067	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.065	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.102	95% KM Chebyshev UCL	1.139
97.5% KM Chebyshev UCL	1.191	99% KM Chebyshev UCL	1.292

**Gamma GOF Tests on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Gamma Statistics on Detected Data Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	58.44	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0197	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	233.8	nu star (bias corrected)	N/A
Mean (detects)	1.15		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.02	SD (KM)	0.0748
Variance (KM)	0.0056	SE of Mean (KM)	0.0273
k hat (KM)	185.8	k star (KM)	156.5
nu hat (KM)	7060	nu star (KM)	5946
theta hat (KM)	0.00549	theta star (KM)	0.00652
80% gamma percentile (KM)	1.088	90% gamma percentile (KM)	1.126
95% gamma percentile (KM)	1.158	99% gamma percentile (KM)	1.219

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	5768	Adjusted Level of Significance (β)	0.0369
95% KM Approximate Gamma UCL	1.052	Adjusted Chi Square Value (N/A, β)	5753
		95% KM Adjusted Gamma UCL	1.054

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.449	Mean in Log Scale	-0.992
SD in Original Scale	0.304	SD in Log Scale	0.633
95% t UCL (assumes normality of ROS data)	0.57	95% Percentile Bootstrap UCL	0.566
95% BCA Bootstrap UCL	0.585	95% Bootstrap t UCL	0.621
95% H-UCL (Log ROS)	0.624		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0175	KM Geo Mean	1.018
KM SD (logged)	0.0654	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0239	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0654	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0239		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.674
SD in Original Scale	0.27
95% t UCL (Assumes normality)	0.781

DL/2 Log-Transformed

Mean in Log Scale	-0.46
SD in Log Scale	0.356
95% H-Stat UCL	0.788

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.067
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
Number of Detects	11	Number of Non-Detects	8
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	2.1	Maximum Non-Detect	2
Variance Detects	0.134	Percent Non-Detects	42.11%
Mean Detects	1.518	SD Detects	0.366
Median Detects	1.4	CV Detects	0.241
Skewness Detects	0.363	Kurtosis Detects	-1.208
Mean of Logged Detects	0.391	SD of Logged Detects	0.241

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.935	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.792	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.179	Lilliefors GOF Test
1% Lilliefors Critical Value	0.291	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.358	KM Standard Error of Mean	0.0944
90KM SD	0.362	95% KM (BCA) UCL	1.507
95% KM (t) UCL	1.522	95% KM (Percentile Bootstrap) UCL	1.508
95% KM (z) UCL	1.514	95% KM Bootstrap t UCL	1.548
90% KM Chebyshev UCL	1.642	95% KM Chebyshev UCL	1.77
97.5% KM Chebyshev UCL	1.948	99% KM Chebyshev UCL	2.298

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.329	Anderson-Darling GOF Test
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.175	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.255	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	19.18	k star (bias corrected MLE)	14.01
Theta hat (MLE)	0.0792	Theta star (bias corrected MLE)	0.108
nu hat (MLE)	422	nu star (bias corrected)	308.2
Mean (detects)	1.518		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.63	Mean	1.302
Maximum	2.1	Median	1.3
SD	0.421	CV	0.323
k hat (MLE)	9.916	k star (bias corrected MLE)	8.386
Theta hat (MLE)	0.131	Theta star (bias corrected MLE)	0.155
nu hat (MLE)	376.8	nu star (bias corrected)	318.7
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (318.65, α)	278.3	Adjusted Chi Square Value (318.65, β)	275
95% Gamma Approximate UCL	1.491	95% Gamma Adjusted UCL	1.508

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.358	SD (KM)	0.362
Variance (KM)	0.131	SE of Mean (KM)	0.0944
k hat (KM)	14.07	k star (KM)	11.89
nu hat (KM)	534.8	nu star (KM)	451.7
theta hat (KM)	0.0965	theta star (KM)	0.114
80% gamma percentile (KM)	1.674	90% gamma percentile (KM)	1.881
95% gamma percentile (KM)	2.065	99% gamma percentile (KM)	2.438

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (451.69, α)	403.4	Adjusted Chi Square Value (451.69, β)	399.4
95% KM Approximate Gamma UCL	1.521	95% KM Adjusted Gamma UCL	1.536

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.949	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.876	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.158	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.231	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.317	Mean in Log Scale	0.233
SD in Original Scale	0.398	SD in Log Scale	0.3
95% t UCL (assumes normality of ROS data)	1.476	95% Percentile Bootstrap UCL	1.47
95% BCA Bootstrap UCL	1.475	95% Bootstrap t UCL	1.496
95% H-UCL (Log ROS)	1.504		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.273	KM Geo Mean	1.314
KM SD (logged)	0.254	95% Critical H Value (KM-Log)	1.814
KM Standard Error of Mean (logged)	0.0669	95% H-UCL (KM -Log)	1.513
KM SD (logged)	0.254	95% Critical H Value (KM-Log)	1.814
KM Standard Error of Mean (logged)	0.0669		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.195
SD in Original Scale	0.504
95% t UCL (Assumes normality)	1.395

DL/2 Log-Transformed

Mean in Log Scale	0.0806
SD in Log Scale	0.475
95% H-Stat UCL	1.515

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.522

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	1.3	Minimum Non-Detect	2
Maximum Detect	7	Maximum Non-Detect	2
Variance Detects	1.603	Percent Non-Detects	5.263%
Mean Detects	3.141	SD Detects	1.266
Median Detects	2.855	CV Detects	0.403
Skewness Detects	1.727	Kurtosis Detects	4.502
Mean of Logged Detects	1.078	SD of Logged Detects	0.371

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.851	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.858	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.197	Lilliefors GOF Test
1% Lilliefors Critical Value	0.235	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.055	KM Standard Error of Mean	0.296
90KM SD	1.253	95% KM (BCA) UCL	3.616
95% KM (t) UCL	3.568	95% KM (Percentile Bootstrap) UCL	3.585
95% KM (z) UCL	3.542	95% KM Bootstrap t UCL	3.775
90% KM Chebyshev UCL	3.943	95% KM Chebyshev UCL	4.346
97.5% KM Chebyshev UCL	4.904	99% KM Chebyshev UCL	6.002

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.532	Anderson-Darling GOF Test
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.166	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.204	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.672	k star (bias corrected MLE)	6.43
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Theta hat (MLE)	0.409	Theta star (bias corrected MLE)	0.488
nu hat (MLE)	276.2	nu star (bias corrected)	231.5
Mean (detects)	3.141		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.3	Mean	3.047
Maximum	7	Median	2.71
SD	1.297	CV	0.426
k hat (MLE)	6.663	k star (bias corrected MLE)	5.646
Theta hat (MLE)	0.457	Theta star (bias corrected MLE)	0.54
nu hat (MLE)	253.2	nu star (bias corrected)	214.6
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (214.55, α)	181.7	Adjusted Chi Square Value (214.55, β)	179
95% Gamma Approximate UCL	3.599	95% Gamma Adjusted UCL	3.652

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.055	SD (KM)	1.253
Variance (KM)	1.571	SE of Mean (KM)	0.296
k hat (KM)	5.94	k star (KM)	5.038
nu hat (KM)	225.7	nu star (KM)	191.4
theta hat (KM)	0.514	theta star (KM)	0.606
80% gamma percentile (KM)	4.103	90% gamma percentile (KM)	4.877
95% gamma percentile (KM)	5.582	99% gamma percentile (KM)	7.072

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (191.43, α)	160.4	Adjusted Chi Square Value (191.43, β)	157.9
95% KM Approximate Gamma UCL	3.645	95% KM Adjusted Gamma UCL	3.702

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.952	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.181	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.185	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.06	Mean in Log Scale	1.046
SD in Original Scale	1.281	SD in Log Scale	0.387
95% t UCL (assumes normality of ROS data)	3.569	95% Percentile Bootstrap UCL	3.553
95% BCA Bootstrap UCL	3.627	95% Bootstrap t UCL	3.747
95% H-UCL (Log ROS)	3.651		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.042	KM Geo Mean	2.835
KM SD (logged)	0.384	95% Critical H Value (KM-Log)	1.908

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM Standard Error of Mean (logged)	0.091	95% H-UCL (KM -Log)	3.627
KM SD (logged)	0.384	95% Critical H Value (KM-Log)	1.908
KM Standard Error of Mean (logged)	0.091		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	3.028
SD in Original Scale	1.325
95% t UCL (Assumes normality)	3.556

DL/2 Log-Transformed

Mean in Log Scale	1.021
SD in Log Scale	0.437
95% H-Stat UCL	3.736

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 3.568

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (cobalt [ug/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	4
Number of Detects	5	Number of Non-Detects	14
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	2.1	Maximum Non-Detect	2
Variance Detects	0.258	Percent Non-Detects	73.68%
Mean Detects	1.56	SD Detects	0.508
Median Detects	1.3	CV Detects	0.326
Skewness Detects	0.331	Kurtosis Detects	-2.788
Mean of Logged Detects	0.402	SD of Logged Detects	0.329

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.827
1% Shapiro Wilk Critical Value	0.686
Lilliefors Test Statistic	0.296
1% Lilliefors Critical Value	0.396

Shapiro Wilk GOF Test

Detected Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.157	KM Standard Error of Mean	0.0882
90KM SD	0.339	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.31	95% KM (Percentile Bootstrap) UCL	N/A

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% KM (z) UCL	1.302	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.422	95% KM Chebyshev UCL	1.542
97.5% KM Chebyshev UCL	1.708	99% KM Chebyshev UCL	2.035

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.525	Anderson-Darling GOF Test	
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.295	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	11.8	k star (bias corrected MLE)	4.854
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.321
nu hat (MLE)	118	nu star (bias corrected)	48.54
Mean (detects)	1.56		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.654
Maximum	2.1	Median	0.518
SD	0.667	CV	1.02
k hat (MLE)	0.583	k star (bias corrected MLE)	0.526
Theta hat (MLE)	1.122	Theta star (bias corrected MLE)	1.244
nu hat (MLE)	22.16	nu star (bias corrected)	19.99
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (19.99, α)	10.85	Adjusted Chi Square Value (19.99, β)	10.26
95% Gamma Approximate UCL	1.206	95% Gamma Adjusted UCL	1.275

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.157	SD (KM)	0.339
Variance (KM)	0.115	SE of Mean (KM)	0.0882
k hat (KM)	11.63	k star (KM)	9.832
nu hat (KM)	442.1	nu star (KM)	373.6
theta hat (KM)	0.0995	theta star (KM)	0.118
80% gamma percentile (KM)	1.451	90% gamma percentile (KM)	1.648
95% gamma percentile (KM)	1.823	99% gamma percentile (KM)	2.183

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (373.62, α)	329.8	Adjusted Chi Square Value (373.62, β)	326.2
95% KM Approximate Gamma UCL	1.311	95% KM Adjusted Gamma UCL	1.325

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.859	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lilliefors Test Statistic 0.264 **Lilliefors GOF Test**
 10% Lilliefors Critical Value 0.319 Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.847	Mean in Log Scale	-0.33
SD in Original Scale	0.533	SD in Log Scale	0.579
95% t UCL (assumes normality of ROS data)	1.059	95% Percentile Bootstrap UCL	1.053
95% BCA Bootstrap UCL	1.085	95% Bootstrap t UCL	1.152
95% H-UCL (Log ROS)	1.13		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.114	KM Geo Mean	1.121
KM SD (logged)	0.233	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.0612	95% H-UCL (KM -Log)	1.272
KM SD (logged)	0.233	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.0612		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 0.884
 SD in Original Scale 0.519
 95% t UCL (Assumes normality) 1.091

DL/2 Log-Transformed

Mean in Log Scale -0.259
 SD in Log Scale 0.515
 95% H-Stat UCL 1.126

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.31

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	820	Mean	878.6
Maximum	934	Median	880
SD	35.75	Std. Error of Mean	8.67
Coefficient of Variation	0.0407	Skewness	0.137

Normal GOF Test

Shapiro Wilk Test Statistic 0.94
 1% Shapiro Wilk Critical Value 0.851

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lilliefors Test Statistic 0.146 **Lilliefors GOF Test**
 1% Lilliefors Critical Value 0.241 Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 893.8

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 893.2
 95% Modified-t UCL (Johnson-1978) 893.8

Gamma GOF Test

A-D Test Statistic 0.427
 5% A-D Critical Value 0.736
 K-S Test Statistic 0.153
 5% K-S Critical Value 0.208

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 643.2
 Theta hat (MLE) 1.366
 nu hat (MLE) 21870
 MLE Mean (bias corrected) 878.6
 Adjusted Level of Significance 0.0346

k star (bias corrected MLE) 529.8
 Theta star (bias corrected MLE) 1.659
 nu star (bias corrected) 18012
 MLE Sd (bias corrected) 38.17
 Approximate Chi Square Value (0.05) 17701
 Adjusted Chi Square Value 17669

Assuming Gamma Distribution

95% Approximate Gamma UCL 894.1

95% Adjusted Gamma UCL 895.7

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.942
 10% Shapiro Wilk Critical Value 0.91
 Lilliefors Test Statistic 0.146
 10% Lilliefors Critical Value 0.19

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 6.709
 Maximum of Logged Data 6.839

Mean of logged Data 6.778
 SD of logged Data 0.0406

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 916.4
 99% Chebyshev (MVUE) UCL 964.8

90% Chebyshev (MVUE) UCL 904.6
 97.5% Chebyshev (MVUE) UCL 932.7

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 892.9
 95% Standard Bootstrap UCL 892.4
 95% Hall's Bootstrap UCL 892.8

95% BCA Bootstrap UCL 892.7
 95% Bootstrap-t UCL 894.2
 95% Percentile Bootstrap UCL 892.2

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

90% Chebyshev(Mean, Sd) UCL	904.7	95% Chebyshev(Mean, Sd) UCL	916.4
97.5% Chebyshev(Mean, Sd) UCL	932.8	99% Chebyshev(Mean, Sd) UCL	964.9

Suggested UCL to Use

95% Student's-t UCL 893.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	494.4	Mean	610.2
Maximum	757.3	Median	616.8
SD	57.55	Std. Error of Mean	13.96
Coefficient of Variation	0.0943	Skewness	0.508

Normal GOF Test

Shapiro Wilk Test Statistic 0.942
 1% Shapiro Wilk Critical Value 0.851
 Lilliefors Test Statistic 0.155
 1% Lilliefors Critical Value 0.241

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 634.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 635
 95% Modified-t UCL (Johnson-1978) 634.8

Gamma GOF Test

A-D Test Statistic 0.416
 5% A-D Critical Value 0.736
 K-S Test Statistic 0.141
 5% K-S Critical Value 0.208

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	121	k star (bias corrected MLE)	99.71
Theta hat (MLE)	5.041	Theta star (bias corrected MLE)	6.119
nu hat (MLE)	4115	nu star (bias corrected)	3390
MLE Mean (bias corrected)	610.2	MLE Sd (bias corrected)	61.1
		Approximate Chi Square Value (0.05)	3256
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	3242

Assuming Gamma Distribution

95% Approximate Gamma UCL 635.3

95% Adjusted Gamma UCL 638

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.91	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.141	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.19	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	6.203	Mean of logged Data	6.41
Maximum of Logged Data	6.63	SD of logged Data	0.0936

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	651.8
95% Chebyshev (MVUE) UCL	670.6	97.5% Chebyshev (MVUE) UCL	696.8
99% Chebyshev (MVUE) UCL	748.2		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	633.1	95% BCA Bootstrap UCL	635.5
95% Standard Bootstrap UCL	632.9	95% Bootstrap-t UCL	636.7
95% Hall's Bootstrap UCL	641.8	95% Percentile Bootstrap UCL	632.6
90% Chebyshev(Mean, Sd) UCL	652	95% Chebyshev(Mean, Sd) UCL	671
97.5% Chebyshev(Mean, Sd) UCL	697.3	99% Chebyshev(Mean, Sd) UCL	749

Suggested UCL to Use

95% Student's-t UCL 634.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intraWell_apw-05/05r)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	472.2	Mean	697.5
Maximum	764	Median	711.4
SD	67.9	Std. Error of Mean	16.47
Coefficient of Variation	0.0974	Skewness	-2.487

Normal GOF Test

Shapiro Wilk Test Statistic	0.747	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.851	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.237	Lilliefors GOF Test
1% Lilliefors Critical Value	0.241	Data appear Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 726.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 714

95% Modified-t UCL (Johnson-1978) 724.6

Gamma GOF Test

A-D Test Statistic 1.553
 5% A-D Critical Value 0.736
 K-S Test Statistic 0.256
 5% K-S Critical Value 0.208

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 94.2
 Theta hat (MLE) 7.404
 nu hat (MLE) 3203
 MLE Mean (bias corrected) 697.5
 Adjusted Level of Significance 0.0346

k star (bias corrected MLE) 77.62
 Theta star (bias corrected MLE) 8.986
 nu star (bias corrected) 2639
 MLE Sd (bias corrected) 79.17
 Approximate Chi Square Value (0.05) 2521
 Adjusted Chi Square Value 2509

Assuming Gamma Distribution

95% Approximate Gamma UCL 730.2

95% Adjusted Gamma UCL 733.8

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.682
 10% Shapiro Wilk Critical Value 0.91
 Lilliefors Test Statistic 0.271
 10% Lilliefors Critical Value 0.19

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 6.157
 Maximum of Logged Data 6.639

Mean of logged Data 6.542
 SD of logged Data 0.111

Assuming Lognormal Distribution

95% H-UCL 732.8
 95% Chebyshev (MVUE) UCL 780
 99% Chebyshev (MVUE) UCL 885.5

90% Chebyshev (MVUE) UCL 754.4

97.5% Chebyshev (MVUE) UCL 815.6

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 724.6
 95% Standard Bootstrap UCL 724.6
 95% Hall's Bootstrap UCL 718.8
 90% Chebyshev(Mean, Sd) UCL 746.9
 97.5% Chebyshev(Mean, Sd) UCL 800.3

95% BCA Bootstrap UCL 717.3
 95% Bootstrap-t UCL 720.8
 95% Percentile Bootstrap UCL 720.9
 95% Chebyshev(Mean, Sd) UCL 769.3
 99% Chebyshev(Mean, Sd) UCL 861.3

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% Student's-t UCL 726.2

When a data set follows an approximate distribution passing only one of the GOF tests,
 it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (dissolved solids, total [mg/l]_inrawell_apw-06d)

General Statistics

Total Number of Observations	15	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	482	Mean	578.5
Maximum	735	Median	564
SD	57.82	Std. Error of Mean	14.93
Coefficient of Variation	0.0999	Skewness	1.524

Normal GOF Test

Shapiro Wilk Test Statistic	0.809
1% Shapiro Wilk Critical Value	0.835
Lilliefors Test Statistic	0.288
1% Lilliefors Critical Value	0.255

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 604.8

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 609.3
 95% Modified-t UCL (Johnson-1978) 605.7

Gamma GOF Test

A-D Test Statistic	1.244
5% A-D Critical Value	0.734
K-S Test Statistic	0.27
5% K-S Critical Value	0.221

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	115.1	k star (bias corrected MLE)	92.13
Theta hat (MLE)	5.026	Theta star (bias corrected MLE)	6.279
nu hat (MLE)	3453	nu star (bias corrected)	2764
MLE Mean (bias corrected)	578.5	MLE Sd (bias corrected)	60.27
		Approximate Chi Square Value (0.05)	2643

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Adjusted Level of Significance 0.0324 Adjusted Chi Square Value 2628

Assuming Gamma Distribution

95% Approximate Gamma UCL 605 95% Adjusted Gamma UCL 608.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.841	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.901	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.267	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.202	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	6.178	Mean of logged Data	6.356
Maximum of Logged Data	6.6	SD of logged Data	0.095

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	621
95% Chebyshev (MVUE) UCL	640.3	97.5% Chebyshev (MVUE) UCL	667.1
99% Chebyshev (MVUE) UCL	719.8		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	603	95% BCA Bootstrap UCL	608.3
95% Standard Bootstrap UCL	602.3	95% Bootstrap-t UCL	623.8
95% Hall's Bootstrap UCL	793	95% Percentile Bootstrap UCL	603.5
90% Chebyshev(Mean, Sd) UCL	623.3	95% Chebyshev(Mean, Sd) UCL	643.5
97.5% Chebyshev(Mean, Sd) UCL	671.7	99% Chebyshev(Mean, Sd) UCL	727

Suggested UCL to Use

95% Student's-t UCL 604.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	567.7	Mean	634.5
Maximum	729.4	Median	639.3
SD	38.54	Std. Error of Mean	9.347
Coefficient of Variation	0.0607	Skewness	0.419

Normal GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.95	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.851	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.142	Lilliefors GOF Test
1% Lilliefors Critical Value	0.241	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 650.8

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 650.9

95% Modified-t UCL (Johnson-1978) 650.9

Gamma GOF Test

A-D Test Statistic 0.352

Anderson-Darling Gamma GOF Test

5% A-D Critical Value 0.736

Detected data appear Gamma Distributed at 5% Significance Level

K-S Test Statistic 0.131

Kolmogorov-Smirnov Gamma GOF Test

5% K-S Critical Value 0.208

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 290.7

k star (bias corrected MLE) 239.4

Theta hat (MLE) 2.183

Theta star (bias corrected MLE) 2.65

nu hat (MLE) 9884

nu star (bias corrected) 8141

MLE Mean (bias corrected) 634.5

MLE Sd (bias corrected) 41

Approximate Chi Square Value (0.05) 7932

Adjusted Level of Significance 0.0346

Adjusted Chi Square Value 7911

Assuming Gamma Distribution

95% Approximate Gamma UCL 651.2

95% Adjusted Gamma UCL 652.9

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.956

Shapiro Wilk Lognormal GOF Test

10% Shapiro Wilk Critical Value 0.91

Data appear Lognormal at 10% Significance Level

Lilliefors Test Statistic 0.134

Lilliefors Lognormal GOF Test

10% Lilliefors Critical Value 0.19

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 6.342

Mean of logged Data 6.451

Maximum of Logged Data 6.592

SD of logged Data 0.0604

Assuming Lognormal Distribution

95% H-UCL N/A

90% Chebyshev (MVUE) UCL 662.3

95% Chebyshev (MVUE) UCL 675

97.5% Chebyshev (MVUE) UCL 692.5

99% Chebyshev (MVUE) UCL 727

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 649.8

95% BCA Bootstrap UCL 650

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Standard Bootstrap UCL	649.2	95% Bootstrap-t UCL	651.5
95% Hall's Bootstrap UCL	654.3	95% Percentile Bootstrap UCL	649.4
90% Chebyshev(Mean, Sd) UCL	662.5	95% Chebyshev(Mean, Sd) UCL	675.2
97.5% Chebyshev(Mean, Sd) UCL	692.8	99% Chebyshev(Mean, Sd) UCL	727.5

Suggested UCL to Use

95% Student's-t UCL 650.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	624	Mean	748.5
Maximum	824	Median	740
SD	50.86	Std. Error of Mean	12.34
Coefficient of Variation	0.0679	Skewness	-0.826

Normal GOF Test

Shapiro Wilk Test Statistic	0.922
1% Shapiro Wilk Critical Value	0.851
Lilliefors Test Statistic	0.181
1% Lilliefors Critical Value	0.241

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 770.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	766.2
95% Modified-t UCL (Johnson-1978)	769.7

Gamma GOF Test

A-D Test Statistic	0.605
5% A-D Critical Value	0.736
K-S Test Statistic	0.187
5% K-S Critical Value	0.208

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	221.1	k star (bias corrected MLE)	182.1
Theta hat (MLE)	3.385	Theta star (bias corrected MLE)	4.11
nu hat (MLE)	7518	nu star (bias corrected)	6193
MLE Mean (bias corrected)	748.5	MLE Sd (bias corrected)	55.46
		Approximate Chi Square Value (0.05)	6011
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	5992

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Gamma Distribution

95% Approximate Gamma UCL 771.2 95% Adjusted Gamma UCL 773.6

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.904	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value 0.91	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic 0.196	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value 0.19	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 6.436		Mean of logged Data 6.616
Maximum of Logged Data 6.714		SD of logged Data 0.0701

Assuming Lognormal Distribution

95% H-UCL N/A		90% Chebyshev (MVUE) UCL 786.8
95% Chebyshev (MVUE) UCL 804.1		97.5% Chebyshev (MVUE) UCL 828.1
99% Chebyshev (MVUE) UCL 875.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 768.8		95% BCA Bootstrap UCL 767.1
95% Standard Bootstrap UCL 768.9		95% Bootstrap-t UCL 768.2
95% Hall's Bootstrap UCL 767.7		95% Percentile Bootstrap UCL 768.1
90% Chebyshev(Mean, Sd) UCL 785.5		95% Chebyshev(Mean, Sd) UCL 802.3
97.5% Chebyshev(Mean, Sd) UCL 825.6		99% Chebyshev(Mean, Sd) UCL 871.3

Suggested UCL to Use

95% Student's-t UCL 770.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-08)

General Statistics

Total Number of Observations 17		Number of Distinct Observations 17
		Number of Missing Observations 0
Minimum 345.3		Mean 381.8
Maximum 434.9		Median 381.2
SD 24.01		Std. Error of Mean 5.824
Coefficient of Variation 0.0629		Skewness 0.607

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Normal GOF Test

Shapiro Wilk Test Statistic 0.956
 1% Shapiro Wilk Critical Value 0.851
 Lilliefors Test Statistic 0.143
 1% Lilliefors Critical Value 0.241

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 391.9

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 392.3

95% Modified-t UCL (Johnson-1978) 392.1

Gamma GOF Test

A-D Test Statistic 0.306
 5% A-D Critical Value 0.736
 K-S Test Statistic 0.144
 5% K-S Critical Value 0.208

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 273.6
 Theta hat (MLE) 1.395
 nu hat (MLE) 9303
 MLE Mean (bias corrected) 381.8
 Adjusted Level of Significance 0.0346

k star (bias corrected MLE) 225.4
 Theta star (bias corrected MLE) 1.694
 nu star (bias corrected) 7662
 MLE Sd (bias corrected) 25.43
 Approximate Chi Square Value (0.05) 7460
 Adjusted Chi Square Value 7439

Assuming Gamma Distribution

95% Approximate Gamma UCL 392.1

95% Adjusted Gamma UCL 393.2

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.964
 10% Shapiro Wilk Critical Value 0.91
 Lilliefors Test Statistic 0.137
 10% Lilliefors Critical Value 0.19

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 5.844
 Maximum of Logged Data 6.075

Mean of logged Data 5.943
 SD of logged Data 0.0621

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 406.8
 99% Chebyshev (MVUE) UCL 439

90% Chebyshev (MVUE) UCL 399
 97.5% Chebyshev (MVUE) UCL 417.7

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% CLT UCL	391.3	95% BCA Bootstrap UCL	391.5
95% Standard Bootstrap UCL	391.2	95% Bootstrap-t UCL	393.5
95% Hall's Bootstrap UCL	393.3	95% Percentile Bootstrap UCL	391.4
90% Chebyshev(Mean, Sd) UCL	399.2	95% Chebyshev(Mean, Sd) UCL	407.1
97.5% Chebyshev(Mean, Sd) UCL	418.1	99% Chebyshev(Mean, Sd) UCL	439.7

Suggested UCL to Use

95% Student's-t UCL 391.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	436	Mean	462.3
Maximum	512	Median	460
SD	18.7	Std. Error of Mean	4.536
Coefficient of Variation	0.0405	Skewness	1.136

Normal GOF Test

Shapiro Wilk Test Statistic	0.929
1% Shapiro Wilk Critical Value	0.851
Lilliefors Test Statistic	0.145
1% Lilliefors Critical Value	0.241

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 470.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 471.1

95% Modified-t UCL (Johnson-1978) 470.4

Gamma GOF Test

A-D Test Statistic	0.343
5% A-D Critical Value	0.736
K-S Test Statistic	0.135
5% K-S Critical Value	0.208

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	665.3	k star (bias corrected MLE)	547.9
Theta hat (MLE)	0.695	Theta star (bias corrected MLE)	0.844
nu hat (MLE)	22620	nu star (bias corrected)	18629
MLE Mean (bias corrected)	462.3	MLE Sd (bias corrected)	19.75
		Approximate Chi Square Value (0.05)	18313
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	18280

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Gamma Distribution

95% Approximate Gamma UCL 470.3 95% Adjusted Gamma UCL 471.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.941	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.91	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.136	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.19	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	6.078	Mean of logged Data	6.135
Maximum of Logged Data	6.238	SD of logged Data	0.0397

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	475.7
95% Chebyshev (MVUE) UCL	481.7	97.5% Chebyshev (MVUE) UCL	490.1
99% Chebyshev (MVUE) UCL	506.6		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	469.8	95% BCA Bootstrap UCL	471
95% Standard Bootstrap UCL	469.5	95% Bootstrap-t UCL	472.2
95% Hall's Bootstrap UCL	473.6	95% Percentile Bootstrap UCL	469.9
90% Chebyshev(Mean, Sd) UCL	475.9	95% Chebyshev(Mean, Sd) UCL	482.1
97.5% Chebyshev(Mean, Sd) UCL	490.6	99% Chebyshev(Mean, Sd) UCL	507.4

Suggested UCL to Use

95% Student's-t UCL 470.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (dissolved solids, total [mg/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	694.1	Mean	770.5
Maximum	903	Median	763.2
SD	46.74	Std. Error of Mean	11.69
Coefficient of Variation	0.0607	Skewness	1.353

Normal GOF Test

Shapiro Wilk Test Statistic 0.902

Shapiro Wilk GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

1% Shapiro Wilk Critical Value	0.844	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.161	Lilliefors GOF Test
1% Lilliefors Critical Value	0.248	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 791

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 794

95% Modified-t UCL (Johnson-1978) 791.7

Gamma GOF Test

A-D Test Statistic 0.453

5% A-D Critical Value 0.736

K-S Test Statistic 0.147

5% K-S Critical Value 0.214

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 302

Theta hat (MLE) 2.552

nu hat (MLE) 9663

MLE Mean (bias corrected) 770.5

Adjusted Level of Significance 0.0335

k star (bias corrected MLE) 245.4

Theta star (bias corrected MLE) 3.14

nu star (bias corrected) 7853

MLE Sd (bias corrected) 49.19

Approximate Chi Square Value (0.05) 7648

Adjusted Chi Square Value 7625

Assuming Gamma Distribution

95% Approximate Gamma UCL 791.2

95% Adjusted Gamma UCL 793.6

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.926

10% Shapiro Wilk Critical Value 0.906

Lilliefors Test Statistic 0.148

10% Lilliefors Critical Value 0.196

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 6.543

Maximum of Logged Data 6.806

Mean of logged Data 6.645

SD of logged Data 0.0589

Assuming Lognormal Distribution

95% H-UCL N/A

95% Chebyshev (MVUE) UCL 820

99% Chebyshev (MVUE) UCL 883.4

90% Chebyshev (MVUE) UCL 804.6

97.5% Chebyshev (MVUE) UCL 841.4

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 789.8

95% Standard Bootstrap UCL 789.4

95% BCA Bootstrap UCL 795

95% Bootstrap-t UCL 796.9

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Hall's Bootstrap UCL	813	95% Percentile Bootstrap UCL	790.7
90% Chebyshev(Mean, Sd) UCL	805.6	95% Chebyshev(Mean, Sd) UCL	821.5
97.5% Chebyshev(Mean, Sd) UCL	843.5	99% Chebyshev(Mean, Sd) UCL	886.8

Suggested UCL to Use

95% Student's-t UCL 791

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intraWell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	7
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.197	Minimum Non-Detect	1.5
Maximum Detect	0.26	Maximum Non-Detect	1.5
Variance Detects	2.6743E-4	Percent Non-Detects	5.263%
Mean Detects	0.24	SD Detects	0.0164
Median Detects	0.24	CV Detects	0.068
Skewness Detects	-1.117	Kurtosis Detects	1.544
Mean of Logged Detects	-1.428	SD of Logged Detects	0.0708

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.894	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.858	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.213	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.235	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.24	KM Standard Error of Mean	0.00385
90KM SD	0.0159	95% KM (BCA) UCL	0.246
95% KM (t) UCL	0.247	95% KM (Percentile Bootstrap) UCL	0.246
95% KM (z) UCL	0.247	95% KM Bootstrap t UCL	0.246
90% KM Chebyshev UCL	0.252	95% KM Chebyshev UCL	0.257
97.5% KM Chebyshev UCL	0.264	99% KM Chebyshev UCL	0.279

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.742	Anderson-Darling GOF Test	
5% A-D Critical Value	0.737	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.203	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	217.1	k star (bias corrected MLE)	181
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Theta hat (MLE)	0.00111	Theta star (bias corrected MLE)	0.00133
nu hat (MLE)	7817	nu star (bias corrected)	6515
Mean (detects)	0.24		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.197	Mean	0.24
Maximum	0.26	Median	0.24
SD	0.0159	CV	0.0661
k hat (MLE)	229.2	k star (bias corrected MLE)	193
Theta hat (MLE)	0.00105	Theta star (bias corrected MLE)	0.00125
nu hat (MLE)	8709	nu star (bias corrected)	7335
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	7137	Adjusted Chi Square Value (N/A, β)	7120
95% Gamma Approximate UCL	0.247	95% Gamma Adjusted UCL	0.248

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.24	SD (KM)	0.0159
Variance (KM)	2.5257E-4	SE of Mean (KM)	0.00385
k hat (KM)	228.8	k star (KM)	192.7
nu hat (KM)	8694	nu star (KM)	7323
theta hat (KM)	0.00105	theta star (KM)	0.00125
80% gamma percentile (KM)	0.255	90% gamma percentile (KM)	0.263
95% gamma percentile (KM)	0.27	99% gamma percentile (KM)	0.282

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	7125	Adjusted Chi Square Value (N/A, β)	7108
95% KM Approximate Gamma UCL	0.247	95% KM Adjusted Gamma UCL	0.248

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.874	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.226	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.185	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.24	Mean in Log Scale	-1.428
SD in Original Scale	0.0159	SD in Log Scale	0.0688
95% t UCL (assumes normality of ROS data)	0.247	95% Percentile Bootstrap UCL	0.246
95% BCA Bootstrap UCL	0.245	95% Bootstrap t UCL	0.246
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.428	KM Geo Mean	0.24
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM SD (logged)	0.0688	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0167	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0688	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0167		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.267
SD in Original Scale	0.118
95% t UCL (Assumes normality)	0.314

DL/2 Log-Transformed

Mean in Log Scale	-1.368
SD in Log Scale	0.27
95% H-Stat UCL	0.297

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.247

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intraWell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.182	Minimum Non-Detect	0.15
Maximum Detect	0.366	Maximum Non-Detect	0.15
Variance Detects	0.00163	Percent Non-Detects	5.263%
Mean Detects	0.24	SD Detects	0.0404
Median Detects	0.233	CV Detects	0.168
Skewness Detects	1.865	Kurtosis Detects	5.143
Mean of Logged Detects	-1.439	SD of Logged Detects	0.153

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.828
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.235
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Detected Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.235	KM Standard Error of Mean	0.0102
90KM SD	0.0431	95% KM (BCA) UCL	0.252
95% KM (t) UCL	0.253	95% KM (Percentile Bootstrap) UCL	0.252
95% KM (z) UCL	0.252	95% KM Bootstrap t UCL	0.257
90% KM Chebyshev UCL	0.266	95% KM Chebyshev UCL	0.28
97.5% KM Chebyshev UCL	0.299	99% KM Chebyshev UCL	0.336

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.844	Anderson-Darling GOF Test
5% A-D Critical Value	0.739	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.211	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.203	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	42.73	k star (bias corrected MLE)	35.64
Theta hat (MLE)	0.00561	Theta star (bias corrected MLE)	0.00673
nu hat (MLE)	1538	nu star (bias corrected)	1283
Mean (detects)	0.24		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.157	Mean	0.236
Maximum	0.366	Median	0.233
SD	0.0436	CV	0.185
k hat (MLE)	33.22	k star (bias corrected MLE)	28.01
Theta hat (MLE)	0.00709	Theta star (bias corrected MLE)	0.00841
nu hat (MLE)	1262	nu star (bias corrected)	1064
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	989.6	Adjusted Chi Square Value (N/A, β)	983.3
95% Gamma Approximate UCL	0.253	95% Gamma Adjusted UCL	0.255

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.235	SD (KM)	0.0431
Variance (KM)	0.00186	SE of Mean (KM)	0.0102
k hat (KM)	29.71	k star (KM)	25.06
nu hat (KM)	1129	nu star (KM)	952.2
theta hat (KM)	0.00791	theta star (KM)	0.00938
80% gamma percentile (KM)	0.274	90% gamma percentile (KM)	0.297
95% gamma percentile (KM)	0.317	99% gamma percentile (KM)	0.358

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (952.19, α)	881.6	Adjusted Chi Square Value (952.19, β)	875.6
95% KM Approximate Gamma UCL	0.254	95% KM Adjusted Gamma UCL	0.256

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.898	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.201	Lilliefors GOF Test
10% Lilliefors Critical Value	0.185	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.236	Mean in Log Scale	-1.458
SD in Original Scale	0.0428	SD in Log Scale	0.17
95% t UCL (assumes normality of ROS data)	0.253	95% Percentile Bootstrap UCL	0.253
95% BCA Bootstrap UCL	0.255	95% Bootstrap t UCL	0.257
95% H-UCL (Log ROS)	0.253		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.463	KM Geo Mean	0.231
KM SD (logged)	0.177	95% Critical H Value (KM-Log)	1.768
KM Standard Error of Mean (logged)	0.0419	95% H-UCL (KM -Log)	0.253
KM SD (logged)	0.177	95% Critical H Value (KM-Log)	1.768
KM Standard Error of Mean (logged)	0.0419		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.231
SD in Original Scale	0.0545
95% t UCL (Assumes normality)	0.253

DL/2 Log-Transformed

Mean in Log Scale	-1.5
SD in Log Scale	0.303
95% H-Stat UCL	0.267

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.253
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intraWell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	12
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.199	Minimum Non-Detect	0.15
Maximum Detect	0.38	Maximum Non-Detect	0.15
Variance Detects	0.00151	Percent Non-Detects	5.263%
Mean Detects	0.328	SD Detects	0.0389
Median Detects	0.33	CV Detects	0.119
Skewness Detects	-2.16	Kurtosis Detects	7.04
Mean of Logged Detects	-1.123	SD of Logged Detects	0.139

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.8
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.252
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Detected Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data Not Normal at 1% Significance Level

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.319	KM Standard Error of Mean	0.0128
90KM SD	0.0542	95% KM (BCA) UCL	0.338
95% KM (t) UCL	0.341	95% KM (Percentile Bootstrap) UCL	0.338
95% KM (z) UCL	0.34	95% KM Bootstrap t UCL	0.336
90% KM Chebyshev UCL	0.357	95% KM Chebyshev UCL	0.374
97.5% KM Chebyshev UCL	0.398	99% KM Chebyshev UCL	0.446

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.379	Anderson-Darling GOF Test	
5% A-D Critical Value	0.738	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.274	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.203	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	61.54	k star (bias corrected MLE)	51.32
Theta hat (MLE)	0.00533	Theta star (bias corrected MLE)	0.00639
nu hat (MLE)	2215	nu star (bias corrected)	1848
Mean (detects)	0.328		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.199	Mean	0.324
Maximum	0.38	Median	0.33
SD	0.0415	CV	0.128
k hat (MLE)	54.03	k star (bias corrected MLE)	45.53
Theta hat (MLE)	0.006	Theta star (bias corrected MLE)	0.00712
nu hat (MLE)	2053	nu star (bias corrected)	1730
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	1635	Adjusted Chi Square Value (N/A, β)	1626
95% Gamma Approximate UCL	0.343	95% Gamma Adjusted UCL	0.345

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.319	SD (KM)	0.0542
Variance (KM)	0.00293	SE of Mean (KM)	0.0128
k hat (KM)	34.62	k star (KM)	29.19
nu hat (KM)	1316	nu star (KM)	1109
theta hat (KM)	0.0092	theta star (KM)	0.0109
80% gamma percentile (KM)	0.367	90% gamma percentile (KM)	0.396
95% gamma percentile (KM)	0.421	99% gamma percentile (KM)	0.472

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α) 1033 Adjusted Chi Square Value (N/A, β) 1026

User Selected Options

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From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

95% KM Approximate Gamma UCL 0.342

95% KM Adjusted Gamma UCL 0.344

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic 0.709

Shapiro Wilk GOF Test

10% Shapiro Wilk Critical Value 0.914

Detected Data Not Lognormal at 10% Significance Level

Lilliefors Test Statistic 0.286

Lilliefors GOF Test

10% Lilliefors Critical Value 0.185

Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale 0.324

Mean in Log Scale -1.137

SD in Original Scale 0.0421

SD in Log Scale 0.149

95% t UCL (assumes normality of ROS data) 0.34

95% Percentile Bootstrap UCL 0.338

95% BCA Bootstrap UCL 0.336

95% Bootstrap t UCL 0.337

95% H-UCL (Log ROS) 0.345

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged) -1.164

KM Geo Mean 0.312

KM SD (logged) 0.217

95% Critical H Value (KM-Log) 1.791

KM Standard Error of Mean (logged) 0.0512

95% H-UCL (KM -Log) 0.35

KM SD (logged) 0.217

95% Critical H Value (KM-Log) 1.791

KM Standard Error of Mean (logged) 0.0512

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 0.315

Mean in Log Scale -1.2

SD in Original Scale 0.0693

SD in Log Scale 0.363

95% t UCL (Assumes normality) 0.342

95% H-Stat UCL 0.378

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 0.341

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations 18

Number of Distinct Observations 8

Number of Detects 16

Number of Non-Detects 2

Number of Distinct Detects 7

Number of Distinct Non-Detects 1

Minimum Detect 0.2

Minimum Non-Detect 0.15

Maximum Detect 0.24

Maximum Non-Detect 0.15

Variance Detects 1.5823E-4

Percent Non-Detects 11.11%

Mean Detects 0.217

SD Detects 0.0126

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Median Detects	0.216	CV Detects	0.0579
Skewness Detects	0.519	Kurtosis Detects	-0.538
Mean of Logged Detects	-1.528	SD of Logged Detects	0.0573

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.921	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.844	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.165	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.248	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.21	KM Standard Error of Mean	0.00586
90KM SD	0.0241	95% KM (BCA) UCL	0.219
95% KM (t) UCL	0.22	95% KM (Percentile Bootstrap) UCL	0.219
95% KM (z) UCL	0.219	95% KM Bootstrap t UCL	0.218
90% KM Chebyshev UCL	0.227	95% KM Chebyshev UCL	0.235
97.5% KM Chebyshev UCL	0.246	99% KM Chebyshev UCL	0.268

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.497	Anderson-Darling GOF Test	
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.214	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	323.1	k star (bias corrected MLE)	262.5
Theta hat (MLE)	6.7264E-4	Theta star (bias corrected MLE)	8.2773E-4
nu hat (MLE)	10338	nu star (bias corrected)	8401
Mean (detects)	0.217		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.186	Mean	0.214
Maximum	0.24	Median	0.211
SD	0.015	CV	0.0702
k hat (MLE)	214.1	k star (bias corrected MLE)	178.4
Theta hat (MLE)	0.001	Theta star (bias corrected MLE)	0.0012
nu hat (MLE)	7707	nu star (bias corrected)	6424
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (N/A, α)	6238	Adjusted Chi Square Value (N/A, β)	6221
95% Gamma Approximate UCL	0.22	95% Gamma Adjusted UCL	0.221

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.21	SD (KM)	0.0241
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Variance (KM)	5.7936E-4	SE of Mean (KM)	0.00586
k hat (KM)	76	k star (KM)	63.37
nu hat (KM)	2736	nu star (KM)	2281
theta hat (KM)	0.00276	theta star (KM)	0.00331
80% gamma percentile (KM)	0.232	90% gamma percentile (KM)	0.244
95% gamma percentile (KM)	0.255	99% gamma percentile (KM)	0.276

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	2171	Adjusted Chi Square Value (N/A, β)	2161
95% KM Approximate Gamma UCL	0.22	95% KM Adjusted Gamma UCL	0.222

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.928	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.906	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.157	Lilliefors GOF Test
10% Lilliefors Critical Value	0.196	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.214	Mean in Log Scale	-1.543
SD in Original Scale	0.0148	SD in Log Scale	0.0694
95% t UCL (assumes normality of ROS data)	0.22	95% Percentile Bootstrap UCL	0.22
95% BCA Bootstrap UCL	0.22	95% Bootstrap t UCL	0.22
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.569	KM Geo Mean	0.208
KM SD (logged)	0.127	95% Critical H Value (KM-Log)	1.747
KM Standard Error of Mean (logged)	0.031	95% H-UCL (KM -Log)	0.222
KM SD (logged)	0.127	95% Critical H Value (KM-Log)	1.747
KM Standard Error of Mean (logged)	0.031		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.202
SD in Original Scale	0.0475
95% t UCL (Assumes normality)	0.221

DL/2 Log-Transformed

Mean in Log Scale	-1.646
SD in Log Scale	0.348
95% H-Stat UCL	0.24

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.22
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	13
Number of Detects	17	Number of Non-Detects	2
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.24	Minimum Non-Detect	0.15
Maximum Detect	0.41	Maximum Non-Detect	0.15
Variance Detects	0.00179	Percent Non-Detects	10.53%
Mean Detects	0.281	SD Detects	0.0423
Median Detects	0.27	CV Detects	0.15
Skewness Detects	1.942	Kurtosis Detects	4.666
Mean of Logged Detects	-1.278	SD of Logged Detects	0.137

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.812	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.851	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.182	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.241	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.267	KM Standard Error of Mean	0.0132
90KM SD	0.0559	95% KM (BCA) UCL	0.288
95% KM (t) UCL	0.29	95% KM (Percentile Bootstrap) UCL	0.289
95% KM (z) UCL	0.289	95% KM Bootstrap t UCL	0.29
90% KM Chebyshev UCL	0.307	95% KM Chebyshev UCL	0.325
97.5% KM Chebyshev UCL	0.35	99% KM Chebyshev UCL	0.399

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.772	Anderson-Darling GOF Test	
5% A-D Critical Value	0.737	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.169	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.208	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	53.69	k star (bias corrected MLE)	44.26
Theta hat (MLE)	0.00524	Theta star (bias corrected MLE)	0.00635
nu hat (MLE)	1826	nu star (bias corrected)	1505
Mean (detects)	0.281		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.187	Mean	0.272
Maximum	0.41	Median	0.26
SD	0.0484	CV	0.178

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	35.23	k star (bias corrected MLE)	29.7
Theta hat (MLE)	0.00772	Theta star (bias corrected MLE)	0.00916
nu hat (MLE)	1339	nu star (bias corrected)	1129
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	1052	Adjusted Chi Square Value (N/A, β)	1045
95% Gamma Approximate UCL	0.292	95% Gamma Adjusted UCL	0.294

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.267	SD (KM)	0.0559
Variance (KM)	0.00313	SE of Mean (KM)	0.0132
k hat (KM)	22.86	k star (KM)	19.28
nu hat (KM)	868.6	nu star (KM)	732.8
theta hat (KM)	0.0117	theta star (KM)	0.0139
80% gamma percentile (KM)	0.317	90% gamma percentile (KM)	0.348
95% gamma percentile (KM)	0.375	99% gamma percentile (KM)	0.429

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (732.80, α)	671	Adjusted Chi Square Value (732.80, β)	665.8
95% KM Approximate Gamma UCL	0.292	95% KM Adjusted Gamma UCL	0.294

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.868	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.91	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.163	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.19	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.273	Mean in Log Scale	-1.311
SD in Original Scale	0.0467	SD in Log Scale	0.162
95% t UCL (assumes normality of ROS data)	0.292	95% Percentile Bootstrap UCL	0.291
95% BCA Bootstrap UCL	0.293	95% Bootstrap t UCL	0.295
95% H-UCL (Log ROS)	0.292		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.343	KM Geo Mean	0.261
KM SD (logged)	0.228	95% Critical H Value (KM-Log)	1.797
KM Standard Error of Mean (logged)	0.0538	95% H-UCL (KM -Log)	0.295
KM SD (logged)	0.228	95% Critical H Value (KM-Log)	1.797
KM Standard Error of Mean (logged)	0.0538		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.259
SD in Original Scale	0.0763
95% t UCL (Assumes normality)	0.29

DL/2 Log-Transformed

Mean in Log Scale	-1.416
SD in Log Scale	0.433
95% H-Stat UCL	0.325

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% KM (t) UCL 0.29

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_inrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	18
Number of Detects	17	Number of Non-Detects	2
Number of Distinct Detects	17	Number of Distinct Non-Detects	1
Minimum Detect	0.134	Minimum Non-Detect	0.15
Maximum Detect	0.301	Maximum Non-Detect	0.15
Variance Detects	0.00142	Percent Non-Detects	10.53%
Mean Detects	0.171	SD Detects	0.0377
Median Detects	0.162	CV Detects	0.221
Skewness Detects	2.859	Kurtosis Detects	9.75
Mean of Logged Detects	-1.786	SD of Logged Detects	0.182

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.684	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.851	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.243	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.241	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.167	KM Standard Error of Mean	0.00849
90KM SD	0.0359	95% KM (BCA) UCL	0.182
95% KM (t) UCL	0.182	95% KM (Percentile Bootstrap) UCL	0.182
95% KM (z) UCL	0.181	95% KM Bootstrap t UCL	0.195
90% KM Chebyshev UCL	0.193	95% KM Chebyshev UCL	0.204
97.5% KM Chebyshev UCL	0.22	99% KM Chebyshev UCL	0.252

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.264	Anderson-Darling GOF Test	
5% A-D Critical Value	0.738	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.209	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	28.45	k star (bias corrected MLE)	23.47
Theta hat (MLE)	0.006	Theta star (bias corrected MLE)	0.00727

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

nu hat (MLE)	967.3	nu star (bias corrected)	797.9
Mean (detects)	0.171		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.12	Mean	0.166
Maximum	0.301	Median	0.161
SD	0.0382	CV	0.23
k hat (MLE)	25.32	k star (bias corrected MLE)	21.35
Theta hat (MLE)	0.00656	Theta star (bias corrected MLE)	0.00777
nu hat (MLE)	962	nu star (bias corrected)	811.5
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (811.45, α)	746.3	Adjusted Chi Square Value (811.45, β)	740.9
95% Gamma Approximate UCL	0.18	95% Gamma Adjusted UCL	0.182

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.167	SD (KM)	0.0359
Variance (KM)	0.00129	SE of Mean (KM)	0.00849
k hat (KM)	21.79	k star (KM)	18.39
nu hat (KM)	828.1	nu star (KM)	698.7
theta hat (KM)	0.00768	theta star (KM)	0.0091
80% gamma percentile (KM)	0.199	90% gamma percentile (KM)	0.219
95% gamma percentile (KM)	0.236	99% gamma percentile (KM)	0.271

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (698.69, α)	638.4	Adjusted Chi Square Value (698.69, β)	633.3
95% KM Approximate Gamma UCL	0.183	95% KM Adjusted Gamma UCL	0.185

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.797	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.91	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.212	Lilliefors GOF Test
10% Lilliefors Critical Value	0.19	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.167	Mean in Log Scale	-1.811
SD in Original Scale	0.0376	SD in Log Scale	0.188
95% t UCL (assumes normality of ROS data)	0.182	95% Percentile Bootstrap UCL	0.182
95% BCA Bootstrap UCL	0.186	95% Bootstrap t UCL	0.193
95% H-UCL (Log ROS)	0.18		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.805	KM Geo Mean	0.164
KM SD (logged)	0.177	95% Critical H Value (KM-Log)	1.768
KM Standard Error of Mean (logged)	0.0418	95% H-UCL (KM -Log)	0.18

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM SD (logged) 0.177 95% Critical H Value (KM-Log) 1.768
 KM Standard Error of Mean (logged) 0.0418

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 0.161
 SD in Original Scale 0.0466
 95% t UCL (Assumes normality) 0.179

DL/2 Log-Transformed

Mean in Log Scale -1.871
 SD in Log Scale 0.306
 95% H-Stat UCL 0.184

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 0.182

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.228	Minimum Non-Detect	0.15
Maximum Detect	0.333	Maximum Non-Detect	0.15
Variance Detects	5.2893E-4	Percent Non-Detects	5.263%
Mean Detects	0.259	SD Detects	0.023
Median Detects	0.253	CV Detects	0.0889
Skewness Detects	2.14	Kurtosis Detects	6.263
Mean of Logged Detects	-1.356	SD of Logged Detects	0.0829

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic 0.801
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.227
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Detected Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.253	KM Standard Error of Mean	0.00769
90KM SD	0.0326	95% KM (BCA) UCL	0.264
95% KM (t) UCL	0.266	95% KM (Percentile Bootstrap) UCL	0.265
95% KM (z) UCL	0.266	95% KM Bootstrap t UCL	0.265
90% KM Chebyshev UCL	0.276	95% KM Chebyshev UCL	0.286
97.5% KM Chebyshev UCL	0.301	99% KM Chebyshev UCL	0.329

Gamma GOF Tests on Detected Observations Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

A-D Test Statistic	1.012	Anderson-Darling GOF Test
5% A-D Critical Value	0.737	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.203	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	147.4	k star (bias corrected MLE)	122.8
Theta hat (MLE)	0.00176	Theta star (bias corrected MLE)	0.00211
nu hat (MLE)	5305	nu star (bias corrected)	4422
Mean (detects)	0.259		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.21	Mean	0.256
Maximum	0.333	Median	0.253
SD	0.025	CV	0.0975
k hat (MLE)	118.2	k star (bias corrected MLE)	99.6
Theta hat (MLE)	0.00217	Theta star (bias corrected MLE)	0.00257
nu hat (MLE)	4493	nu star (bias corrected)	3785
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	3643	Adjusted Chi Square Value (N/A, β)	3631
95% Gamma Approximate UCL	0.266	95% Gamma Adjusted UCL	0.267

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.253	SD (KM)	0.0326
Variance (KM)	0.00106	SE of Mean (KM)	0.00769
k hat (KM)	60.24	k star (KM)	50.77
nu hat (KM)	2289	nu star (KM)	1929
theta hat (KM)	0.0042	theta star (KM)	0.00498
80% gamma percentile (KM)	0.282	90% gamma percentile (KM)	0.299
95% gamma percentile (KM)	0.314	99% gamma percentile (KM)	0.343

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1828	Adjusted Chi Square Value (N/A, β)	1820
95% KM Approximate Gamma UCL	0.267	95% KM Adjusted Gamma UCL	0.268

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.846	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.207	Lilliefors GOF Test
10% Lilliefors Critical Value	0.185	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.256	Mean in Log Scale	-1.366
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

SD in Original Scale	0.0246	SD in Log Scale	0.0914
95% t UCL (assumes normality of ROS data)	0.266	95% Percentile Bootstrap UCL	0.266
95% BCA Bootstrap UCL	0.267	95% Bootstrap t UCL	0.269
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.384	KM Geo Mean	0.251
KM SD (logged)	0.144	95% Critical H Value (KM-Log)	1.75
KM Standard Error of Mean (logged)	0.034	95% H-UCL (KM -Log)	0.269
KM SD (logged)	0.144	95% Critical H Value (KM-Log)	1.75
KM Standard Error of Mean (logged)	0.034		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.249
SD in Original Scale	0.0477
95% t UCL (Assumes normality)	0.268

DL/2 Log-Transformed

Mean in Log Scale	-1.421
SD in Log Scale	0.294
95% H-Stat UCL	0.287

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.266

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	5
Number of Detects	13	Number of Non-Detects	6
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.14	Maximum Non-Detect	0.15
Variance Detects	1.3590E-4	Percent Non-Detects	31.58%
Mean Detects	0.112	SD Detects	0.0117
Median Detects	0.11	CV Detects	0.104
Skewness Detects	0.967	Kurtosis Detects	1.254
Mean of Logged Detects	-2.191	SD of Logged Detects	0.101

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.859
1% Shapiro Wilk Critical Value	0.814
Lilliefors Test Statistic	0.194

Shapiro Wilk GOF Test

Detected Data appear Normal at 1% Significance Level

Lilliefors GOF Test

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

1% Lilliefors Critical Value 0.271 Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.111	KM Standard Error of Mean	0.00302
90KM SD	0.0112	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.116	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.116	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.12	95% KM Chebyshev UCL	0.124
97.5% KM Chebyshev UCL	0.13	99% KM Chebyshev UCL	0.141

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.7	Anderson-Darling GOF Test
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.236	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	105.1	k star (bias corrected MLE)	80.9
Theta hat (MLE)	0.00107	Theta star (bias corrected MLE)	0.00139
nu hat (MLE)	2733	nu star (bias corrected)	2103
Mean (detects)	0.112		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0847	Mean	0.109
Maximum	0.14	Median	0.11
SD	0.0131	CV	0.12
k hat (MLE)	73.28	k star (bias corrected MLE)	61.75
Theta hat (MLE)	0.00149	Theta star (bias corrected MLE)	0.00176
nu hat (MLE)	2785	nu star (bias corrected)	2346
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	2235	Adjusted Chi Square Value (N/A, β)	2225
95% Gamma Approximate UCL	0.114	95% Gamma Adjusted UCL	0.115

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.111	SD (KM)	0.0112
Variance (KM)	1.2622E-4	SE of Mean (KM)	0.00302
k hat (KM)	97.03	k star (KM)	81.74
nu hat (KM)	3687	nu star (KM)	3106
theta hat (KM)	0.00114	theta star (KM)	0.00135
80% gamma percentile (KM)	0.121	90% gamma percentile (KM)	0.127
95% gamma percentile (KM)	0.132	99% gamma percentile (KM)	0.141

Gamma Kaplan-Meier (KM) Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Approximate Chi Square Value (N/A, α) 2978

Adjusted Chi Square Value (N/A, β) 2967

95% KM Approximate Gamma UCL 0.115

95% KM Adjusted Gamma UCL 0.116

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic 0.873

Shapiro Wilk GOF Test

10% Shapiro Wilk Critical Value 0.889

Detected Data Not Lognormal at 10% Significance Level

Lilliefors Test Statistic 0.179

Lilliefors GOF Test

10% Lilliefors Critical Value 0.215

Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale 0.109

Mean in Log Scale -2.222

SD in Original Scale 0.0127

SD in Log Scale 0.116

95% t UCL (assumes normality of ROS data) 0.114

95% Percentile Bootstrap UCL 0.114

95% BCA Bootstrap UCL 0.114

95% Bootstrap t UCL 0.115

95% H-UCL (Log ROS) 0.114

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged) -2.206

KM Geo Mean 0.11

KM SD (logged) 0.0976

95% Critical H Value (KM-Log) N/A

KM Standard Error of Mean (logged) 0.0262

95% H-UCL (KM -Log) N/A

KM SD (logged) 0.0976

95% Critical H Value (KM-Log) N/A

KM Standard Error of Mean (logged) 0.0262

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 0.0979

Mean in Log Scale -2.36

SD in Original Scale 0.0247

SD in Log Scale 0.29

95% t UCL (Assumes normality) 0.108

95% H-Stat UCL 0.112

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.116

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (fluoride [mg/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations 19

Number of Distinct Observations 7

Number of Detects 16

Number of Non-Detects 3

Number of Distinct Detects 7

Number of Distinct Non-Detects 1

Minimum Detect 0.15

Minimum Non-Detect 0.15

Maximum Detect 0.251

Maximum Non-Detect 0.15

Variance Detects 6.8373E-4

Percent Non-Detects 15.79%

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean Detects	0.173	SD Detects	0.0261
Median Detects	0.165	CV Detects	0.152
Skewness Detects	2.115	Kurtosis Detects	4.99
Mean of Logged Detects	-1.766	SD of Logged Detects	0.136

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.755	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.844	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.289	Lilliefors GOF Test
1% Lilliefors Critical Value	0.248	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.169	KM Standard Error of Mean	0.00584
90KM SD	0.0246	95% KM (BCA) UCL	0.179
95% KM (t) UCL	0.179	95% KM (Percentile Bootstrap) UCL	0.179
95% KM (z) UCL	0.179	95% KM Bootstrap t UCL	0.187
90% KM Chebyshev UCL	0.187	95% KM Chebyshev UCL	0.194
97.5% KM Chebyshev UCL	0.205	99% KM Chebyshev UCL	0.227

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.216	Anderson-Darling GOF Test
5% A-D Critical Value	0.735	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.276	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.214	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	53.99	k star (bias corrected MLE)	43.91
Theta hat (MLE)	0.0032	Theta star (bias corrected MLE)	0.00393
nu hat (MLE)	1728	nu star (bias corrected)	1405
Mean (detects)	0.173		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.112	Mean	0.164
Maximum	0.251	Median	0.16
SD	0.031	CV	0.189
k hat (MLE)	31.38	k star (bias corrected MLE)	26.46
Theta hat (MLE)	0.00524	Theta star (bias corrected MLE)	0.00621
nu hat (MLE)	1192	nu star (bias corrected)	1005
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	932.7	Adjusted Chi Square Value (N/A, β)	926.6
95% Gamma Approximate UCL	0.177	95% Gamma Adjusted UCL	0.178

Estimates of Gamma Parameters using KM Estimates

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean (KM)	0.169	SD (KM)	0.0246
Variance (KM)	6.0747E-4	SE of Mean (KM)	0.00584
k hat (KM)	47.02	k star (KM)	39.63
nu hat (KM)	1787	nu star (KM)	1506
theta hat (KM)	0.00359	theta star (KM)	0.00426
80% gamma percentile (KM)	0.191	90% gamma percentile (KM)	0.204
95% gamma percentile (KM)	0.215	99% gamma percentile (KM)	0.238

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1417	Adjusted Chi Square Value (N/A, β)	1409
95% KM Approximate Gamma UCL	0.18	95% KM Adjusted Gamma UCL	0.181

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.808	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.906	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.267	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.196	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.165	Mean in Log Scale	-1.813
SD in Original Scale	0.0294	SD in Log Scale	0.168
95% t UCL (assumes normality of ROS data)	0.177	95% Percentile Bootstrap UCL	0.177
95% BCA Bootstrap UCL	0.178	95% Bootstrap t UCL	0.18
95% H-UCL (Log ROS)	0.177		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.787	KM Geo Mean	0.167
KM SD (logged)	0.13	95% Critical H Value (KM-Log)	1.743
KM Standard Error of Mean (logged)	0.0308	95% H-UCL (KM -Log)	0.178
KM SD (logged)	0.13	95% Critical H Value (KM-Log)	1.743
KM Standard Error of Mean (logged)	0.0308		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.157
SD in Original Scale	0.0437
95% t UCL (Assumes normality)	0.175

DL/2 Log-Transformed

Mean in Log Scale	-1.896
SD in Log Scale	0.333
95% H-Stat UCL	0.184

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.179
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (iron [mg/l]_inrawell_apw-02)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	7.63	Mean	9.665
Maximum	11.7	Median	9.665

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_inrawell_apw-02) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (iron [mg/l]_inrawell_apw-03)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.367	Mean	1.014
Maximum	1.66	Median	1.014

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_inrawell_apw-03) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (iron [mg/l]_inrawell_apw-05/05r)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	2.77	Mean	4.33
Maximum	5.89	Median	4.33

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_inrawell_apw-05/05r) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (iron [mg/l]_intrawell_apw-06d)

General Statistics			
Total Number of Observations	1	Number of Distinct Observations	1
		Number of Missing Observations	0
Minimum	3.65	Mean	3.65
Maximum	3.65	Median	3.65

Warning: This data set only has 1 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_intrawell_apw-06d) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (iron [mg/l]_intrawell_apw-06s)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	9.18	Mean	9.265
Maximum	9.35	Median	9.265

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_intrawell_apw-06s) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (iron [mg/l]_intrawell_apw-07)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	17.3	Mean	18.1
Maximum	18.9	Median	18.1

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_intrawell_apw-07) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (iron [mg/l]_intraWell_apw-08)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.44	Mean	1.79
Maximum	3.14	Median	1.79

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_intraWell_apw-08) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (iron [mg/l]_intraWell_apw-10d)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.175	Mean	0.467
Maximum	0.758	Median	0.467

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_intraWell_apw-10d) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (iron [mg/l]_intraWell_apw-10s)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	17.2	Mean	18.4
Maximum	19.6	Median	18.4

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (iron [mg/l]_intraWell_apw-10s) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (lead [ug/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	18
Number of Detects	18	Number of Non-Detects	1
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	2	Minimum Non-Detect	2
Maximum Detect	23.9	Maximum Non-Detect	2
Variance Detects	44.22	Percent Non-Detects	5.263%
Mean Detects	7.932	SD Detects	6.65
Median Detects	5.55	CV Detects	0.838
Skewness Detects	1.292	Kurtosis Detects	0.767
Mean of Logged Detects	1.761	SD of Logged Detects	0.806

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.828	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.858	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.193	Lilliefors GOF Test
1% Lilliefors Critical Value	0.235	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	7.619	KM Standard Error of Mean	1.517
90KM SD	6.428	95% KM (BCA) UCL	10.18
95% KM (t) UCL	10.25	95% KM (Percentile Bootstrap) UCL	10.12
95% KM (z) UCL	10.12	95% KM Bootstrap t UCL	11.2
90% KM Chebyshev UCL	12.17	95% KM Chebyshev UCL	14.23
97.5% KM Chebyshev UCL	17.1	99% KM Chebyshev UCL	22.72

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.545	Anderson-Darling GOF Test
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.162	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.207	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.761	k star (bias corrected MLE)	1.504
Theta hat (MLE)	4.504	Theta star (bias corrected MLE)	5.272
nu hat (MLE)	63.39	nu star (bias corrected)	54.16
Mean (detects)	7.932		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
 GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
 For such situations, GROS method may yield incorrect values of UCLs and BTVs
 This is especially true when the sample size is small.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	7.515
Maximum	23.9	Median	5.4
SD	6.713	CV	0.893
k hat (MLE)	0.979	k star (bias corrected MLE)	0.859
Theta hat (MLE)	7.676	Theta star (bias corrected MLE)	8.744
nu hat (MLE)	37.2	nu star (bias corrected)	32.66
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (32.66, α)	20.6	Adjusted Chi Square Value (32.66, β)	19.76
95% Gamma Approximate UCL	11.92	95% Gamma Adjusted UCL	12.42

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	7.619	SD (KM)	6.428
Variance (KM)	41.32	SE of Mean (KM)	1.517
k hat (KM)	1.405	k star (KM)	1.218
nu hat (KM)	53.39	nu star (KM)	46.29
theta hat (KM)	5.423	theta star (KM)	6.254
80% gamma percentile (KM)	12.05	90% gamma percentile (KM)	16.71
95% gamma percentile (KM)	21.3	99% gamma percentile (KM)	31.82

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (46.29, α)	31.68	Adjusted Chi Square Value (46.29, β)	30.63
95% KM Approximate Gamma UCL	11.13	95% KM Adjusted Gamma UCL	11.52

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.935	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.148	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.185	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.556	Mean in Log Scale	1.656
SD in Original Scale	6.667	SD in Log Scale	0.906
95% t UCL (assumes normality of ROS data)	10.21	95% Percentile Bootstrap UCL	10.14
95% BCA Bootstrap UCL	10.49	95% Bootstrap t UCL	10.88
95% H-UCL (Log ROS)	13.42		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.705	KM Geo Mean	5.499
KM SD (logged)	0.799	95% Critical H Value (KM-Log)	2.34
KM Standard Error of Mean (logged)	0.189	95% H-UCL (KM -Log)	11.75
KM SD (logged)	0.799	95% Critical H Value (KM-Log)	2.34
KM Standard Error of Mean (logged)	0.189		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	7.567
SD in Original Scale	6.655
95% t UCL (Assumes normality)	10.21

DL/2 Log-Transformed

Mean in Log Scale	1.668
SD in Log Scale	0.881
95% H-Stat UCL	12.99

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 10.25

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lead [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	8
Number of Detects	6	Number of Non-Detects	13
Number of Distinct Detects	6	Number of Distinct Non-Detects	2
Minimum Detect	1.3	Minimum Non-Detect	1
Maximum Detect	4.4	Maximum Non-Detect	2
Variance Detects	1.499	Percent Non-Detects	68.42%
Mean Detects	2.867	SD Detects	1.224
Median Detects	2.6	CV Detects	0.427
Skewness Detects	0.245	Kurtosis Detects	-1.525
Mean of Logged Detects	0.97	SD of Logged Detects	0.46

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.927	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.195	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.596	KM Standard Error of Mean	0.269
90KM SD	1.068	95% KM (BCA) UCL	2.048
95% KM (t) UCL	2.062	95% KM (Percentile Bootstrap) UCL	2.021
95% KM (z) UCL	2.038	95% KM Bootstrap t UCL	2.088
90% KM Chebyshev UCL	2.402	95% KM Chebyshev UCL	2.767
97.5% KM Chebyshev UCL	3.274	99% KM Chebyshev UCL	4.27

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.266	Anderson-Darling GOF Test	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.207	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	6.158	k star (bias corrected MLE)	3.19
Theta hat (MLE)	0.465	Theta star (bias corrected MLE)	0.899
nu hat (MLE)	73.9	nu star (bias corrected)	38.28
Mean (detects)	2.867		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.009
Maximum	4.4	Median	0.0307
SD	1.466	CV	1.453
k hat (MLE)	0.318	k star (bias corrected MLE)	0.303
Theta hat (MLE)	3.176	Theta star (bias corrected MLE)	3.334
nu hat (MLE)	12.07	nu star (bias corrected)	11.5
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (11.50, α)	4.898	Adjusted Chi Square Value (11.50, β)	4.526
95% Gamma Approximate UCL	2.368	95% Gamma Adjusted UCL	2.562

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.596	SD (KM)	1.068
Variance (KM)	1.142	SE of Mean (KM)	0.269
k hat (KM)	2.231	k star (KM)	1.913
nu hat (KM)	84.76	nu star (KM)	72.71
theta hat (KM)	0.715	theta star (KM)	0.834
80% gamma percentile (KM)	2.402	90% gamma percentile (KM)	3.136
95% gamma percentile (KM)	3.839	99% gamma percentile (KM)	5.401

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (72.71, α)	54.08	Adjusted Chi Square Value (72.71, β)	52.67
95% KM Approximate Gamma UCL	2.146	95% KM Adjusted Gamma UCL	2.203

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.943	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.177	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.298	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.321	Mean in Log Scale	-0.13
SD in Original Scale	1.283	SD in Log Scale	0.93
95% t UCL (assumes normality of ROS data)	1.831	95% Percentile Bootstrap UCL	1.821

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% BCA Bootstrap UCL	1.928	95% Bootstrap t UCL	2
95% H-UCL (Log ROS)	2.349		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.312	KM Geo Mean	1.366
KM SD (logged)	0.507	95% Critical H Value (KM-Log)	2.016
KM Standard Error of Mean (logged)	0.128	95% H-UCL (KM -Log)	1.976
KM SD (logged)	0.507	95% Critical H Value (KM-Log)	2.016
KM Standard Error of Mean (logged)	0.128		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.353
SD in Original Scale	1.254
95% t UCL (Assumes normality)	1.851

DL/2 Log-Transformed

Mean in Log Scale	-0.0221
SD in Log Scale	0.782
95% H-Stat UCL	2.037

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	2.062
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lead [ug/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	15
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	2.6	Maximum Non-Detect	2
Variance Detects	0.435	Percent Non-Detects	78.95%
Mean Detects	2.018	SD Detects	0.66
Median Detects	2.185	CV Detects	0.327
Skewness Detects	-1.233	Kurtosis Detects	1.268
Mean of Logged Detects	0.652	SD of Logged Detects	0.387

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.915
1% Shapiro Wilk Critical Value	0.687
Lilliefors Test Statistic	0.239
1% Lilliefors Critical Value	0.413

Shapiro Wilk GOF Test

Detected Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM Mean	1.215	KM Standard Error of Mean	0.13
90KM SD	0.49	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.441	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.429	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.605	95% KM Chebyshev UCL	1.782
97.5% KM Chebyshev UCL	2.027	99% KM Chebyshev UCL	2.508

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.412	Anderson-Darling GOF Test	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.281	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	10.14	k star (bias corrected MLE)	2.7
Theta hat (MLE)	0.199	Theta star (bias corrected MLE)	0.747
nu hat (MLE)	81.08	nu star (bias corrected)	21.6
Mean (detects)	2.018		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.568
Maximum	2.6	Median	0.01
SD	0.852	CV	1.5
k hat (MLE)	0.35	k star (bias corrected MLE)	0.33
Theta hat (MLE)	1.621	Theta star (bias corrected MLE)	1.721
nu hat (MLE)	13.32	nu star (bias corrected)	12.55
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (12.55, α)	5.589	Adjusted Chi Square Value (12.55, β)	5.187
95% Gamma Approximate UCL	1.275	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.215	SD (KM)	0.49
Variance (KM)	0.24	SE of Mean (KM)	0.13
k hat (KM)	6.145	k star (KM)	5.21
nu hat (KM)	233.5	nu star (KM)	198
theta hat (KM)	0.198	theta star (KM)	0.233
80% gamma percentile (KM)	1.626	90% gamma percentile (KM)	1.928
95% gamma percentile (KM)	2.203	99% gamma percentile (KM)	2.782

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (197.98, α)	166.4	Adjusted Chi Square Value (197.98, β)	163.9
95% KM Approximate Gamma UCL	1.446	95% KM Adjusted Gamma UCL	1.468

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.857	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.293	Lilliefors GOF Test
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.798	Mean in Log Scale	-0.571
SD in Original Scale	0.735	SD in Log Scale	0.847
95% t UCL (assumes normality of ROS data)	1.091	95% Percentile Bootstrap UCL	1.091
95% BCA Bootstrap UCL	1.142	95% Bootstrap t UCL	1.215
95% H-UCL (Log ROS)	1.305		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.138	KM Geo Mean	1.148
KM SD (logged)	0.307	95% Critical H Value (KM-Log)	1.85
KM Standard Error of Mean (logged)	0.0813	95% H-UCL (KM -Log)	1.376
KM SD (logged)	0.307	95% Critical H Value (KM-Log)	1.85
KM Standard Error of Mean (logged)	0.0813		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 0.898
 SD in Original Scale 0.677
 95% t UCL (Assumes normality) 1.168

DL/2 Log-Transformed

Mean in Log Scale -0.301
 SD in Log Scale 0.587
 95% H-Stat UCL 1.175

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.441

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lead [ug/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	16
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	1.6	Maximum Non-Detect	2
Variance Detects	0.08	Percent Non-Detects	88.89%
Mean Detects	1.4	SD Detects	0.283
Median Detects	1.4	CV Detects	0.202

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.326	SD of Logged Detects	0.203

**Warning: Data set has only 2 Detected Values.
 This is not enough to compute meaningful or reliable statistics and estimates.**

**Normal GOF Test on Detects Only
 Not Enough Data to Perform GOF Test**

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.057	KM Standard Error of Mean	0.0601
90KM SD	0.159	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.162	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.156	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.238	95% KM Chebyshev UCL	1.319
97.5% KM Chebyshev UCL	1.433	99% KM Chebyshev UCL	1.655

**Gamma GOF Tests on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Gamma Statistics on Detected Data Only

k hat (MLE)	48.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0288	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	194.7	nu star (bias corrected)	N/A
Mean (detects)	1.4		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.057	SD (KM)	0.159
Variance (KM)	0.0253	SE of Mean (KM)	0.0601
k hat (KM)	44.16	k star (KM)	36.84
nu hat (KM)	1590	nu star (KM)	1326
theta hat (KM)	0.0239	theta star (KM)	0.0287
80% gamma percentile (KM)	1.2	90% gamma percentile (KM)	1.286
95% gamma percentile (KM)	1.359	99% gamma percentile (KM)	1.504

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1243	Adjusted Level of Significance (β)	0.0357
95% KM Approximate Gamma UCL	1.128	Adjusted Chi Square Value (N/A, β)	1235
		95% KM Adjusted Gamma UCL	1.135

**Lognormal GOF Test on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.528	Mean in Log Scale	-0.857
SD in Original Scale	0.384	SD in Log Scale	0.678
95% t UCL (assumes normality of ROS data)	0.686	95% Percentile Bootstrap UCL	0.688
95% BCA Bootstrap UCL	0.719	95% Bootstrap t UCL	0.756
95% H-UCL (Log ROS)	0.769		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0466	KM Geo Mean	1.048
KM SD (logged)	0.126	95% Critical H Value (KM-Log)	1.746
KM Standard Error of Mean (logged)	0.0478	95% H-UCL (KM -Log)	1.114
KM SD (logged)	0.126	95% Critical H Value (KM-Log)	1.746
KM Standard Error of Mean (logged)	0.0478		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.711
SD in Original Scale	0.334
95% t UCL (Assumes normality)	0.848

DL/2 Log-Transformed

Mean in Log Scale	-0.426
SD in Log Scale	0.403
95% H-Stat UCL	0.856

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 1.162

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lead [ug/l]_intraWell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (lead [ug/l]_intraWell_apw-06s) was not processed!

x_ols (lead [ug/l]_intraWell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (lead [ug/l]_intraWell_apw-07) was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (lead [ug/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	14
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	2.8	Maximum Non-Detect	2
Variance Detects	0.428	Percent Non-Detects	73.68%
Mean Detects	1.94	SD Detects	0.654
Median Detects	1.8	CV Detects	0.337
Skewness Detects	0.357	Kurtosis Detects	-1.657
Mean of Logged Detects	0.616	SD of Logged Detects	0.343

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.958	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.185	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.272	KM Standard Error of Mean	0.136
90KM SD	0.514	95% KM (BCA) UCL	1.53
95% KM (t) UCL	1.507	95% KM (Percentile Bootstrap) UCL	1.501
95% KM (z) UCL	1.495	95% KM Bootstrap t UCL	1.45
90% KM Chebyshev UCL	1.679	95% KM Chebyshev UCL	1.863
97.5% KM Chebyshev UCL	2.119	99% KM Chebyshev UCL	2.622

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.22	Anderson-Darling GOF Test	
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.196	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	10.9	k star (bias corrected MLE)	4.495
Theta hat (MLE)	0.178	Theta star (bias corrected MLE)	0.432
nu hat (MLE)	109	nu star (bias corrected)	44.95
Mean (detects)	1.94		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.766
Maximum	2.8	Median	0.545
SD	0.851	CV	1.111
k hat (MLE)	0.512	k star (bias corrected MLE)	0.466
Theta hat (MLE)	1.496	Theta star (bias corrected MLE)	1.642
nu hat (MLE)	19.47	nu star (bias corrected)	17.73
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (17.73, α)	9.192	Adjusted Chi Square Value (17.73, β)	8.658
95% Gamma Approximate UCL	1.477	95% Gamma Adjusted UCL	1.568

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.272	SD (KM)	0.514
Variance (KM)	0.264	SE of Mean (KM)	0.136
k hat (KM)	6.128	k star (KM)	5.195
nu hat (KM)	232.9	nu star (KM)	197.4
theta hat (KM)	0.208	theta star (KM)	0.245
80% gamma percentile (KM)	1.702	90% gamma percentile (KM)	2.018
95% gamma percentile (KM)	2.306	99% gamma percentile (KM)	2.913

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (197.43, α)	165.9	Adjusted Chi Square Value (197.43, β)	163.4
95% KM Approximate Gamma UCL	1.513	95% KM Adjusted Gamma UCL	1.537

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.97	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.175	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.016	Mean in Log Scale	-0.172
SD in Original Scale	0.686	SD in Log Scale	0.622
95% t UCL (assumes normality of ROS data)	1.289	95% Percentile Bootstrap UCL	1.285
95% BCA Bootstrap UCL	1.319	95% Bootstrap t UCL	1.395
95% H-UCL (Log ROS)	1.397		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.181	KM Geo Mean	1.199
KM SD (logged)	0.317	95% Critical H Value (KM-Log)	1.857
KM Standard Error of Mean (logged)	0.085	95% H-UCL (KM -Log)	1.448
KM SD (logged)	0.317	95% Critical H Value (KM-Log)	1.857
KM Standard Error of Mean (logged)	0.085		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.984
SD in Original Scale	0.692

DL/2 Log-Transformed

Mean in Log Scale	-0.203
SD in Log Scale	0.596

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% t UCL (Assumes normality) 1.26 95% H-Stat UCL 1.311

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.507

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lead [ug/l]_intra well_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	2	Maximum Non-Detect	2
Variance Detects	0.5	Percent Non-Detects	89.47%
Mean Detects	1.5	SD Detects	0.707
Median Detects	1.5	CV Detects	0.471
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.347	SD of Logged Detects	0.49

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.053	KM Standard Error of Mean	0.0724
90KM SD	0.223	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.178	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.172	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.27	95% KM Chebyshev UCL	1.368
97.5% KM Chebyshev UCL	1.505	99% KM Chebyshev UCL	1.773

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.653	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.173	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	34.61	nu star (bias corrected)	N/A
Mean (detects)	1.5		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.053	SD (KM)	0.223
Variance (KM)	0.0499	SE of Mean (KM)	0.0724
k hat (KM)	22.22	k star (KM)	18.75
nu hat (KM)	844.4	nu star (KM)	712.4
theta hat (KM)	0.0474	theta star (KM)	0.0561
80% gamma percentile (KM)	1.25	90% gamma percentile (KM)	1.374
95% gamma percentile (KM)	1.482	99% gamma percentile (KM)	1.699

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (712.44, α)	651.5	Adjusted Level of Significance (β)	0.0369
95% KM Approximate Gamma UCL	1.151	Adjusted Chi Square Value (712.44, β)	646.4
		95% KM Adjusted Gamma UCL	1.16

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.348	Mean in Log Scale	-1.618
SD in Original Scale	0.464	SD in Log Scale	1.06
95% t UCL (assumes normality of ROS data)	0.533	95% Percentile Bootstrap UCL	0.534
95% BCA Bootstrap UCL	0.6	95% Bootstrap t UCL	0.768
95% H-UCL (Log ROS)	0.682		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0365	KM Geo Mean	1.037
KM SD (logged)	0.155	95% Critical H Value (KM-Log)	1.756
KM Standard Error of Mean (logged)	0.0502	95% H-UCL (KM -Log)	1.119
KM SD (logged)	0.155	95% Critical H Value (KM-Log)	1.756
KM Standard Error of Mean (logged)	0.0502		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.711
SD in Original Scale	0.384
95% t UCL (Assumes normality)	0.863

DL/2 Log-Transformed

Mean in Log Scale	-0.438
SD in Log Scale	0.414
95% H-Stat UCL	0.849

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.178
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	14
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	4.3	Maximum Non-Detect	2
Variance Detects	1.907	Percent Non-Detects	73.68%
Mean Detects	2.28	SD Detects	1.381
Median Detects	1.6	CV Detects	0.606
Skewness Detects	0.902	Kurtosis Detects	-0.919
Mean of Logged Detects	0.679	SD of Logged Detects	0.599

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.889	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.289	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.353	KM Standard Error of Mean	0.219
90KM SD	0.846	95% KM (BCA) UCL	1.697
95% KM (t) UCL	1.732	95% KM (Percentile Bootstrap) UCL	1.702
95% KM (z) UCL	1.712	95% KM Bootstrap t UCL	2.049
90% KM Chebyshev UCL	2.009	95% KM Chebyshev UCL	2.306
97.5% KM Chebyshev UCL	2.718	99% KM Chebyshev UCL	3.527

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.333	Anderson-Darling GOF Test	
5% A-D Critical Value	0.682	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.275	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.359	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	3.609	k star (bias corrected MLE)	1.577
Theta hat (MLE)	0.632	Theta star (bias corrected MLE)	1.446
nu hat (MLE)	36.09	nu star (bias corrected)	15.77
Mean (detects)	2.28		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.654
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Maximum	4.3	Median	0.01
SD	1.203	CV	1.84
k hat (MLE)	0.288	k star (bias corrected MLE)	0.277
Theta hat (MLE)	2.273	Theta star (bias corrected MLE)	2.358
nu hat (MLE)	10.93	nu star (bias corrected)	10.54
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (10.54, α)	4.281	Adjusted Chi Square Value (10.54, β)	3.938
95% Gamma Approximate UCL	1.61	95% Gamma Adjusted UCL	1.75

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.353	SD (KM)	0.846
Variance (KM)	0.716	SE of Mean (KM)	0.219
k hat (KM)	2.555	k star (KM)	2.187
nu hat (KM)	97.1	nu star (KM)	83.1
theta hat (KM)	0.529	theta star (KM)	0.619
80% gamma percentile (KM)	2.004	90% gamma percentile (KM)	2.577
95% gamma percentile (KM)	3.121	99% gamma percentile (KM)	4.32

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (83.10, α)	63.1	Adjusted Chi Square Value (83.10, β)	61.57
95% KM Approximate Gamma UCL	1.782	95% KM Adjusted Gamma UCL	1.826

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.94	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.237	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.877	Mean in Log Scale	-0.712
SD in Original Scale	1.101	SD in Log Scale	1.098
95% t UCL (assumes normality of ROS data)	1.315	95% Percentile Bootstrap UCL	1.314
95% BCA Bootstrap UCL	1.436	95% Bootstrap t UCL	1.803
95% H-UCL (Log ROS)	1.826		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.192	KM Geo Mean	1.211
KM SD (logged)	0.407	95% Critical H Value (KM-Log)	1.927
KM Standard Error of Mean (logged)	0.106	95% H-UCL (KM -Log)	1.583
KM SD (logged)	0.407	95% Critical H Value (KM-Log)	1.927
KM Standard Error of Mean (logged)	0.106		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.074
SD in Original Scale	1.006
95% t UCL (Assumes normality)	1.474

DL/2 Log-Transformed

Mean in Log Scale	-0.186
SD in Log Scale	0.662
95% H-Stat UCL	1.452

DL/2 is not a recommended method, provided for comparisons and historical reasons

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.732

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lithium [ug/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	38.6	Mean	48.72
Maximum	64.7	Median	47.4
SD	7.068	Std. Error of Mean	1.622
Coefficient of Variation	0.145	Skewness	0.697

Normal GOF Test

Shapiro Wilk Test Statistic	0.951
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.129
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 51.53

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	51.67
95% Modified-t UCL (Johnson-1978)	51.58

Gamma GOF Test

A-D Test Statistic	0.28
5% A-D Critical Value	0.74
K-S Test Statistic	0.122
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	52.26	k star (bias corrected MLE)	44.04
Theta hat (MLE)	0.932	Theta star (bias corrected MLE)	1.106
nu hat (MLE)	1986	nu star (bias corrected)	1674
MLE Mean (bias corrected)	48.72	MLE Sd (bias corrected)	7.341
		Approximate Chi Square Value (0.05)	1580
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1572

Assuming Gamma Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Approximate Gamma UCL 51.62 95% Adjusted Gamma UCL 51.88

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.112	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.653	Mean of logged Data	3.877
Maximum of Logged Data	4.17	SD of logged Data	0.141

Assuming Lognormal Distribution

95% H-UCL	51.66	90% Chebyshev (MVUE) UCL	53.46
95% Chebyshev (MVUE) UCL	55.61	97.5% Chebyshev (MVUE) UCL	58.59
99% Chebyshev (MVUE) UCL	64.46		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	51.39	95% BCA Bootstrap UCL	51.86
95% Standard Bootstrap UCL	51.36	95% Bootstrap-t UCL	51.79
95% Hall's Bootstrap UCL	51.64	95% Percentile Bootstrap UCL	51.53
90% Chebyshev(Mean, Sd) UCL	53.59	95% Chebyshev(Mean, Sd) UCL	55.79
97.5% Chebyshev(Mean, Sd) UCL	58.85	99% Chebyshev(Mean, Sd) UCL	64.85

Suggested UCL to Use

95% Student's-t UCL 51.53

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lithium [ug/l]_intraWell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	28.95	Mean	32.92
Maximum	40.31	Median	32.2
SD	2.965	Std. Error of Mean	0.68
Coefficient of Variation	0.0901	Skewness	1.042

Normal GOF Test

Shapiro Wilk Test Statistic	0.914	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.213	Lilliefors GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

1% Lilliefors Critical Value 0.229 Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 34.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 34.22

95% Modified-t UCL (Johnson-1978) 34.13

Gamma GOF Test

A-D Test Statistic 0.575

5% A-D Critical Value 0.738

K-S Test Statistic 0.201

5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE) 136.3

Theta hat (MLE) 0.241

nu hat (MLE) 5181

MLE Mean (bias corrected) 32.92

Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 114.9

Theta star (bias corrected MLE) 0.287

nu star (bias corrected) 4364

MLE Sd (bias corrected) 3.072

Approximate Chi Square Value (0.05) 4212

Adjusted Chi Square Value 4199

Assuming Gamma Distribution

95% Approximate Gamma UCL 34.11

95% Adjusted Gamma UCL 34.22

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.935

10% Shapiro Wilk Critical Value 0.917

Lilliefors Test Statistic 0.196

10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 3.366

Maximum of Logged Data 3.697

Mean of logged Data 3.49

SD of logged Data 0.0871

Assuming Lognormal Distribution

95% H-UCL N/A

95% Chebyshev (MVUE) UCL 35.79

99% Chebyshev (MVUE) UCL 39.47

90% Chebyshev (MVUE) UCL 34.9

97.5% Chebyshev (MVUE) UCL 37.03

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 34.04

95% Standard Bootstrap UCL 34.03

95% Hall's Bootstrap UCL 34.43

90% Chebyshev(Mean, Sd) UCL 34.96

95% BCA Bootstrap UCL 34.28

95% Bootstrap-t UCL 34.45

95% Percentile Bootstrap UCL 34.08

95% Chebyshev(Mean, Sd) UCL 35.89

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.728	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.259	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.885	Mean of logged Data	3.636
Maximum of Logged Data	3.957	SD of logged Data	0.212

Assuming Lognormal Distribution

95% H-UCL	42.43	90% Chebyshev (MVUE) UCL	44.45
95% Chebyshev (MVUE) UCL	47.02	97.5% Chebyshev (MVUE) UCL	50.6
99% Chebyshev (MVUE) UCL	57.62		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	41.16	95% BCA Bootstrap UCL	40.74
95% Standard Bootstrap UCL	41.12	95% Bootstrap-t UCL	40.89
95% Hall's Bootstrap UCL	40.91	95% Percentile Bootstrap UCL	41.01
90% Chebyshev(Mean, Sd) UCL	43.24	95% Chebyshev(Mean, Sd) UCL	45.32
97.5% Chebyshev(Mean, Sd) UCL	48.2	99% Chebyshev(Mean, Sd) UCL	53.87

Suggested UCL to Use

95% Student's-t UCL 41.3

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (lithium [ug/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	16	Mean	17.25
Maximum	19.9	Median	17.15
SD	1.024	Std. Error of Mean	0.241
Coefficient of Variation	0.0594	Skewness	0.987

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Normal GOF Test

Shapiro Wilk Test Statistic 0.926
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.111
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 17.67

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 17.71
 95% Modified-t UCL (Johnson-1978) 17.68

Gamma GOF Test

A-D Test Statistic 0.341
 5% A-D Critical Value 0.737
 K-S Test Statistic 0.111
 5% K-S Critical Value 0.203

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 309.8
 Theta hat (MLE) 0.0557
 nu hat (MLE) 11151
 MLE Mean (bias corrected) 17.25
 Adjusted Level of Significance 0.0357

k star (bias corrected MLE) 258.2
 Theta star (bias corrected MLE) 0.0668
 nu star (bias corrected) 9294
 MLE Sd (bias corrected) 1.074
 Approximate Chi Square Value (0.05) 9071
 Adjusted Chi Square Value 9050

Assuming Gamma Distribution

95% Approximate Gamma UCL 17.67

95% Adjusted Gamma UCL 17.72

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.938
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.106
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 2.773
 Maximum of Logged Data 2.991

Mean of logged Data 2.846
 SD of logged Data 0.0581

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 18.28
 99% Chebyshev (MVUE) UCL 19.6

90% Chebyshev (MVUE) UCL 17.96
 97.5% Chebyshev (MVUE) UCL 18.72

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% CLT UCL	17.65	95% BCA Bootstrap UCL	17.71
95% Standard Bootstrap UCL	17.64	95% Bootstrap-t UCL	17.73
95% Hall's Bootstrap UCL	17.76	95% Percentile Bootstrap UCL	17.67
90% Chebyshev(Mean, Sd) UCL	17.97	95% Chebyshev(Mean, Sd) UCL	18.3
97.5% Chebyshev(Mean, Sd) UCL	18.76	99% Chebyshev(Mean, Sd) UCL	19.65

Suggested UCL to Use

95% Student's-t UCL 17.67

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lithium [ug/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	32	Mean	40.76
Maximum	56.4	Median	41
SD	5.138	Std. Error of Mean	1.179
Coefficient of Variation	0.126	Skewness	1.272

Normal GOF Test

Shapiro Wilk Test Statistic	0.871
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.239
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 42.81

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 43.07

95% Modified-t UCL (Johnson-1978) 42.86

Gamma GOF Test

A-D Test Statistic	0.782
5% A-D Critical Value	0.739
K-S Test Statistic	0.219
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	70.75	k star (bias corrected MLE)	59.61
Theta hat (MLE)	0.576	Theta star (bias corrected MLE)	0.684
nu hat (MLE)	2688	nu star (bias corrected)	2265
MLE Mean (bias corrected)	40.76	MLE Sd (bias corrected)	5.28
		Approximate Chi Square Value (0.05)	2156
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2146

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Gamma Distribution

95% Approximate Gamma UCL	42.83	95% Adjusted Gamma UCL	43.02
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.911	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.214	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.466	Mean of logged Data	3.701
Maximum of Logged Data	4.032	SD of logged Data	0.121

Assuming Lognormal Distribution

95% H-UCL	42.84	90% Chebyshev (MVUE) UCL	44.15
95% Chebyshev (MVUE) UCL	45.69	97.5% Chebyshev (MVUE) UCL	47.83
99% Chebyshev (MVUE) UCL	52.02		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	42.7	95% BCA Bootstrap UCL	43.15
95% Standard Bootstrap UCL	42.71	95% Bootstrap-t UCL	43.21
95% Hall's Bootstrap UCL	44.72	95% Percentile Bootstrap UCL	42.85
90% Chebyshev(Mean, Sd) UCL	44.3	95% Chebyshev(Mean, Sd) UCL	45.9
97.5% Chebyshev(Mean, Sd) UCL	48.13	99% Chebyshev(Mean, Sd) UCL	52.49

Suggested UCL to Use

95% Student's-t UCL 42.81

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lithium [ug/l]_intraWell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	14.1	Mean	17.22
Maximum	23.1	Median	17.4
SD	2.106	Std. Error of Mean	0.483
Coefficient of Variation	0.122	Skewness	0.873

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Normal GOF Test

Shapiro Wilk Test Statistic	0.922	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.134	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 18.06

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 18.12
 95% Modified-t UCL (Johnson-1978) 18.08

Gamma GOF Test

A-D Test Statistic	0.392	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.121	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.198	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	73.46	k star (bias corrected MLE)	61.9
Theta hat (MLE)	0.234	Theta star (bias corrected MLE)	0.278
nu hat (MLE)	2792	nu star (bias corrected)	2352
MLE Mean (bias corrected)	17.22	MLE Sd (bias corrected)	2.189
		Approximate Chi Square Value (0.05)	2240
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2231

Assuming Gamma Distribution

95% Approximate Gamma UCL 18.08 95% Adjusted Gamma UCL 18.16

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.124	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.646	Mean of logged Data	2.839
Maximum of Logged Data	3.14	SD of logged Data	0.119

Assuming Lognormal Distribution

95% H-UCL	18.09	90% Chebyshev (MVUE) UCL	18.63
95% Chebyshev (MVUE) UCL	19.27	97.5% Chebyshev (MVUE) UCL	20.16
99% Chebyshev (MVUE) UCL	21.91		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCLs

95% CLT UCL	18.02	95% BCA Bootstrap UCL	18.13
95% Standard Bootstrap UCL	18.03	95% Bootstrap-t UCL	18.17
95% Hall's Bootstrap UCL	18.38	95% Percentile Bootstrap UCL	18.08
90% Chebyshev(Mean, Sd) UCL	18.67	95% Chebyshev(Mean, Sd) UCL	19.33
97.5% Chebyshev(Mean, Sd) UCL	20.24	99% Chebyshev(Mean, Sd) UCL	22.03

Suggested UCL to Use

95% Student's-t UCL 18.06

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lithium [ug/l]_inrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	13.47	Mean	15.91
Maximum	20.52	Median	15.21
SD	1.846	Std. Error of Mean	0.424
Coefficient of Variation	0.116	Skewness	0.906

Normal GOF Test

Shapiro Wilk Test Statistic	0.922
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.175
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 16.64

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	16.7
95% Modified-t UCL (Johnson-1978)	16.66

Gamma GOF Test

A-D Test Statistic	0.517
5% A-D Critical Value	0.739
K-S Test Statistic	0.176
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	82.3	k star (bias corrected MLE)	69.34
Theta hat (MLE)	0.193	Theta star (bias corrected MLE)	0.229
nu hat (MLE)	3127	nu star (bias corrected)	2635
MLE Mean (bias corrected)	15.91	MLE Sd (bias corrected)	1.91
		Approximate Chi Square Value (0.05)	2517

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Adjusted Level of Significance 0.0369 Adjusted Chi Square Value 2506

Assuming Gamma Distribution

95% Approximate Gamma UCL 16.66 95% Adjusted Gamma UCL 16.72

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.941	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.169	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.6	Mean of logged Data	2.761
Maximum of Logged Data	3.021	SD of logged Data	0.112

Assuming Lognormal Distribution

95% H-UCL	16.66	90% Chebyshev (MVUE) UCL	17.14
95% Chebyshev (MVUE) UCL	17.69	97.5% Chebyshev (MVUE) UCL	18.47
99% Chebyshev (MVUE) UCL	19.99		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	16.61	95% BCA Bootstrap UCL	16.68
95% Standard Bootstrap UCL	16.59	95% Bootstrap-t UCL	16.73
95% Hall's Bootstrap UCL	16.74	95% Percentile Bootstrap UCL	16.63
90% Chebyshev(Mean, Sd) UCL	17.18	95% Chebyshev(Mean, Sd) UCL	17.75
97.5% Chebyshev(Mean, Sd) UCL	18.55	99% Chebyshev(Mean, Sd) UCL	20.12

Suggested UCL to Use

95% Student's-t UCL 16.64

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (lithium [ug/l]_intraWell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	11.3	Mean	14.77
Maximum	18	Median	14.7
SD	1.338	Std. Error of Mean	0.307
Coefficient of Variation	0.0906	Skewness	-0.417

Normal GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.89	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.187	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	15.3	95% Adjusted-CLT UCL (Chen-1995)	15.24
		95% Modified-t UCL (Johnson-1978)	15.3

Gamma GOF Test

A-D Test Statistic	0.997	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.738	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.198	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.198	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	123.5	k star (bias corrected MLE)	104
Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.142
nu hat (MLE)	4691	nu star (bias corrected)	3952
MLE Mean (bias corrected)	14.77	MLE Sd (bias corrected)	1.448
		Approximate Chi Square Value (0.05)	3807
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	3794

Assuming Gamma Distribution

95% Approximate Gamma UCL	15.33	95% Adjusted Gamma UCL	15.38
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.87	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.205	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.425	Mean of logged Data	2.688
Maximum of Logged Data	2.89	SD of logged Data	0.0937

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	15.72
95% Chebyshev (MVUE) UCL	16.16	97.5% Chebyshev (MVUE) UCL	16.76
99% Chebyshev (MVUE) UCL	17.93		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	15.27	95% BCA Bootstrap UCL	15.23
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Standard Bootstrap UCL	15.24	95% Bootstrap-t UCL	15.24
95% Hall's Bootstrap UCL	15.29	95% Percentile Bootstrap UCL	15.24
90% Chebyshev(Mean, Sd) UCL	15.69	95% Chebyshev(Mean, Sd) UCL	16.11
97.5% Chebyshev(Mean, Sd) UCL	16.68	99% Chebyshev(Mean, Sd) UCL	17.82

Suggested UCL to Use

95% Student's-t UCL 15.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (lithium [ug/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	26.3	Mean	30.59
Maximum	40.1	Median	29.7
SD	3.221	Std. Error of Mean	0.739
Coefficient of Variation	0.105	Skewness	1.493

Normal GOF Test

Shapiro Wilk Test Statistic	0.889
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.158
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 31.87

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	32.08
95% Modified-t UCL (Johnson-1978)	31.91

Gamma GOF Test

A-D Test Statistic	0.501
5% A-D Critical Value	0.738
K-S Test Statistic	0.143
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	102.7	k star (bias corrected MLE)	86.52
Theta hat (MLE)	0.298	Theta star (bias corrected MLE)	0.354
nu hat (MLE)	3903	nu star (bias corrected)	3288
MLE Mean (bias corrected)	30.59	MLE Sd (bias corrected)	3.289

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

The data set for variable x_ols (manganese [mg/l]_inrawell_apw-02) was not processed!

**It is suggested to collect at least 8 to 10 observations before using these statistical methods!
 If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**

x_ols (manganese [mg/l]_inrawell_apw-03)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.321	Mean	0.378
Maximum	0.435	Median	0.378

Warning: This data set only has 2 observations!

**Data set is too small to compute reliable and meaningful statistics and estimates!
 The data set for variable x_ols (manganese [mg/l]_inrawell_apw-03) was not processed!**

**It is suggested to collect at least 8 to 10 observations before using these statistical methods!
 If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**

x_ols (manganese [mg/l]_inrawell_apw-05/05r)

General Statistics			
Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.554	Mean	0.727
Maximum	0.9	Median	0.727

Warning: This data set only has 2 observations!

**Data set is too small to compute reliable and meaningful statistics and estimates!
 The data set for variable x_ols (manganese [mg/l]_inrawell_apw-05/05r) was not processed!**

**It is suggested to collect at least 8 to 10 observations before using these statistical methods!
 If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**

x_ols (manganese [mg/l]_inrawell_apw-06d)

General Statistics			
Total Number of Observations	1	Number of Distinct Observations	1
		Number of Missing Observations	0
Minimum	0.622	Mean	0.622
Maximum	0.622	Median	0.622

Warning: This data set only has 1 observations!

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (manganese [mg/l]_intrawell_apw-06d) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (manganese [mg/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.512	Mean	0.521
Maximum	0.53	Median	0.521

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (manganese [mg/l]_intrawell_apw-06s) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (manganese [mg/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	1.11	Mean	1.15
Maximum	1.19	Median	1.15

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (manganese [mg/l]_intrawell_apw-07) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (manganese [mg/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.0435	Mean	0.123
Maximum	0.202	Median	0.123

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (manganese [mg/l]_inrawell_apw-08) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (manganese [mg/l]_inrawell_apw-10d)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.88	Mean	1.02
Maximum	1.16	Median	1.02

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (manganese [mg/l]_inrawell_apw-10d) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (manganese [mg/l]_inrawell_apw-10s)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	0.174	Mean	0.209
Maximum	0.243	Median	0.209

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable x_ols (manganese [mg/l]_inrawell_apw-10s) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

x_ols (mercury [ug/l]_inrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-02) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-03)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-03) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-05/05r)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-05/05r) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-06d)

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	18
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-06d) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-06s)

General Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-06s) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-07) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-08) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-10d) was not processed!

x_ols (mercury [ug/l]_inrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (mercury [ug/l]_inrawell_apw-10s) was not processed!

x_ols (molybdenum [ug/l]_inrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	95.1	Mean	172.2
Maximum	332	Median	165
SD	54.09	Std. Error of Mean	12.41
Coefficient of Variation	0.314	Skewness	1.452

Normal GOF Test

Shapiro Wilk Test Statistic	0.894
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.216
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL	193.7
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95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	197
95% Modified-t UCL (Johnson-1978)	194.4

Gamma GOF Test

A-D Test Statistic	0.342
5% A-D Critical Value	0.741
K-S Test Statistic	0.177
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.24	k star (bias corrected MLE)	10.34
Theta hat (MLE)	14.07	Theta star (bias corrected MLE)	16.65

UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

nu hat (MLE)	465.1	nu star (bias corrected)	393
MLE Mean (bias corrected)	172.2	MLE Sd (bias corrected)	53.55
		Approximate Chi Square Value (0.05)	348.1
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	344.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	194.5	95% Adjusted Gamma UCL	196.5
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.975	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.158	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.555	Mean of logged Data	5.107
Maximum of Logged Data	5.805	SD of logged Data	0.29

Assuming Lognormal Distribution

95% H-UCL	195.4	90% Chebyshev (MVUE) UCL	206.7
95% Chebyshev (MVUE) UCL	222.4	97.5% Chebyshev (MVUE) UCL	244.3
99% Chebyshev (MVUE) UCL	287.2		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	192.6	95% BCA Bootstrap UCL	197.5
95% Standard Bootstrap UCL	192.8	95% Bootstrap-t UCL	202.2
95% Hall's Bootstrap UCL	213.5	95% Percentile Bootstrap UCL	193.7
90% Chebyshev(Mean, Sd) UCL	209.4	95% Chebyshev(Mean, Sd) UCL	226.3
97.5% Chebyshev(Mean, Sd) UCL	249.7	99% Chebyshev(Mean, Sd) UCL	295.7

Suggested UCL to Use

95% Student's-t UCL 193.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (molybdenum [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	23.15	Mean	48.04
Maximum	65.14	Median	49.37
SD	10.83	Std. Error of Mean	2.484

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Coefficient of Variation 0.225 Skewness -0.819

Normal GOF Test

Shapiro Wilk Test Statistic 0.942
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.161
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 52.34

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 51.62
 95% Modified-t UCL (Johnson-1978) 52.27

Gamma GOF Test

A-D Test Statistic 0.786
 5% A-D Critical Value 0.741
 K-S Test Statistic 0.197
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.18	k star (bias corrected MLE)	14.5
Theta hat (MLE)	2.797	Theta star (bias corrected MLE)	3.313
nu hat (MLE)	652.7	nu star (bias corrected)	550.9
MLE Mean (bias corrected)	48.04	MLE Sd (bias corrected)	12.62
		Approximate Chi Square Value (0.05)	497.5
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	493.1

Assuming Gamma Distribution

95% Approximate Gamma UCL 53.2 95% Adjusted Gamma UCL 53.67

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.867
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.214
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.142	Mean of logged Data	3.843
Maximum of Logged Data	4.177	SD of logged Data	0.263

Assuming Lognormal Distribution

95% H-UCL	54.07	90% Chebyshev (MVUE) UCL	57.03
95% Chebyshev (MVUE) UCL	61.03	97.5% Chebyshev (MVUE) UCL	66.58
99% Chebyshev (MVUE) UCL	77.48		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCLs

95% CLT UCL	52.12	95% BCA Bootstrap UCL	51.31
95% Standard Bootstrap UCL	52	95% Bootstrap-t UCL	51.94
95% Hall's Bootstrap UCL	51.75	95% Percentile Bootstrap UCL	51.72
90% Chebyshev(Mean, Sd) UCL	55.49	95% Chebyshev(Mean, Sd) UCL	58.86
97.5% Chebyshev(Mean, Sd) UCL	63.55	99% Chebyshev(Mean, Sd) UCL	72.75

Suggested UCL to Use

95% Student's-t UCL 52.34

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. Recommendations are based upon data size, data distribution, and skewness using results from simulation studies. However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (molybdenum [ug/l]_intraWell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	109	Mean	205.5
Maximum	249	Median	212
SD	34.35	Std. Error of Mean	7.88
Coefficient of Variation	0.167	Skewness	-1.238

Normal GOF Test

Shapiro Wilk Test Statistic	0.909
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.147
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 219.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	216.1
95% Modified-t UCL (Johnson-1978)	218.8

Gamma GOF Test

A-D Test Statistic	0.751
5% A-D Critical Value	0.74
K-S Test Statistic	0.176
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	31.38	k star (bias corrected MLE)	26.46
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User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Theta hat (MLE)	6.55	Theta star (bias corrected MLE)	7.767
nu hat (MLE)	1192	nu star (bias corrected)	1005
MLE Mean (bias corrected)	205.5	MLE Sd (bias corrected)	39.95
		Approximate Chi Square Value (0.05)	932.9
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	926.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	221.5	95% Adjusted Gamma UCL	223
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Lognormal GOF Test

Shapiro Wilk Test Statistic 0.828
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.194
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.691	Mean of logged Data	5.31
Maximum of Logged Data	5.517	SD of logged Data	0.194

Assuming Lognormal Distribution

95% H-UCL	223.5	90% Chebyshev (MVUE) UCL	233.5
95% Chebyshev (MVUE) UCL	246.1	97.5% Chebyshev (MVUE) UCL	263.4
99% Chebyshev (MVUE) UCL	297.6		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	218.5	95% BCA Bootstrap UCL	216.6
95% Standard Bootstrap UCL	218.3	95% Bootstrap-t UCL	217.7
95% Hall's Bootstrap UCL	217.1	95% Percentile Bootstrap UCL	217.6
90% Chebyshev(Mean, Sd) UCL	229.2	95% Chebyshev(Mean, Sd) UCL	239.9
97.5% Chebyshev(Mean, Sd) UCL	254.7	99% Chebyshev(Mean, Sd) UCL	283.9

Suggested UCL to Use

95% Student's-t UCL 219.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Number of Missing Observations 0
 Mean 60.8
 Median 60.35
 Std. Error of Mean 1.776
 Skewness -0.383

Minimum 46.3
 Maximum 72
 SD 7.536
 Coefficient of Variation 0.124

Normal GOF Test

Shapiro Wilk Test Statistic 0.946
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.143
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 63.89

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 63.55
 95% Modified-t UCL (Johnson-1978) 63.86

Gamma GOF Test

A-D Test Statistic 0.414
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.156
 5% K-S Critical Value 0.203

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	65.87	k star (bias corrected MLE)	54.93
Theta hat (MLE)	0.923	Theta star (bias corrected MLE)	1.107
nu hat (MLE)	2371	nu star (bias corrected)	1978
MLE Mean (bias corrected)	60.8	MLE Sd (bias corrected)	8.203
		Approximate Chi Square Value (0.05)	1875
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	1866

Assuming Gamma Distribution

95% Approximate Gamma UCL 64.12 95% Adjusted Gamma UCL 64.44

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.927
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.167
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.835	Mean of logged Data	4.1
Maximum of Logged Data	4.277	SD of logged Data	0.129

Assuming Lognormal Distribution

95% H-UCL	64.25	90% Chebyshev (MVUE) UCL	66.36
95% Chebyshev (MVUE) UCL	68.87	97.5% Chebyshev (MVUE) UCL	72.35

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000
 99% Chebyshev (MVUE) UCL 79.2

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	63.72	95% BCA Bootstrap UCL	63.62
95% Standard Bootstrap UCL	63.64	95% Bootstrap-t UCL	63.79
95% Hall's Bootstrap UCL	63.76	95% Percentile Bootstrap UCL	63.53
90% Chebyshev(Mean, Sd) UCL	66.13	95% Chebyshev(Mean, Sd) UCL	68.54
97.5% Chebyshev(Mean, Sd) UCL	71.89	99% Chebyshev(Mean, Sd) UCL	78.47

Suggested UCL to Use

95% Student's-t UCL 63.89

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (molybdenum [ug/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	173.3	Mean	218.5
Maximum	256.2	Median	216.1
SD	28.21	Std. Error of Mean	6.471
Coefficient of Variation	0.129	Skewness	-0.212

Normal GOF Test

Shapiro Wilk Test Statistic	0.925
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.147
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 229.8

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 228.9
 95% Modified-t UCL (Johnson-1978) 229.7

Gamma GOF Test

A-D Test Statistic	0.496
5% A-D Critical Value	0.74
K-S Test Statistic	0.154
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	61.61	k star (bias corrected MLE)	51.92
Theta hat (MLE)	3.547	Theta star (bias corrected MLE)	4.209
nu hat (MLE)	2341	nu star (bias corrected)	1973
MLE Mean (bias corrected)	218.5	MLE Sd (bias corrected)	30.33
		Approximate Chi Square Value (0.05)	1871
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	1862

Assuming Gamma Distribution

95% Approximate Gamma UCL	230.5	95% Adjusted Gamma UCL	231.6
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.919
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.149
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.155	Mean of logged Data	5.379
Maximum of Logged Data	5.546	SD of logged Data	0.132

Assuming Lognormal Distribution

95% H-UCL	230.9	90% Chebyshev (MVUE) UCL	238.5
95% Chebyshev (MVUE) UCL	247.5	97.5% Chebyshev (MVUE) UCL	260.1
99% Chebyshev (MVUE) UCL	284.7		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	229.2	95% BCA Bootstrap UCL	228.1
95% Standard Bootstrap UCL	229.1	95% Bootstrap-t UCL	229.9
95% Hall's Bootstrap UCL	229	95% Percentile Bootstrap UCL	228.9
90% Chebyshev(Mean, Sd) UCL	238	95% Chebyshev(Mean, Sd) UCL	246.8
97.5% Chebyshev(Mean, Sd) UCL	259	99% Chebyshev(Mean, Sd) UCL	282.9

Suggested UCL to Use

95% Student's-t UCL	229.8
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
Number of Detects	15	Number of Non-Detects	4
Number of Distinct Detects	15	Number of Distinct Non-Detects	1
Minimum Detect	2.908	Minimum Non-Detect	5
Maximum Detect	5.223	Maximum Non-Detect	5
Variance Detects	0.554	Percent Non-Detects	21.05%
Mean Detects	3.782	SD Detects	0.744
Median Detects	3.705	CV Detects	0.197
Skewness Detects	0.528	Kurtosis Detects	-0.66
Mean of Logged Detects	1.313	SD of Logged Detects	0.193

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.917	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.835	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.163	Lilliefors GOF Test
1% Lilliefors Critical Value	0.255	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.76	KM Standard Error of Mean	0.184
90KM SD	0.702	95% KM (BCA) UCL	4.057
95% KM (t) UCL	4.079	95% KM (Percentile Bootstrap) UCL	4.058
95% KM (z) UCL	4.063	95% KM Bootstrap t UCL	4.126
90% KM Chebyshev UCL	4.312	95% KM Chebyshev UCL	4.562
97.5% KM Chebyshev UCL	4.909	99% KM Chebyshev UCL	5.59

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.437	Anderson-Darling GOF Test
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.166	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.221	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	28.55	k star (bias corrected MLE)	22.88
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.165
nu hat (MLE)	856.5	nu star (bias corrected)	686.5
Mean (detects)	3.782		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.908	Mean	3.758
Maximum	5.223	Median	3.705
SD	0.69	CV	0.184

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	32.38	k star (bias corrected MLE)	27.3
Theta hat (MLE)	0.116	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	1230	nu star (bias corrected)	1037
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (N/A, α)	963.7	Adjusted Chi Square Value (N/A, β)	957.5
95% Gamma Approximate UCL	4.045	95% Gamma Adjusted UCL	4.071

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.76	SD (KM)	0.702
Variance (KM)	0.493	SE of Mean (KM)	0.184
k hat (KM)	28.67	k star (KM)	24.18
nu hat (KM)	1089	nu star (KM)	918.7
theta hat (KM)	0.131	theta star (KM)	0.156
80% gamma percentile (KM)	4.384	90% gamma percentile (KM)	4.767
95% gamma percentile (KM)	5.1	99% gamma percentile (KM)	5.764

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (918.69, α)	849.3	Adjusted Chi Square Value (918.69, β)	843.5
95% KM Approximate Gamma UCL	4.067	95% KM Adjusted Gamma UCL	4.095

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.927	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.156	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.202	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.754	Mean in Log Scale	1.307
SD in Original Scale	0.689	SD in Log Scale	0.18
95% t UCL (assumes normality of ROS data)	4.028	95% Percentile Bootstrap UCL	4.016
95% BCA Bootstrap UCL	4.016	95% Bootstrap t UCL	4.064
95% H-UCL (Log ROS)	4.049		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.307	KM Geo Mean	3.697
KM SD (logged)	0.183	95% Critical H Value (KM-Log)	1.771
KM Standard Error of Mean (logged)	0.0483	95% H-UCL (KM -Log)	4.058
KM SD (logged)	0.183	95% Critical H Value (KM-Log)	1.771
KM Standard Error of Mean (logged)	0.0483		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	3.512
SD in Original Scale	0.848
95% t UCL (Assumes normality)	3.849

DL/2 Log-Transformed

Mean in Log Scale	1.229
SD in Log Scale	0.238
95% H-Stat UCL	3.891

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% KM (t) UCL 4.079

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (molybdenum [ug/l]_intrawell_apw-08)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	16
Number of Distinct Detects	2	Number of Distinct Non-Detects	3
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	1.5	Maximum Non-Detect	5
Variance Detects	0.0533	Percent Non-Detects	84.21%
Mean Detects	1.233	SD Detects	0.231
Median Detects	1.1	CV Detects	0.187
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	0.199	SD of Logged Detects	0.179

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.753	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.385	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.057	KM Standard Error of Mean	0.0414
90KM SD	0.126	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.128	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.125	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.181	95% KM Chebyshev UCL	1.237
97.5% KM Chebyshev UCL	1.315	99% KM Chebyshev UCL	1.468

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.619	Anderson-Darling GOF Test	
5% A-D Critical Value	0.634	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.427	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	45.52	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0271	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	273.1	nu star (bias corrected)	N/A
Mean (detects)	1.233		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.341	Mean	0.787
Maximum	1.5	Median	0.769
SD	0.296	CV	0.376
k hat (MLE)	7.39	k star (bias corrected MLE)	6.259
Theta hat (MLE)	0.106	Theta star (bias corrected MLE)	0.126
nu hat (MLE)	280.8	nu star (bias corrected)	237.8
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (237.83, α)	203.1	Adjusted Chi Square Value (237.83, β)	200.3
95% Gamma Approximate UCL	0.921	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.057	SD (KM)	0.126
Variance (KM)	0.0158	SE of Mean (KM)	0.0414
k hat (KM)	70.72	k star (KM)	59.59
nu hat (KM)	2687	nu star (KM)	2264
theta hat (KM)	0.0149	theta star (KM)	0.0177
80% gamma percentile (KM)	1.17	90% gamma percentile (KM)	1.235
95% gamma percentile (KM)	1.291	99% gamma percentile (KM)	1.401

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	2155	Adjusted Chi Square Value (N/A, β)	2145
95% KM Approximate Gamma UCL	1.11	95% KM Adjusted Gamma UCL	1.115

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.789	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.385	Lilliefors GOF Test
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.865	Mean in Log Scale	-0.176
SD in Original Scale	0.233	SD in Log Scale	0.255
95% t UCL (assumes normality of ROS data)	0.958	95% Percentile Bootstrap UCL	0.956
95% BCA Bootstrap UCL	0.96	95% Bootstrap t UCL	0.973
95% H-UCL (Log ROS)	0.966		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM Mean (logged)	0.0493	KM Geo Mean	1.051
KM SD (logged)	0.103	95% Critical H Value (KM-Log)	1.73
KM Standard Error of Mean (logged)	0.0344	95% H-UCL (KM -Log)	1.102
KM SD (logged)	0.103	95% Critical H Value (KM-Log)	1.73
KM Standard Error of Mean (logged)	0.0344		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.116
SD in Original Scale	0.778
95% t UCL (Assumes normality)	1.425

DL/2 Log-Transformed

Mean in Log Scale	-0.0855
SD in Log Scale	0.614
95% H-Stat UCL	1.507

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.128
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When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (molybdenum [ug/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	4
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	3

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (molybdenum [ug/l]_intrawell_apw-10d) was not processed!

x_ols (molybdenum [ug/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	6
Number of Detects	3	Number of Non-Detects	16
Number of Distinct Detects	3	Number of Distinct Non-Detects	3
Minimum Detect	1.6	Minimum Non-Detect	1
Maximum Detect	2.1	Maximum Non-Detect	5
Variance Detects	0.07	Percent Non-Detects	84.21%
Mean Detects	1.8	SD Detects	0.265

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Median Detects	1.7	CV Detects	0.147
Skewness Detects	1.458	Kurtosis Detects	N/A
Mean of Logged Detects	0.581	SD of Logged Detects	0.143

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.893	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.314	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.16	KM Standard Error of Mean	0.106
90KM SD	0.334	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.343	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.334	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.477	95% KM Chebyshev UCL	1.621
97.5% KM Chebyshev UCL	1.82	99% KM Chebyshev UCL	2.212

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.385	Anderson-Darling GOF Test	
5% A-D Critical Value	0.634	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.337	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	72.31	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0249	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	433.9	nu star (bias corrected)	N/A
Mean (detects)	1.8		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.788
Maximum	2.1	Median	0.657
SD	0.604	CV	0.766
k hat (MLE)	0.975	k star (bias corrected MLE)	0.856
Theta hat (MLE)	0.808	Theta star (bias corrected MLE)	0.92
nu hat (MLE)	37.05	nu star (bias corrected)	32.53
Adjusted Level of Significance (β)	0.0369		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Approximate Chi Square Value (32.53, α)	20.49	Adjusted Chi Square Value (32.53, β)	19.66
95% Gamma Approximate UCL	1.25	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.16	SD (KM)	0.334
Variance (KM)	0.112	SE of Mean (KM)	0.106
k hat (KM)	12.04	k star (KM)	10.18
nu hat (KM)	457.6	nu star (KM)	386.7
theta hat (KM)	0.0963	theta star (KM)	0.114
80% gamma percentile (KM)	1.45	90% gamma percentile (KM)	1.644
95% gamma percentile (KM)	1.816	99% gamma percentile (KM)	2.169

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (386.71, α)	342.1	Adjusted Chi Square Value (386.71, β)	338.5
95% KM Approximate Gamma UCL	1.311	95% KM Adjusted Gamma UCL	1.325

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.907	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.304	Lilliefors GOF Test
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.054	Mean in Log Scale	-0.0142
SD in Original Scale	0.414	SD in Log Scale	0.371
95% t UCL (assumes normality of ROS data)	1.219	95% Percentile Bootstrap UCL	1.213
95% BCA Bootstrap UCL	1.218	95% Bootstrap t UCL	1.25
95% H-UCL (Log ROS)	1.247		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.116	KM Geo Mean	1.123
KM SD (logged)	0.238	95% Critical H Value (KM-Log)	1.804
KM Standard Error of Mean (logged)	0.0753	95% H-UCL (KM -Log)	1.279
KM SD (logged)	0.238	95% Critical H Value (KM-Log)	1.804
KM Standard Error of Mean (logged)	0.0753		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.205
SD in Original Scale	0.821
95% t UCL (Assumes normality)	1.532

DL/2 Log-Transformed

Mean in Log Scale	-0.0251
SD in Log Scale	0.657
95% H-Stat UCL	1.695

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.343
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

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 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_inrawell_apw-02)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	2.37	Mean	28.74
Maximum	72.5	Median	26.3
SD	22.49	Std. Error of Mean	6.78
Coefficient of Variation	0.782	Skewness	0.929

Normal GOF Test

Shapiro Wilk Test Statistic	0.908	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.792	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.214	Lilliefors GOF Test
1% Lilliefors Critical Value	0.291	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	41.03	95% Adjusted-CLT UCL (Chen-1995)	41.92
		95% Modified-t UCL (Johnson-1978)	41.35

Gamma GOF Test

A-D Test Statistic	0.216	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.119	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.26	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.469	k star (bias corrected MLE)	1.129
Theta hat (MLE)	19.57	Theta star (bias corrected MLE)	25.46
nu hat (MLE)	32.32	nu star (bias corrected)	24.84
MLE Mean (bias corrected)	28.74	MLE Sd (bias corrected)	27.05
		Approximate Chi Square Value (0.05)	14.49
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	13.21

Assuming Gamma Distribution

95% Approximate Gamma UCL	49.28	95% Adjusted Gamma UCL	54.03
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.876	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.177	Lilliefors Lognormal GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

10% Lilliefors Critical Value 0.231 Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.863	Mean of logged Data	2.981
Maximum of Logged Data	4.284	SD of logged Data	1.044

Assuming Lognormal Distribution

95% H-UCL	94.09	90% Chebyshev (MVUE) UCL	63.6
95% Chebyshev (MVUE) UCL	78.03	97.5% Chebyshev (MVUE) UCL	98.06
99% Chebyshev (MVUE) UCL	137.4		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	39.9	95% BCA Bootstrap UCL	40.29
95% Standard Bootstrap UCL	39.35	95% Bootstrap-t UCL	46.5
95% Hall's Bootstrap UCL	51.92	95% Percentile Bootstrap UCL	39.42
90% Chebyshev(Mean, Sd) UCL	49.08	95% Chebyshev(Mean, Sd) UCL	58.3
97.5% Chebyshev(Mean, Sd) UCL	71.09	99% Chebyshev(Mean, Sd) UCL	96.21

Suggested UCL to Use

95% Student's-t UCL 41.03

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	9
Number of Detects	8	Number of Non-Detects	3
Number of Distinct Detects	8	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	1
Maximum Detect	10	Maximum Non-Detect	2
Variance Detects	8.224	Percent Non-Detects	27.27%
Mean Detects	3.988	SD Detects	2.868
Median Detects	2.95	CV Detects	0.719
Skewness Detects	1.455	Kurtosis Detects	2.304
Mean of Logged Detects	1.168	SD of Logged Detects	0.711

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.87	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.749	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.22	Lilliefors GOF Test
1% Lilliefors Critical Value	0.333	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.193	KM Standard Error of Mean	0.85
90KM SD	2.633	95% KM (BCA) UCL	4.627
95% KM (t) UCL	4.733	95% KM (Percentile Bootstrap) UCL	4.6
95% KM (z) UCL	4.591	95% KM Bootstrap t UCL	5.577
90% KM Chebyshev UCL	5.742	95% KM Chebyshev UCL	6.897
97.5% KM Chebyshev UCL	8.5	99% KM Chebyshev UCL	11.65

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.217	Anderson-Darling GOF Test
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.159	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	2.478	k star (bias corrected MLE)	1.632
Theta hat (MLE)	1.609	Theta star (bias corrected MLE)	2.443
nu hat (MLE)	39.65	nu star (bias corrected)	26.11
Mean (detects)	3.988		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.903
Maximum	10	Median	2.5
SD	3.035	CV	1.045
k hat (MLE)	0.44	k star (bias corrected MLE)	0.381
Theta hat (MLE)	6.594	Theta star (bias corrected MLE)	7.624
nu hat (MLE)	9.684	nu star (bias corrected)	8.376
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (8.38, α)	2.955	Adjusted Chi Square Value (8.38, β)	2.455
95% Gamma Approximate UCL	8.229	95% Gamma Adjusted UCL	9.903

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.193	SD (KM)	2.633
Variance (KM)	6.933	SE of Mean (KM)	0.85
k hat (KM)	1.471	k star (KM)	1.13
nu hat (KM)	32.36	nu star (KM)	24.86
theta hat (KM)	2.171	theta star (KM)	2.825
80% gamma percentile (KM)	5.085	90% gamma percentile (KM)	7.134
95% gamma percentile (KM)	9.163	99% gamma percentile (KM)	13.83

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (24.86, α)	14.51	Adjusted Chi Square Value (24.86, β)	13.23
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% KM Approximate Gamma UCL 5.473 95% KM Adjusted Gamma UCL 6

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.986	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.851	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.117	Lilliefors GOF Test
10% Lilliefors Critical Value	0.265	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.091	Mean in Log Scale	0.74
SD in Original Scale	2.851	SD in Log Scale	0.958
95% t UCL (assumes normality of ROS data)	4.649	95% Percentile Bootstrap UCL	4.51
95% BCA Bootstrap UCL	4.927	95% Bootstrap t UCL	5.442
95% H-UCL (Log ROS)	8.026		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.864	KM Geo Mean	2.373
KM SD (logged)	0.759	95% Critical H Value (KM-Log)	2.563
KM Standard Error of Mean (logged)	0.247	95% H-UCL (KM -Log)	5.858
KM SD (logged)	0.759	95% Critical H Value (KM-Log)	2.563
KM Standard Error of Mean (logged)	0.247		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 3.082
 SD in Original Scale 2.86
 95% t UCL (Assumes normality) 4.645

DL/2 Log-Transformed

Mean in Log Scale 0.723
 SD in Log Scale 0.983
 95% H-Stat UCL 8.394

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 4.733

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_inrawell_apw-05/05r)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	4
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	7.4	Maximum Non-Detect	2
Variance Detects	4.418	Percent Non-Detects	36.36%

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean Detects	3.286	SD Detects	2.102
Median Detects	2.3	CV Detects	0.64
Skewness Detects	1.431	Kurtosis Detects	2.064
Mean of Logged Detects	1.031	SD of Logged Detects	0.6

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.864	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.252	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.459	KM Standard Error of Mean	0.619
90KM SD	1.899	95% KM (BCA) UCL	3.473
95% KM (t) UCL	3.58	95% KM (Percentile Bootstrap) UCL	3.445
95% KM (z) UCL	3.477	95% KM Bootstrap t UCL	4.19
90% KM Chebyshev UCL	4.315	95% KM Chebyshev UCL	5.155
97.5% KM Chebyshev UCL	6.322	99% KM Chebyshev UCL	8.614

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.301	Anderson-Darling GOF Test	
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.236	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	3.315	k star (bias corrected MLE)	1.99
Theta hat (MLE)	0.991	Theta star (bias corrected MLE)	1.651
nu hat (MLE)	46.41	nu star (bias corrected)	27.86
Mean (detects)	3.286		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.095
Maximum	7.4	Median	2
SD	2.32	CV	1.108
k hat (MLE)	0.378	k star (bias corrected MLE)	0.335
Theta hat (MLE)	5.543	Theta star (bias corrected MLE)	6.245
nu hat (MLE)	8.312	nu star (bias corrected)	7.379
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (7.38, α)	2.381	Adjusted Chi Square Value (7.38, β)	1.945
95% Gamma Approximate UCL	6.492	95% Gamma Adjusted UCL	7.947

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.459	SD (KM)	1.899
Variance (KM)	3.607	SE of Mean (KM)	0.619
k hat (KM)	1.677	k star (KM)	1.28
nu hat (KM)	36.89	nu star (KM)	28.16
theta hat (KM)	1.467	theta star (KM)	1.921
80% gamma percentile (KM)	3.869	90% gamma percentile (KM)	5.327
95% gamma percentile (KM)	6.759	99% gamma percentile (KM)	10.03

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (28.16, α)	17.05	Adjusted Chi Square Value (28.16, β)	15.66
95% KM Approximate Gamma UCL	4.061	95% KM Adjusted Gamma UCL	4.423

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.968	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.201	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.321	Mean in Log Scale	0.477
SD in Original Scale	2.11	SD in Log Scale	0.917
95% t UCL (assumes normality of ROS data)	3.474	95% Percentile Bootstrap UCL	3.37
95% BCA Bootstrap UCL	3.681	95% Bootstrap t UCL	4.053
95% H-UCL (Log ROS)	5.587		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.66	KM Geo Mean	1.936
KM SD (logged)	0.662	95% Critical H Value (KM-Log)	2.406
KM Standard Error of Mean (logged)	0.216	95% H-UCL (KM -Log)	3.985
KM SD (logged)	0.662	95% Critical H Value (KM-Log)	2.406
KM Standard Error of Mean (logged)	0.216		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.318
SD in Original Scale	2.115
95% t UCL (Assumes normality)	3.474

DL/2 Log-Transformed

Mean in Log Scale	0.467
SD in Log Scale	0.93
95% H-Stat UCL	5.707

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	3.58
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	1.7	Mean	3.695
Maximum	9.3	Median	2.65
SD	2.74	Std. Error of Mean	0.866
Coefficient of Variation	0.742	Skewness	1.654

Normal GOF Test

Shapiro Wilk Test Statistic	0.7	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.781	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.372	Lilliefors GOF Test
1% Lilliefors Critical Value	0.304	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	5.283	95% Adjusted-CLT UCL (Chen-1995)	5.604
		95% Modified-t UCL (Johnson-1978)	5.359

Gamma GOF Test

A-D Test Statistic	1.009	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.733	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.269	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.848	k star (bias corrected MLE)	2.06
Theta hat (MLE)	1.298	Theta star (bias corrected MLE)	1.794
nu hat (MLE)	56.95	nu star (bias corrected)	41.2
MLE Mean (bias corrected)	3.695	MLE Sd (bias corrected)	2.574
		Approximate Chi Square Value (0.05)	27.49
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	25.56

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.538	95% Adjusted Gamma UCL	5.957
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.83	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.869	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.272	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.241	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal Statistics

Minimum of Logged Data	0.531	Mean of logged Data	1.121
Maximum of Logged Data	2.23	SD of logged Data	0.595

Assuming Lognormal Distribution

95% H-UCL	5.852	90% Chebyshev (MVUE) UCL	5.668
95% Chebyshev (MVUE) UCL	6.608	97.5% Chebyshev (MVUE) UCL	7.914
99% Chebyshev (MVUE) UCL	10.48		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	5.12	95% BCA Bootstrap UCL	5.5
95% Standard Bootstrap UCL	5.04	95% Bootstrap-t UCL	10.15
95% Hall's Bootstrap UCL	15.02	95% Percentile Bootstrap UCL	5.115
90% Chebyshev(Mean, Sd) UCL	6.294	95% Chebyshev(Mean, Sd) UCL	7.472
97.5% Chebyshev(Mean, Sd) UCL	9.106	99% Chebyshev(Mean, Sd) UCL	12.32

Suggested UCL to Use

95% Student's-t UCL 5.283

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	9
Number of Detects	9	Number of Non-Detects	2
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	9	Maximum Non-Detect	2
Variance Detects	5.791	Percent Non-Detects	18.18%
Mean Detects	2.811	SD Detects	2.406
Median Detects	2.1	CV Detects	0.856
Skewness Detects	2.607	Kurtosis Detects	7.275
Mean of Logged Detects	0.83	SD of Logged Detects	0.609

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.64	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.764	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.341	Lilliefors GOF Test
1% Lilliefors Critical Value	0.316	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.505	KM Standard Error of Mean	0.689
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User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

90KM SD	2.154	95% KM (BCA) UCL	3.764
95% KM (t) UCL	3.754	95% KM (Percentile Bootstrap) UCL	3.755
95% KM (z) UCL	3.639	95% KM Bootstrap t UCL	5.843
90% KM Chebyshev UCL	4.573	95% KM Chebyshev UCL	5.51
97.5% KM Chebyshev UCL	6.81	99% KM Chebyshev UCL	9.364

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.766
5% A-D Critical Value	0.728
K-S Test Statistic	0.246
5% K-S Critical Value	0.282

Anderson-Darling GOF Test

Detected Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov GOF

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	2.615	k star (bias corrected MLE)	1.818
Theta hat (MLE)	1.075	Theta star (bias corrected MLE)	1.547
nu hat (MLE)	47.07	nu star (bias corrected)	32.72
Mean (detects)	2.811		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.339
Maximum	9	Median	2.1
SD	2.397	CV	1.025
k hat (MLE)	0.878	k star (bias corrected MLE)	0.699
Theta hat (MLE)	2.664	Theta star (bias corrected MLE)	3.346
nu hat (MLE)	19.31	nu star (bias corrected)	15.38
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (15.38, α)	7.527	Adjusted Chi Square Value (15.38, β)	6.651
95% Gamma Approximate UCL	4.78	95% Gamma Adjusted UCL	5.409

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.505	SD (KM)	2.154
Variance (KM)	4.642	SE of Mean (KM)	0.689
k hat (KM)	1.351	k star (KM)	1.043
nu hat (KM)	29.73	nu star (KM)	22.96
theta hat (KM)	1.853	theta star (KM)	2.4
80% gamma percentile (KM)	4.017	90% gamma percentile (KM)	5.707
95% gamma percentile (KM)	7.391	99% gamma percentile (KM)	11.29

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (22.96, α)	13.06	Adjusted Chi Square Value (22.96, β)	11.86
95% KM Approximate Gamma UCL	4.403	95% KM Adjusted Gamma UCL	4.849

Lognormal GOF Test on Detected Observations Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.868	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.2	Lilliefors GOF Test
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level
Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.451	Mean in Log Scale	0.637
SD in Original Scale	2.3	SD in Log Scale	0.709
95% t UCL (assumes normality of ROS data)	3.707	95% Percentile Bootstrap UCL	3.697
95% BCA Bootstrap UCL	4.225	95% Bootstrap t UCL	5.36
95% H-UCL (Log ROS)	4.238		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.698	KM Geo Mean	2.01
KM SD (logged)	0.594	95% Critical H Value (KM-Log)	2.306
KM Standard Error of Mean (logged)	0.191	95% H-UCL (KM -Log)	3.699
KM SD (logged)	0.594	95% Critical H Value (KM-Log)	2.306
KM Standard Error of Mean (logged)	0.191		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 2.436
 SD in Original Scale 2.311
 95% t UCL (Assumes normality) 3.699

DL/2 Log-Transformed

Mean in Log Scale 0.616
 SD in Log Scale 0.74
 95% H-Stat UCL 4.404

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	4.849	95% GROS Adjusted Gamma UCL	5.409
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When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	6
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	1.3	Minimum Non-Detect	1
Maximum Detect	15	Maximum Non-Detect	2
Variance Detects	32.54	Percent Non-Detects	54.55%

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean Detects	5.04	SD Detects	5.705
Median Detects	3.3	CV Detects	1.132
Skewness Detects	1.979	Kurtosis Detects	4.065
Mean of Logged Detects	1.187	SD of Logged Detects	0.994

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.735	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.359	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.845	KM Standard Error of Mean	1.342
90KM SD	3.981	95% KM (BCA) UCL	5.133
95% KM (t) UCL	5.278	95% KM (Percentile Bootstrap) UCL	5.112
95% KM (z) UCL	5.053	95% KM Bootstrap t UCL	9.116
90% KM Chebyshev UCL	6.872	95% KM Chebyshev UCL	8.696
97.5% KM Chebyshev UCL	11.23	99% KM Chebyshev UCL	16.2

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.446	Anderson-Darling GOF Test	
5% A-D Critical Value	0.688	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.261	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.363	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.304	k star (bias corrected MLE)	0.655
Theta hat (MLE)	3.866	Theta star (bias corrected MLE)	7.697
nu hat (MLE)	13.04	nu star (bias corrected)	6.548
Mean (detects)	5.04		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.296
Maximum	15	Median	0.01
SD	4.463	CV	1.943
k hat (MLE)	0.253	k star (bias corrected MLE)	0.245
Theta hat (MLE)	9.081	Theta star (bias corrected MLE)	9.391
nu hat (MLE)	5.563	nu star (bias corrected)	5.379
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (5.38, α)	1.331	Adjusted Chi Square Value (5.38, β)	1.034
95% Gamma Approximate UCL	9.278	95% Gamma Adjusted UCL	11.95

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.845	SD (KM)	3.981
Variance (KM)	15.85	SE of Mean (KM)	1.342
k hat (KM)	0.511	k star (KM)	0.432
nu hat (KM)	11.24	nu star (KM)	9.506
theta hat (KM)	5.57	theta star (KM)	6.585
80% gamma percentile (KM)	4.629	90% gamma percentile (KM)	7.925
95% gamma percentile (KM)	11.51	99% gamma percentile (KM)	20.45

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (9.51, α)	3.636	Adjusted Chi Square Value (9.51, β)	3.068
95% KM Approximate Gamma UCL	7.44	95% KM Adjusted Gamma UCL	8.818

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.904	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.204	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.436	Mean in Log Scale	-0.314
SD in Original Scale	4.387	SD in Log Scale	1.677
95% t UCL (assumes normality of ROS data)	4.833	95% Percentile Bootstrap UCL	4.848
95% BCA Bootstrap UCL	6.255	95% Bootstrap t UCL	9.739
95% H-UCL (Log ROS)	31.12		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.547	KM Geo Mean	1.729
KM SD (logged)	0.838	95% Critical H Value (KM-Log)	2.699
KM Standard Error of Mean (logged)	0.283	95% H-UCL (KM -Log)	5.024
KM SD (logged)	0.838	95% Critical H Value (KM-Log)	2.699
KM Standard Error of Mean (logged)	0.283		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	2.609
SD in Original Scale	4.296
95% t UCL (Assumes normality)	4.957

DL/2 Log-Transformed

Mean in Log Scale	0.225
SD in Log Scale	1.133
95% H-Stat UCL	7.657

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.278
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The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_inrawell_apw-08)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	2.6	Mean	4.04
Maximum	7.7	Median	3.54
SD	1.719	Std. Error of Mean	0.518
Coefficient of Variation	0.426	Skewness	1.17

Normal GOF Test

Shapiro Wilk Test Statistic	0.839	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.792	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.201	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.291	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	4.98	95% Adjusted-CLT UCL (Chen-1995)	5.088
		95% Modified-t UCL (Johnson-1978)	5.01

Gamma GOF Test

A-D Test Statistic	0.612	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.214	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.052	k star (bias corrected MLE)	5.189
Theta hat (MLE)	0.573	Theta star (bias corrected MLE)	0.779
nu hat (MLE)	155.1	nu star (bias corrected)	114.2
MLE Mean (bias corrected)	4.04	MLE Sd (bias corrected)	1.773
		Approximate Chi Square Value (0.05)	90.5
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	87.07

Assuming Gamma Distribution

95% Approximate Gamma UCL	5.097	95% Adjusted Gamma UCL	5.297
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Lognormal GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.877	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.876	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.202	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.231	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.956	Mean of logged Data	1.324
Maximum of Logged Data	2.041	SD of logged Data	0.388

Assuming Lognormal Distribution

95% H-UCL	5.202	90% Chebyshev (MVUE) UCL	5.45
95% Chebyshev (MVUE) UCL	6.098	97.5% Chebyshev (MVUE) UCL	6.996
99% Chebyshev (MVUE) UCL	8.761		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	4.893	95% BCA Bootstrap UCL	5.011
95% Standard Bootstrap UCL	4.85	95% Bootstrap-t UCL	5.367
95% Hall's Bootstrap UCL	5.198	95% Percentile Bootstrap UCL	4.904
90% Chebyshev(Mean, Sd) UCL	5.595	95% Chebyshev(Mean, Sd) UCL	6.3
97.5% Chebyshev(Mean, Sd) UCL	7.278	99% Chebyshev(Mean, Sd) UCL	9.198

Suggested UCL to Use

95% Student's-t UCL 4.98

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (nickel [ug/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	2.5	Mean	6.03
Maximum	9.5	Median	6.3
SD	1.943	Std. Error of Mean	0.586
Coefficient of Variation	0.322	Skewness	-0.204

Normal GOF Test

Shapiro Wilk Test Statistic	0.979	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.792	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.14	Lilliefors GOF Test
1% Lilliefors Critical Value	0.291	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.092

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 6.955
 95% Modified-t UCL (Johnson-1978) 7.086

Gamma GOF Test

A-D Test Statistic 0.35
 5% A-D Critical Value 0.73
 K-S Test Statistic 0.179
 5% K-S Critical Value 0.256

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.935	k star (bias corrected MLE)	6.559
Theta hat (MLE)	0.675	Theta star (bias corrected MLE)	0.919
nu hat (MLE)	196.6	nu star (bias corrected)	144.3
MLE Mean (bias corrected)	6.03	MLE Sd (bias corrected)	2.355
		Approximate Chi Square Value (0.05)	117.5
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	113.6

Assuming Gamma Distribution

95% Approximate Gamma UCL 7.403

95% Adjusted Gamma UCL 7.659

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.914
 10% Shapiro Wilk Critical Value 0.876
 Lilliefors Test Statistic 0.208
 10% Lilliefors Critical Value 0.231

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.916	Mean of logged Data	1.74
Maximum of Logged Data	2.251	SD of logged Data	0.375

Assuming Lognormal Distribution

95% H-UCL 7.774
 95% Chebyshev (MVUE) UCL 9.103
 99% Chebyshev (MVUE) UCL 12.99

90% Chebyshev (MVUE) UCL 8.157
 97.5% Chebyshev (MVUE) UCL 10.41

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	6.994	95% BCA Bootstrap UCL	6.909
95% Standard Bootstrap UCL	6.932	95% Bootstrap-t UCL	6.984
95% Hall's Bootstrap UCL	7.014	95% Percentile Bootstrap UCL	6.955
90% Chebyshev(Mean, Sd) UCL	7.787	95% Chebyshev(Mean, Sd) UCL	8.583
97.5% Chebyshev(Mean, Sd) UCL	9.688	99% Chebyshev(Mean, Sd) UCL	11.86

Suggested UCL to Use

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000
 95% Student's-t UCL 7.092

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (nickel [ug/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	5
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	5.1	Maximum Non-Detect	2
Variance Detects	2.39	Percent Non-Detects	45.45%
Mean Detects	2.283	SD Detects	1.546
Median Detects	1.45	CV Detects	0.677
Skewness Detects	1.605	Kurtosis Detects	1.884
Mean of Logged Detects	0.67	SD of Logged Detects	0.577

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.36	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.717	KM Standard Error of Mean	0.402
90KM SD	1.215	95% KM (BCA) UCL	2.438
95% KM (t) UCL	2.446	95% KM (Percentile Bootstrap) UCL	2.411
95% KM (z) UCL	2.378	95% KM Bootstrap t UCL	4.541
90% KM Chebyshev UCL	2.923	95% KM Chebyshev UCL	3.469
97.5% KM Chebyshev UCL	4.228	99% KM Chebyshev UCL	5.717

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.74	Anderson-Darling GOF Test	
5% A-D Critical Value	0.701	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.37	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.334	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.375	k star (bias corrected MLE)	1.799
Theta hat (MLE)	0.677	Theta star (bias corrected MLE)	1.27
nu hat (MLE)	40.5	nu star (bias corrected)	21.58

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean (detects) 2.283

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.287
Maximum	5.1	Median	1.2
SD	1.586	CV	1.232
k hat (MLE)	0.427	k star (bias corrected MLE)	0.371
Theta hat (MLE)	3.015	Theta star (bias corrected MLE)	3.468
nu hat (MLE)	9.394	nu star (bias corrected)	8.166
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (8.17, α)	2.831	Adjusted Chi Square Value (8.17, β)	2.345
95% Gamma Approximate UCL	3.713	95% Gamma Adjusted UCL	4.483

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.717	SD (KM)	1.215
Variance (KM)	1.477	SE of Mean (KM)	0.402
k hat (KM)	1.996	k star (KM)	1.512
nu hat (KM)	43.9	nu star (KM)	33.26
theta hat (KM)	0.86	theta star (KM)	1.136
80% gamma percentile (KM)	2.654	90% gamma percentile (KM)	3.571
95% gamma percentile (KM)	4.461	99% gamma percentile (KM)	6.469

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (33.26, α)	21.08	Adjusted Chi Square Value (33.26, β)	19.51
95% KM Approximate Gamma UCL	2.71	95% KM Adjusted Gamma UCL	2.928

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.808	Shapiro Wilk GOF Test
10% Shapiro Wilk Critical Value	0.826	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.344	Lilliefors GOF Test
10% Lilliefors Critical Value	0.298	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.506	Mean in Log Scale	0.0826
SD in Original Scale	1.418	SD in Log Scale	0.833
95% t UCL (assumes normality of ROS data)	2.281	95% Percentile Bootstrap UCL	2.247
95% BCA Bootstrap UCL	2.533	95% Bootstrap t UCL	3.359
95% H-UCL (Log ROS)	3.117		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.38	KM Geo Mean	1.462
KM SD (logged)	0.507	95% Critical H Value (KM-Log)	2.185
KM Standard Error of Mean (logged)	0.168	95% H-UCL (KM -Log)	2.359
KM SD (logged)	0.507	95% Critical H Value (KM-Log)	2.185

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000
 KM Standard Error of Mean (logged) 0.168

DL/2 Statistics

DL/2 Normal

Mean in Original Scale 1.518
 SD in Original Scale 1.41
 95% t UCL (Assumes normality) 2.289

DL/2 Log-Transformed

Mean in Log Scale 0.114
 SD in Log Scale 0.783
 95% H-Stat UCL 2.902

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 2.446

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su_intrawell_apw-02])

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	6.9	Mean	7.117
Maximum	7.52	Median	7.09
SD	0.138	Std. Error of Mean	0.0317
Coefficient of Variation	0.0194	Skewness	1.336

Normal GOF Test

Shapiro Wilk Test Statistic 0.909
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.145
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.172

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.179
 95% Modified-t UCL (Johnson-1978) 7.173

Gamma GOF Test

A-D Test Statistic 0.547
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.137
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	2841	k star (bias corrected MLE)	2392
Theta hat (MLE)	0.00251	Theta star (bias corrected MLE)	0.00298
nu hat (MLE)	107946	nu star (bias corrected)	90904
MLE Mean (bias corrected)	7.117	MLE Sd (bias corrected)	0.146
		Approximate Chi Square Value (0.05)	90203
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	90142

Assuming Gamma Distribution

95% Approximate Gamma UCL	7.172	95% Adjusted Gamma UCL	7.177
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Lognormal GOF Test

Shapiro Wilk Test Statistic 0.917
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.141
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.932	Mean of logged Data	1.962
Maximum of Logged Data	2.018	SD of logged Data	0.0192

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.211
95% Chebyshev (MVUE) UCL	7.254	97.5% Chebyshev (MVUE) UCL	7.313
99% Chebyshev (MVUE) UCL	7.429		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.169	95% BCA Bootstrap UCL	7.179
95% Standard Bootstrap UCL	7.166	95% Bootstrap-t UCL	7.187
95% Hall's Bootstrap UCL	7.224	95% Percentile Bootstrap UCL	7.166
90% Chebyshev(Mean, Sd) UCL	7.212	95% Chebyshev(Mean, Sd) UCL	7.255
97.5% Chebyshev(Mean, Sd) UCL	7.315	99% Chebyshev(Mean, Sd) UCL	7.432

Suggested UCL to Use

95% Student's-t UCL 7.172

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su] intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	7.21	Mean	7.62

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Maximum	7.94	Median	7.65
SD	0.25	Std. Error of Mean	0.0573
Coefficient of Variation	0.0328	Skewness	-0.259

Normal GOF Test

Shapiro Wilk Test Statistic 0.899
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.2
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.719

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.711
 95% Modified-t UCL (Johnson-1978) 7.719

Gamma GOF Test

A-D Test Statistic 0.802
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.207
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	978.5	k star (bias corrected MLE)	824.1
Theta hat (MLE)	0.00779	Theta star (bias corrected MLE)	0.00925
nu hat (MLE)	37185	nu star (bias corrected)	31315
MLE Mean (bias corrected)	7.62	MLE Sd (bias corrected)	0.265
Adjusted Level of Significance	0.0369	Approximate Chi Square Value (0.05)	30904
		Adjusted Chi Square Value	30869

Assuming Gamma Distribution

95% Approximate Gamma UCL 7.721 95% Adjusted Gamma UCL 7.73

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.898
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.202
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.975	Mean of logged Data	2.03
Maximum of Logged Data	2.072	SD of logged Data	0.0329

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.793
95% Chebyshev (MVUE) UCL	7.871	97.5% Chebyshev (MVUE) UCL	7.979
99% Chebyshev (MVUE) UCL	8.192		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.714	95% BCA Bootstrap UCL	7.707
95% Standard Bootstrap UCL	7.714	95% Bootstrap-t UCL	7.721
95% Hall's Bootstrap UCL	7.711	95% Percentile Bootstrap UCL	7.711
90% Chebyshev(Mean, Sd) UCL	7.792	95% Chebyshev(Mean, Sd) UCL	7.87
97.5% Chebyshev(Mean, Sd) UCL	7.978	99% Chebyshev(Mean, Sd) UCL	8.19

Suggested UCL to Use

95% Student's-t UCL 7.719

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (ph, lab [su]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	7.288	Mean	7.446
Maximum	7.612	Median	7.439
SD	0.0961	Std. Error of Mean	0.022
Coefficient of Variation	0.0129	Skewness	0.181

Normal GOF Test

Shapiro Wilk Test Statistic	0.966
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.103
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.484

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	7.483
95% Modified-t UCL (Johnson-1978)	7.484

Gamma GOF Test

A-D Test Statistic	0.479
5% A-D Critical Value	0.738
K-S Test Statistic	0.195
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma Statistics

k hat (MLE)	6348	k star (bias corrected MLE)	5346
Theta hat (MLE)	0.00117	Theta star (bias corrected MLE)	0.00139
nu hat (MLE)	241238	nu star (bias corrected)	203149
MLE Mean (bias corrected)	7.446	MLE Sd (bias corrected)	0.102
		Approximate Chi Square Value (0.05)	202102
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	202011

Assuming Gamma Distribution

95% Approximate Gamma UCL	7.484	95% Adjusted Gamma UCL	7.487
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.966
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.101
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.986	Mean of logged Data	2.008
Maximum of Logged Data	2.03	SD of logged Data	0.0129

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.512
95% Chebyshev (MVUE) UCL	7.542	97.5% Chebyshev (MVUE) UCL	7.583
99% Chebyshev (MVUE) UCL	7.665		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.482	95% BCA Bootstrap UCL	7.484
95% Standard Bootstrap UCL	7.481	95% Bootstrap-t UCL	7.487
95% Hall's Bootstrap UCL	7.484	95% Percentile Bootstrap UCL	7.482
90% Chebyshev(Mean, Sd) UCL	7.512	95% Chebyshev(Mean, Sd) UCL	7.542
97.5% Chebyshev(Mean, Sd) UCL	7.583	99% Chebyshev(Mean, Sd) UCL	7.665

Suggested UCL to Use

95% Student's-t UCL	7.484
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su_intrawell_apw-06d])

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Minimum	7.276	Mean	7.453
Maximum	7.757	Median	7.444
SD	0.0998	Std. Error of Mean	0.0235
Coefficient of Variation	0.0134	Skewness	1.399

Normal GOF Test

Shapiro Wilk Test Statistic 0.865
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.215
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.494

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.5
 95% Modified-t UCL (Johnson-1978) 7.495

Gamma GOF Test

A-D Test Statistic 0.843
 5% A-D Critical Value 0.737
 K-S Test Statistic 0.209
 5% K-S Critical Value 0.203

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5969	k star (bias corrected MLE)	4974
Theta hat (MLE)	0.00125	Theta star (bias corrected MLE)	0.0015
nu hat (MLE)	214870	nu star (bias corrected)	179060
MLE Mean (bias corrected)	7.453	MLE Sd (bias corrected)	0.106
Adjusted Level of Significance	0.0357	Approximate Chi Square Value (0.05)	178076
		Adjusted Chi Square Value	177982

Assuming Gamma Distribution

95% Approximate Gamma UCL 7.494 95% Adjusted Gamma UCL 7.498

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.871
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.212
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.985	Mean of logged Data	2.009
Maximum of Logged Data	2.049	SD of logged Data	0.0133

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.523
95% Chebyshev (MVUE) UCL	7.555	97.5% Chebyshev (MVUE) UCL	7.599
99% Chebyshev (MVUE) UCL	7.685		

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.492	95% BCA Bootstrap UCL	7.502
95% Standard Bootstrap UCL	7.49	95% Bootstrap-t UCL	7.505
95% Hall's Bootstrap UCL	7.553	95% Percentile Bootstrap UCL	7.493
90% Chebyshev(Mean, Sd) UCL	7.523	95% Chebyshev(Mean, Sd) UCL	7.555
97.5% Chebyshev(Mean, Sd) UCL	7.6	99% Chebyshev(Mean, Sd) UCL	7.687

Suggested UCL to Use

95% Student's-t UCL 7.494

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	7.02	Mean	7.19
Maximum	7.67	Median	7.16
SD	0.154	Std. Error of Mean	0.0353
Coefficient of Variation	0.0214	Skewness	1.813

Normal GOF Test

Shapiro Wilk Test Statistic	0.845
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.162
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.251

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	7.264
95% Modified-t UCL (Johnson-1978)	7.254

Gamma GOF Test

A-D Test Statistic	0.788
5% A-D Critical Value	0.738
K-S Test Statistic	0.155
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE) 2361

k star (bias corrected MLE) 1988

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Theta hat (MLE)	0.00305	Theta star (bias corrected MLE)	0.00362
nu hat (MLE)	89709	nu star (bias corrected)	75546
MLE Mean (bias corrected)	7.19	MLE Sd (bias corrected)	0.161
		Approximate Chi Square Value (0.05)	74908
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	74852

Assuming Gamma Distribution

95% Approximate Gamma UCL	7.251	95% Adjusted Gamma UCL	7.257
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.855	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.157	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.949	Mean of logged Data	1.972
Maximum of Logged Data	2.037	SD of logged Data	0.021

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.294
95% Chebyshev (MVUE) UCL	7.341	97.5% Chebyshev (MVUE) UCL	7.407
99% Chebyshev (MVUE) UCL	7.535		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.248	95% BCA Bootstrap UCL	7.263
95% Standard Bootstrap UCL	7.245	95% Bootstrap-t UCL	7.281
95% Hall's Bootstrap UCL	7.339	95% Percentile Bootstrap UCL	7.247
90% Chebyshev(Mean, Sd) UCL	7.296	95% Chebyshev(Mean, Sd) UCL	7.344
97.5% Chebyshev(Mean, Sd) UCL	7.41	99% Chebyshev(Mean, Sd) UCL	7.541

Suggested UCL to Use

95% Student's-t UCL 7.251

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Number of Missing Observations 0
 Mean 7.004
 Median 6.988
 Std. Error of Mean 0.0294
 Skewness 1.006

Minimum 6.814
 Maximum 7.324
 SD 0.128
 Coefficient of Variation 0.0183

Normal GOF Test

Shapiro Wilk Test Statistic 0.912
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.151
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.055

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.06
 95% Modified-t UCL (Johnson-1978) 7.056

Gamma GOF Test

A-D Test Statistic 0.671
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.172
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 3195
 Theta hat (MLE) 0.00219
 nu hat (MLE) 121398
 MLE Mean (bias corrected) 7.004
 Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 2690
 Theta star (bias corrected MLE) 0.0026
 nu star (bias corrected) 102231
 MLE Sd (bias corrected) 0.135
 Approximate Chi Square Value (0.05) 101489
 Adjusted Chi Square Value 101424

Assuming Gamma Distribution

95% Approximate Gamma UCL 7.056

95% Adjusted Gamma UCL 7.06

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.917
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.147
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 1.919
 Maximum of Logged Data 1.991

Mean of logged Data 1.946
 SD of logged Data 0.0181

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 7.131

90% Chebyshev (MVUE) UCL 7.092
 97.5% Chebyshev (MVUE) UCL 7.186

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000
 99% Chebyshev (MVUE) UCL 7.294

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.053	95% BCA Bootstrap UCL	7.062
95% Standard Bootstrap UCL	7.052	95% Bootstrap-t UCL	7.07
95% Hall's Bootstrap UCL	7.094	95% Percentile Bootstrap UCL	7.055
90% Chebyshev(Mean, Sd) UCL	7.092	95% Chebyshev(Mean, Sd) UCL	7.132
97.5% Chebyshev(Mean, Sd) UCL	7.188	99% Chebyshev(Mean, Sd) UCL	7.296

Suggested UCL to Use

95% Student's-t UCL 7.055

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su_intrawell_apw-08])

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	7.205	Mean	7.384
Maximum	7.713	Median	7.345
SD	0.131	Std. Error of Mean	0.0301
Coefficient of Variation	0.0177	Skewness	0.924

Normal GOF Test

Shapiro Wilk Test Statistic	0.921
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.145
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.436

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	7.44
95% Modified-t UCL (Johnson-1978)	7.437

Gamma GOF Test

A-D Test Statistic	0.695
5% A-D Critical Value	0.738
K-S Test Statistic	0.174
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	3383	k star (bias corrected MLE)	2849
Theta hat (MLE)	0.00218	Theta star (bias corrected MLE)	0.00259
nu hat (MLE)	128554	nu star (bias corrected)	108257
MLE Mean (bias corrected)	7.384	MLE Sd (bias corrected)	0.138
		Approximate Chi Square Value (0.05)	107493
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	107426

Assuming Gamma Distribution

95% Approximate Gamma UCL	7.437	95% Adjusted Gamma UCL	7.441
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Lognormal GOF Test

Shapiro Wilk Test Statistic 0.925
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.142
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.975	Mean of logged Data	1.999
Maximum of Logged Data	2.043	SD of logged Data	0.0176

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.474
95% Chebyshev (MVUE) UCL	7.514	97.5% Chebyshev (MVUE) UCL	7.57
99% Chebyshev (MVUE) UCL	7.681		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.433	95% BCA Bootstrap UCL	7.44
95% Standard Bootstrap UCL	7.431	95% Bootstrap-t UCL	7.443
95% Hall's Bootstrap UCL	7.446	95% Percentile Bootstrap UCL	7.43
90% Chebyshev(Mean, Sd) UCL	7.474	95% Chebyshev(Mean, Sd) UCL	7.515
97.5% Chebyshev(Mean, Sd) UCL	7.572	99% Chebyshev(Mean, Sd) UCL	7.683

Suggested UCL to Use

95% Student's-t UCL 7.436

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su] intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	7.023	Mean	7.314

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Maximum	7.685	Median	7.31
SD	0.156	Std. Error of Mean	0.0357
Coefficient of Variation	0.0213	Skewness	0.641

Normal GOF Test

Shapiro Wilk Test Statistic 0.902
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.195
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.376

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.378
 95% Modified-t UCL (Johnson-1978) 7.376

Gamma GOF Test

A-D Test Statistic 0.829
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.188
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE) 2342
 Theta hat (MLE) 0.00312
 nu hat (MLE) 89014
 MLE Mean (bias corrected) 7.314
 Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 1973
 Theta star (bias corrected MLE) 0.00371
 nu star (bias corrected) 74961
 MLE Sd (bias corrected) 0.165
 Approximate Chi Square Value (0.05) 74325
 Adjusted Chi Square Value 74270

Assuming Gamma Distribution

95% Approximate Gamma UCL 7.376

95% Adjusted Gamma UCL 7.382

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.906
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.192
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 1.949
 Maximum of Logged Data 2.039

Mean of logged Data 1.99
 SD of logged Data 0.0212

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 7.469
 99% Chebyshev (MVUE) UCL 7.667

90% Chebyshev (MVUE) UCL 7.42
 97.5% Chebyshev (MVUE) UCL 7.536

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.372	95% BCA Bootstrap UCL	7.382
95% Standard Bootstrap UCL	7.372	95% Bootstrap-t UCL	7.384
95% Hall's Bootstrap UCL	7.403	95% Percentile Bootstrap UCL	7.371
90% Chebyshev(Mean, Sd) UCL	7.421	95% Chebyshev(Mean, Sd) UCL	7.469
97.5% Chebyshev(Mean, Sd) UCL	7.537	99% Chebyshev(Mean, Sd) UCL	7.669

Suggested UCL to Use

95% Student's-t UCL 7.376

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (ph, lab [su_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	6.963	Mean	7.168
Maximum	7.601	Median	7.162
SD	0.133	Std. Error of Mean	0.0305
Coefficient of Variation	0.0186	Skewness	1.713

Normal GOF Test

Shapiro Wilk Test Statistic	0.826
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.198
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 7.221

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 7.232

95% Modified-t UCL (Johnson-1978) 7.223

Gamma GOF Test

A-D Test Statistic	0.97
5% A-D Critical Value	0.738
K-S Test Statistic	0.19
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	3120	k star (bias corrected MLE)	2627
Theta hat (MLE)	0.0023	Theta star (bias corrected MLE)	0.00273

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

nu hat (MLE)	118558	nu star (bias corrected)	99840
MLE Mean (bias corrected)	7.168	MLE Sd (bias corrected)	0.14
		Approximate Chi Square Value (0.05)	99106
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	99042

Assuming Gamma Distribution

95% Approximate Gamma UCL	7.222	95% Adjusted Gamma UCL	7.226
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.836	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.193	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.941	Mean of logged Data	1.97
Maximum of Logged Data	2.028	SD of logged Data	0.0183

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	7.259
95% Chebyshev (MVUE) UCL	7.3	97.5% Chebyshev (MVUE) UCL	7.357
99% Chebyshev (MVUE) UCL	7.468		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	7.219	95% BCA Bootstrap UCL	7.234
95% Standard Bootstrap UCL	7.218	95% Bootstrap-t UCL	7.237
95% Hall's Bootstrap UCL	7.348	95% Percentile Bootstrap UCL	7.219
90% Chebyshev(Mean, Sd) UCL	7.26	95% Chebyshev(Mean, Sd) UCL	7.302
97.5% Chebyshev(Mean, Sd) UCL	7.359	99% Chebyshev(Mean, Sd) UCL	7.472

Suggested UCL to Use

95% Student's-t UCL 7.221

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (radium-226/228 [pci/l]_intraWell_apw-02)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	11
		Number of Missing Observations	0

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Minimum	0.476	Mean	1.881
Maximum	4.09	Median	2
SD	0.809	Std. Error of Mean	0.191
Coefficient of Variation	0.43	Skewness	0.925

Normal GOF Test

Shapiro Wilk Test Statistic 0.889
 1% Shapiro Wilk Critical Value 0.858
 Lilliefors Test Statistic 0.275
 1% Lilliefors Critical Value 0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 2.213

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 2.239
 95% Modified-t UCL (Johnson-1978) 2.219

Gamma GOF Test

A-D Test Statistic 0.914
 5% A-D Critical Value 0.743
 K-S Test Statistic 0.224
 5% K-S Critical Value 0.204

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 5.235
 Theta hat (MLE) 0.359
 nu hat (MLE) 188.5
 MLE Mean (bias corrected) 1.881
 Adjusted Level of Significance 0.0357

k star (bias corrected MLE) 4.399
 Theta star (bias corrected MLE) 0.428
 nu star (bias corrected) 158.4
 MLE Sd (bias corrected) 0.897
 Approximate Chi Square Value (0.05) 130.3
 Adjusted Chi Square Value 127.8

Assuming Gamma Distribution

95% Approximate Gamma UCL 2.287

95% Adjusted Gamma UCL 2.33

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.878
 10% Shapiro Wilk Critical Value 0.914
 Lilliefors Test Statistic 0.239
 10% Lilliefors Critical Value 0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data -0.742
 Maximum of Logged Data 1.409

Mean of logged Data 0.533
 SD of logged Data 0.489

Assuming Lognormal Distribution

95% H-UCL 2.439
 95% Chebyshev (MVUE) UCL 2.898
 99% Chebyshev (MVUE) UCL 4.169

90% Chebyshev (MVUE) UCL 2.589
 97.5% Chebyshev (MVUE) UCL 3.327

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.194	95% BCA Bootstrap UCL	2.236
95% Standard Bootstrap UCL	2.188	95% Bootstrap-t UCL	2.27
95% Hall's Bootstrap UCL	2.433	95% Percentile Bootstrap UCL	2.196
90% Chebyshev(Mean, Sd) UCL	2.453	95% Chebyshev(Mean, Sd) UCL	2.712
97.5% Chebyshev(Mean, Sd) UCL	3.071	99% Chebyshev(Mean, Sd) UCL	3.778

Suggested UCL to Use

95% Student's-t UCL 2.213

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (radium-226/228 [pci/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.776	Mean	1.907
Maximum	3.18	Median	2
SD	0.52	Std. Error of Mean	0.119
Coefficient of Variation	0.273	Skewness	-0.0139

Normal GOF Test

Shapiro Wilk Test Statistic	0.819
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.308
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 2.114

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	2.103
95% Modified-t UCL (Johnson-1978)	2.114

Gamma GOF Test

A-D Test Statistic	2.152
5% A-D Critical Value	0.741
K-S Test Statistic	0.341
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Gamma Statistics

k hat (MLE)	12.24	k star (bias corrected MLE)	10.34
Theta hat (MLE)	0.156	Theta star (bias corrected MLE)	0.184
nu hat (MLE)	465.2	nu star (bias corrected)	393
MLE Mean (bias corrected)	1.907	MLE Sd (bias corrected)	0.593
		Approximate Chi Square Value (0.05)	348.1
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	344.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.153	95% Adjusted Gamma UCL	2.176
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.782
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.349
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.254	Mean of logged Data	0.604
Maximum of Logged Data	1.157	SD of logged Data	0.312

Assuming Lognormal Distribution

95% H-UCL	2.202	90% Chebyshev (MVUE) UCL	2.334
95% Chebyshev (MVUE) UCL	2.523	97.5% Chebyshev (MVUE) UCL	2.786
99% Chebyshev (MVUE) UCL	3.302		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.103	95% BCA Bootstrap UCL	2.1
95% Standard Bootstrap UCL	2.099	95% Bootstrap-t UCL	2.104
95% Hall's Bootstrap UCL	2.127	95% Percentile Bootstrap UCL	2.096
90% Chebyshev(Mean, Sd) UCL	2.265	95% Chebyshev(Mean, Sd) UCL	2.427
97.5% Chebyshev(Mean, Sd) UCL	2.652	99% Chebyshev(Mean, Sd) UCL	3.094

Suggested UCL to Use

95% Student's-t UCL	2.114
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	18	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.645	Mean	2.04
Maximum	6.34	Median	2
SD	1.289	Std. Error of Mean	0.304
Coefficient of Variation	0.632	Skewness	2.397

Normal GOF Test

Shapiro Wilk Test Statistic	0.684
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.401
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL	2.569
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95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	2.724
95% Modified-t UCL (Johnson-1978)	2.598

Gamma GOF Test

A-D Test Statistic	1.565
5% A-D Critical Value	0.744
K-S Test Statistic	0.333
5% K-S Critical Value	0.205

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.594	k star (bias corrected MLE)	3.032
Theta hat (MLE)	0.568	Theta star (bias corrected MLE)	0.673
nu hat (MLE)	129.4	nu star (bias corrected)	109.2
MLE Mean (bias corrected)	2.04	MLE Sd (bias corrected)	1.172
		Approximate Chi Square Value (0.05)	86.04
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	84.07

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.588	95% Adjusted Gamma UCL	2.649
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.85
10% Shapiro Wilk Critical Value	0.914
Lilliefors Test Statistic	0.298
10% Lilliefors Critical Value	0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.439	Mean of logged Data	0.568
Maximum of Logged Data	1.847	SD of logged Data	0.546

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	2.691	90% Chebyshev (MVUE) UCL	2.843
95% Chebyshev (MVUE) UCL	3.212	97.5% Chebyshev (MVUE) UCL	3.724
99% Chebyshev (MVUE) UCL	4.729		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.54	95% BCA Bootstrap UCL	2.733
95% Standard Bootstrap UCL	2.531	95% Bootstrap-t UCL	3.034
95% Hall's Bootstrap UCL	5.487	95% Percentile Bootstrap UCL	2.589
90% Chebyshev(Mean, Sd) UCL	2.952	95% Chebyshev(Mean, Sd) UCL	3.365
97.5% Chebyshev(Mean, Sd) UCL	3.938	99% Chebyshev(Mean, Sd) UCL	5.064

Suggested UCL to Use

95% Student's-t UCL 2.569

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (radium-226/228 [pci/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.9	Mean	1.914
Maximum	2.8	Median	2
SD	0.383	Std. Error of Mean	0.0902
Coefficient of Variation	0.2	Skewness	-0.608

Normal GOF Test

Shapiro Wilk Test Statistic	0.804
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.311
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 2.071

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	2.049
95% Modified-t UCL (Johnson-1978)	2.069

Gamma GOF Test

A-D Test Statistic	2.08
5% A-D Critical Value	0.739
K-S Test Statistic	0.332
5% K-S Critical Value	0.203

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	22.09	k star (bias corrected MLE)	18.45
Theta hat (MLE)	0.0867	Theta star (bias corrected MLE)	0.104
nu hat (MLE)	795.4	nu star (bias corrected)	664.1
MLE Mean (bias corrected)	1.914	MLE Sd (bias corrected)	0.446
		Approximate Chi Square Value (0.05)	605.4
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	600

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.1	95% Adjusted Gamma UCL	2.119
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.739
10% Shapiro Wilk Critical Value	0.914
Lilliefors Test Statistic	0.335
10% Lilliefors Critical Value	0.185

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.105	Mean of logged Data	0.627
Maximum of Logged Data	1.03	SD of logged Data	0.233

Assuming Lognormal Distribution

95% H-UCL	2.13	90% Chebyshev (MVUE) UCL	2.239
95% Chebyshev (MVUE) UCL	2.383	97.5% Chebyshev (MVUE) UCL	2.584
99% Chebyshev (MVUE) UCL	2.978		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.063	95% BCA Bootstrap UCL	2.039
95% Standard Bootstrap UCL	2.056	95% Bootstrap-t UCL	2.053
95% Hall's Bootstrap UCL	2.068	95% Percentile Bootstrap UCL	2.054
90% Chebyshev(Mean, Sd) UCL	2.185	95% Chebyshev(Mean, Sd) UCL	2.308
97.5% Chebyshev(Mean, Sd) UCL	2.478	99% Chebyshev(Mean, Sd) UCL	2.812

Suggested UCL to Use

95% Student's-t UCL	2.071
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (radium-226/228 [pci/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.497	Mean	1.764
Maximum	2.93	Median	2
SD	0.549	Std. Error of Mean	0.126
Coefficient of Variation	0.311	Skewness	-0.612

Normal GOF Test

Shapiro Wilk Test Statistic	0.806
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.303
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL	1.982
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95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	1.952
95% Modified-t UCL (Johnson-1978)	1.979

Gamma GOF Test

A-D Test Statistic	2.276
5% A-D Critical Value	0.742
K-S Test Statistic	0.331
5% K-S Critical Value	0.199

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.02	k star (bias corrected MLE)	6.788
Theta hat (MLE)	0.22	Theta star (bias corrected MLE)	0.26
nu hat (MLE)	304.7	nu star (bias corrected)	258
MLE Mean (bias corrected)	1.764	MLE Sd (bias corrected)	0.677
		Approximate Chi Square Value (0.05)	221.8
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	218.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.052	95% Adjusted Gamma UCL	2.079
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.737
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.332
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.699	Mean of logged Data	0.504
Maximum of Logged Data	1.075	SD of logged Data	0.405

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Lognormal Distribution

95% H-UCL	2.159	90% Chebyshev (MVUE) UCL	2.298
95% Chebyshev (MVUE) UCL	2.529	97.5% Chebyshev (MVUE) UCL	2.85
99% Chebyshev (MVUE) UCL	3.48		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.971	95% BCA Bootstrap UCL	1.943
95% Standard Bootstrap UCL	1.968	95% Bootstrap-t UCL	1.965
95% Hall's Bootstrap UCL	1.963	95% Percentile Bootstrap UCL	1.963
90% Chebyshev(Mean, Sd) UCL	2.141	95% Chebyshev(Mean, Sd) UCL	2.313
97.5% Chebyshev(Mean, Sd) UCL	2.55	99% Chebyshev(Mean, Sd) UCL	3.016

Suggested UCL to Use

95% Student's-t UCL	1.982
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (radium-226/228 [pci/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.933	Mean	1.871
Maximum	2.7	Median	2
SD	0.406	Std. Error of Mean	0.0933
Coefficient of Variation	0.217	Skewness	-0.891

Normal GOF Test

Shapiro Wilk Test Statistic	0.733
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.414
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL	2.033
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95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	2.004
95% Modified-t UCL (Johnson-1978)	2.03

Gamma GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

A-D Test Statistic	3.075	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.432	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.198	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	18.34	k star (bias corrected MLE)	15.48
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	0.121
nu hat (MLE)	696.8	nu star (bias corrected)	588.1
MLE Mean (bias corrected)	1.871	MLE Sd (bias corrected)	0.476
		Approximate Chi Square Value (0.05)	532.9
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	528.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.065	95% Adjusted Gamma UCL	2.083
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.697	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.433	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.0694	Mean of logged Data	0.599
Maximum of Logged Data	0.993	SD of logged Data	0.255

Assuming Lognormal Distribution

95% H-UCL	2.098	90% Chebyshev (MVUE) UCL	2.21
95% Chebyshev (MVUE) UCL	2.361	97.5% Chebyshev (MVUE) UCL	2.571
99% Chebyshev (MVUE) UCL	2.982		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.025	95% BCA Bootstrap UCL	2.013
95% Standard Bootstrap UCL	2.026	95% Bootstrap-t UCL	2.017
95% Hall's Bootstrap UCL	2.012	95% Percentile Bootstrap UCL	2.028
90% Chebyshev(Mean, Sd) UCL	2.151	95% Chebyshev(Mean, Sd) UCL	2.278
97.5% Chebyshev(Mean, Sd) UCL	2.454	99% Chebyshev(Mean, Sd) UCL	2.799

Suggested UCL to Use

95% Student's-t UCL	2.033
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (radium-226/228 [pci/l]_intraWell_apw-08)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.595	Mean	1.701
Maximum	2.39	Median	2
SD	0.557	Std. Error of Mean	0.128
Coefficient of Variation	0.327	Skewness	-1.168

Normal GOF Test		Shapiro Wilk GOF Test	
Shapiro Wilk Test Statistic	0.738	Data Not Normal at 1% Significance Level	
1% Shapiro Wilk Critical Value	0.863		
Lilliefors Test Statistic	0.388	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.229	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.923	95% Adjusted-CLT UCL (Chen-1995)	1.875
		95% Modified-t UCL (Johnson-1978)	1.917

Gamma GOF Test		Anderson-Darling Gamma GOF Test	
A-D Test Statistic	2.799	Data Not Gamma Distributed at 5% Significance Level	
5% A-D Critical Value	0.742		
K-S Test Statistic	0.396	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.199	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	6.763	k star (bias corrected MLE)	5.731
Theta hat (MLE)	0.252	Theta star (bias corrected MLE)	0.297
nu hat (MLE)	257	nu star (bias corrected)	217.8
MLE Mean (bias corrected)	1.701	MLE Sd (bias corrected)	0.711
		Approximate Chi Square Value (0.05)	184.6
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	181.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL	2.007	95% Adjusted Gamma UCL	2.036

Lognormal GOF Test		Shapiro Wilk Lognormal GOF Test	
Shapiro Wilk Test Statistic	0.689	Data Not Lognormal at 10% Significance Level	
10% Shapiro Wilk Critical Value	0.917		
Lilliefors Test Statistic	0.389	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal Statistics

Minimum of Logged Data	-0.519	Mean of logged Data	0.456
Maximum of Logged Data	0.871	SD of logged Data	0.443

Assuming Lognormal Distribution

95% H-UCL	2.133	90% Chebyshev (MVUE) UCL	2.271
95% Chebyshev (MVUE) UCL	2.517	97.5% Chebyshev (MVUE) UCL	2.858
99% Chebyshev (MVUE) UCL	3.527		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.911	95% BCA Bootstrap UCL	1.878
95% Standard Bootstrap UCL	1.91	95% Bootstrap-t UCL	1.895
95% Hall's Bootstrap UCL	1.878	95% Percentile Bootstrap UCL	1.908
90% Chebyshev(Mean, Sd) UCL	2.085	95% Chebyshev(Mean, Sd) UCL	2.258
97.5% Chebyshev(Mean, Sd) UCL	2.499	99% Chebyshev(Mean, Sd) UCL	2.973

Suggested UCL to Use

95% Student's-t UCL 1.923

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (radium-226/228 [pci/l]_intraWell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	0.494	Mean	1.34
Maximum	1.92	Median	1.381
SD	0.429	Std. Error of Mean	0.0985
Coefficient of Variation	0.32	Skewness	-0.397

Normal GOF Test

Shapiro Wilk Test Statistic 0.916
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.203
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% UCLs (Adjusted for Skewness)

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Student's-t UCL	1.511	95% Adjusted-CLT UCL (Chen-1995)	1.493
		95% Modified-t UCL (Johnson-1978)	1.51

Gamma GOF Test

A-D Test Statistic	0.889	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.247	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.199	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.44	k star (bias corrected MLE)	7.143
Theta hat (MLE)	0.159	Theta star (bias corrected MLE)	0.188
nu hat (MLE)	320.7	nu star (bias corrected)	271.4
MLE Mean (bias corrected)	1.34	MLE Sd (bias corrected)	0.502
		Approximate Chi Square Value (0.05)	234.3
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	231.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.553	95% Adjusted Gamma UCL	1.573
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.868	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.263	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.705	Mean of logged Data	0.233
Maximum of Logged Data	0.653	SD of logged Data	0.38

Assuming Lognormal Distribution

95% H-UCL	1.609	90% Chebyshev (MVUE) UCL	1.712
95% Chebyshev (MVUE) UCL	1.876	97.5% Chebyshev (MVUE) UCL	2.103
99% Chebyshev (MVUE) UCL	2.549		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.502	95% BCA Bootstrap UCL	1.486
95% Standard Bootstrap UCL	1.5	95% Bootstrap-t UCL	1.504
95% Hall's Bootstrap UCL	1.495	95% Percentile Bootstrap UCL	1.495
90% Chebyshev(Mean, Sd) UCL	1.636	95% Chebyshev(Mean, Sd) UCL	1.77
97.5% Chebyshev(Mean, Sd) UCL	1.955	99% Chebyshev(Mean, Sd) UCL	2.32

Suggested UCL to Use

95% Student's-t UCL	1.511
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (radium-226/228 [pci/l]_intraWell_apw-10s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.646	Mean	1.982
Maximum	4.83	Median	2
SD	0.927	Std. Error of Mean	0.213
Coefficient of Variation	0.468	Skewness	1.458

Normal GOF Test		Shapiro Wilk GOF Test	
Shapiro Wilk Test Statistic	0.841	Data Not Normal at 1% Significance Level	
1% Shapiro Wilk Critical Value	0.863		
Lilliefors Test Statistic	0.282	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.229	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.351	95% Adjusted-CLT UCL (Chen-1995)	2.408
		95% Modified-t UCL (Johnson-1978)	2.363

Gamma GOF Test		Anderson-Darling Gamma GOF Test	
A-D Test Statistic	0.99	Data Not Gamma Distributed at 5% Significance Level	
5% A-D Critical Value	0.742		
K-S Test Statistic	0.251	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.199	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	5.041	k star (bias corrected MLE)	4.28
Theta hat (MLE)	0.393	Theta star (bias corrected MLE)	0.463
nu hat (MLE)	191.6	nu star (bias corrected)	162.6
MLE Mean (bias corrected)	1.982	MLE Sd (bias corrected)	0.958
		Approximate Chi Square Value (0.05)	134.2
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	131.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL	2.403	95% Adjusted Gamma UCL	2.444

Lognormal GOF Test		Shapiro Wilk Lognormal GOF Test	
Shapiro Wilk Test Statistic	0.89		

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.276	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.437	Mean of logged Data	0.582
Maximum of Logged Data	1.575	SD of logged Data	0.481

Assuming Lognormal Distribution

95% H-UCL	2.518	90% Chebyshev (MVUE) UCL	2.679
95% Chebyshev (MVUE) UCL	2.988	97.5% Chebyshev (MVUE) UCL	3.417
99% Chebyshev (MVUE) UCL	4.261		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.332	95% BCA Bootstrap UCL	2.397
95% Standard Bootstrap UCL	2.325	95% Bootstrap-t UCL	2.461
95% Hall's Bootstrap UCL	2.787	95% Percentile Bootstrap UCL	2.339
90% Chebyshev(Mean, Sd) UCL	2.62	95% Chebyshev(Mean, Sd) UCL	2.909
97.5% Chebyshev(Mean, Sd) UCL	3.31	99% Chebyshev(Mean, Sd) UCL	4.098

Suggested UCL to Use

95% Student's-t UCL 2.351

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (selenium [ug/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	18
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (selenium [ug/l]_intrawell_apw-02) was not processed!

x_ols (selenium [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	2

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	1.9	Maximum Non-Detect	2
Variance Detects	0.32	Percent Non-Detects	89.47%
Mean Detects	1.5	SD Detects	0.566
Median Detects	1.5	CV Detects	0.377
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.369	SD of Logged Detects	0.386

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

**Normal GOF Test on Detects Only
 Not Enough Data to Perform GOF Test**

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.067	KM Standard Error of Mean	0.0818
90KM SD	0.224	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.209	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.201	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.312	95% KM Chebyshev UCL	1.423
97.5% KM Chebyshev UCL	1.578	99% KM Chebyshev UCL	1.881

**Gamma GOF Tests on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Gamma Statistics on Detected Data Only

k hat (MLE)	13.72	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.109	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	54.88	nu star (bias corrected)	N/A
Mean (detects)	1.5		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.067	SD (KM)	0.224
Variance (KM)	0.0502	SE of Mean (KM)	0.0818
k hat (KM)	22.65	k star (KM)	19.11
nu hat (KM)	860.9	nu star (KM)	726.3
theta hat (KM)	0.0471	theta star (KM)	0.0558
80% gamma percentile (KM)	1.265	90% gamma percentile (KM)	1.389
95% gamma percentile (KM)	1.497	99% gamma percentile (KM)	1.715

Gamma Kaplan-Meier (KM) Statistics

Adjusted Level of Significance (β)	0.0369
Approximate Chi Square Value (726.29, α)	664.8
Adjusted Chi Square Value (726.29, β)	659.6
95% KM Approximate Gamma UCL	1.165
95% KM Adjusted Gamma UCL	1.174

**Lognormal GOF Test on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Lognormal ROS Statistics Using Imputed Non-Detects

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Mean in Original Scale	0.311	Mean in Log Scale	-1.971
SD in Original Scale	0.465	SD in Log Scale	1.318
95% t UCL (assumes normality of ROS data)	0.496	95% Percentile Bootstrap UCL	0.497
95% BCA Bootstrap UCL	0.573	95% Bootstrap t UCL	0.767
95% H-UCL (Log ROS)	0.868		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0491	KM Geo Mean	1.05
KM SD (logged)	0.16	95% Critical H Value (KM-Log)	1.759
KM Standard Error of Mean (logged)	0.0585	95% H-UCL (KM -Log)	1.137
KM SD (logged)	0.16	95% Critical H Value (KM-Log)	1.759
KM Standard Error of Mean (logged)	0.0585		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	0.711
SD in Original Scale	0.371
95% t UCL (Assumes normality)	0.858

DL/2 Log-Transformed

Mean in Log Scale	-0.435
SD in Log Scale	0.413
95% H-Stat UCL	0.85

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.209
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (selenium [ug/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (selenium [ug/l]_intrawell_apw-05/05r) was not processed!

x_ols (selenium [ug/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	18
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (selenium [ug/l]_intraWell_apw-06d) was not processed!

x_ols (selenium [ug/l]_intraWell_apw-06s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (selenium [ug/l]_intraWell_apw-06s) was not processed!

x_ols (selenium [ug/l]_intraWell_apw-07)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (selenium [ug/l]_intraWell_apw-07) was not processed!

x_ols (selenium [ug/l]_intraWell_apw-08)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	3.6	Mean	13.11
Maximum	22.1	Median	13.5
SD	4.571	Std. Error of Mean	1.049
Coefficient of Variation	0.349	Skewness	-0.347

Normal GOF Test		Shapiro Wilk GOF Test	
Shapiro Wilk Test Statistic	0.961		
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level	

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lilliefors Test Statistic 0.166 **Lilliefors GOF Test**
 1% Lilliefors Critical Value 0.229 Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 14.93

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 14.75

95% Modified-t UCL (Johnson-1978) 14.91

Gamma GOF Test

A-D Test Statistic 0.845

5% A-D Critical Value 0.742

K-S Test Statistic 0.22

5% K-S Critical Value 0.199

Anderson-Darling Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 6.582

Theta hat (MLE) 1.992

nu hat (MLE) 250.1

MLE Mean (bias corrected) 13.11

Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 5.578

Theta star (bias corrected MLE) 2.35

nu star (bias corrected) 212

MLE Sd (bias corrected) 5.551

Approximate Chi Square Value (0.05) 179.3

Adjusted Chi Square Value 176.6

Assuming Gamma Distribution

95% Approximate Gamma UCL 15.5

95% Adjusted Gamma UCL 15.73

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.857

10% Shapiro Wilk Critical Value 0.917

Lilliefors Test Statistic 0.242

10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 1.281

Maximum of Logged Data 3.096

Mean of logged Data 2.495

SD of logged Data 0.445

Assuming Lognormal Distribution

95% H-UCL 16.45

95% Chebyshev (MVUE) UCL 19.42

99% Chebyshev (MVUE) UCL 27.25

90% Chebyshev (MVUE) UCL 17.52

97.5% Chebyshev (MVUE) UCL 22.06

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 14.83

95% Standard Bootstrap UCL 14.85

95% Hall's Bootstrap UCL 14.82

95% BCA Bootstrap UCL 14.75

95% Bootstrap-t UCL 14.85

95% Percentile Bootstrap UCL 14.83

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

90% Chebyshev(Mean, Sd) UCL	16.26	95% Chebyshev(Mean, Sd) UCL	17.68
97.5% Chebyshev(Mean, Sd) UCL	19.66	99% Chebyshev(Mean, Sd) UCL	23.54

Suggested UCL to Use

95% Student's-t UCL 14.93

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. Recommendations are based upon data size, data distribution, and skewness using results from simulation studies. However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (selenium [ug/l]_intrawell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	12
Number of Detects	14	Number of Non-Detects	5
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	3.3	Maximum Non-Detect	2
Variance Detects	0.5	Percent Non-Detects	26.32%
Mean Detects	1.845	SD Detects	0.707
Median Detects	1.6	CV Detects	0.383
Skewness Detects	0.896	Kurtosis Detects	-0.548
Mean of Logged Detects	0.55	SD of Logged Detects	0.359

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.85	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.278	Lilliefors GOF Test
1% Lilliefors Critical Value	0.263	Detected Data Not Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.652	KM Standard Error of Mean	0.162
90KM SD	0.675	95% KM (BCA) UCL	1.938
95% KM (t) UCL	1.933	95% KM (Percentile Bootstrap) UCL	1.927
95% KM (z) UCL	1.919	95% KM Bootstrap t UCL	1.995
90% KM Chebyshev UCL	2.138	95% KM Chebyshev UCL	2.358
97.5% KM Chebyshev UCL	2.663	99% KM Chebyshev UCL	3.263

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.817	Anderson-Darling GOF Test
5% A-D Critical Value	0.736	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.253	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.229	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	8.172	k star (bias corrected MLE)	6.468
Theta hat (MLE)	0.226	Theta star (bias corrected MLE)	0.285
nu hat (MLE)	228.8	nu star (bias corrected)	181.1
Mean (detects)	1.845		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.351	Mean	1.571
Maximum	3.3	Median	1.4
SD	0.79	CV	0.503
k hat (MLE)	3.881	k star (bias corrected MLE)	3.304
Theta hat (MLE)	0.405	Theta star (bias corrected MLE)	0.476
nu hat (MLE)	147.5	nu star (bias corrected)	125.5
Adjusted Level of Significance (β)	0.0369		
Approximate Chi Square Value (125.54, α)	100.7	Adjusted Chi Square Value (125.54, β)	98.72
95% Gamma Approximate UCL	1.96	95% Gamma Adjusted UCL	1.998

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.652	SD (KM)	0.675
Variance (KM)	0.456	SE of Mean (KM)	0.162
k hat (KM)	5.986	k star (KM)	5.076
nu hat (KM)	227.5	nu star (KM)	192.9
theta hat (KM)	0.276	theta star (KM)	0.326
80% gamma percentile (KM)	2.218	90% gamma percentile (KM)	2.634
95% gamma percentile (KM)	3.014	99% gamma percentile (KM)	3.816

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (192.88, α)	161.7	Adjusted Chi Square Value (192.88, β)	159.3
95% KM Approximate Gamma UCL	1.97	95% KM Adjusted Gamma UCL	2.001

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.892	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.895	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.231	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.208	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.613	Mean in Log Scale	0.386
SD in Original Scale	0.735	SD in Log Scale	0.439
95% t UCL (assumes normality of ROS data)	1.906	95% Percentile Bootstrap UCL	1.888
95% BCA Bootstrap UCL	1.922	95% Bootstrap t UCL	1.951
95% H-UCL (Log ROS)	1.983		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.43	KM Geo Mean	1.537
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

KM SD (logged)	0.368	95% Critical H Value (KM-Log)	1.895
KM Standard Error of Mean (logged)	0.0887	95% H-UCL (KM -Log)	1.938
KM SD (logged)	0.368	95% Critical H Value (KM-Log)	1.895
KM Standard Error of Mean (logged)	0.0887		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	1.544
SD in Original Scale	0.804
95% t UCL (Assumes normality)	1.863

DL/2 Log-Transformed

Mean in Log Scale	0.296
SD in Log Scale	0.562
95% H-Stat UCL	2.071

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.933

When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (selenium [ug/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (selenium [ug/l]_intrawell_apw-10s) was not processed!

x_ols (sulfate [mg/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	376	Mean	451.4
Maximum	510	Median	460
SD	38.17	Std. Error of Mean	8.756
Coefficient of Variation	0.0846	Skewness	-0.421

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Normal GOF Test

Shapiro Wilk Test Statistic 0.962
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.158
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 466.6

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 464.9

95% Modified-t UCL (Johnson-1978) 466.4

Gamma GOF Test

A-D Test Statistic 0.329
 5% A-D Critical Value 0.738
 K-S Test Statistic 0.17
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 143.6
 Theta hat (MLE) 3.144
 nu hat (MLE) 5455
 MLE Mean (bias corrected) 451.4
 Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 120.9
 Theta star (bias corrected MLE) 3.733
 nu star (bias corrected) 4595
 MLE Sd (bias corrected) 41.05
 Approximate Chi Square Value (0.05) 4439
 Adjusted Chi Square Value 4425

Assuming Gamma Distribution

95% Approximate Gamma UCL 467.3

95% Adjusted Gamma UCL 468.7

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.952
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.172
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 5.93
 Maximum of Logged Data 6.234

Mean of logged Data 6.109
 SD of logged Data 0.0865

Assuming Lognormal Distribution

95% H-UCL N/A
 95% Chebyshev (MVUE) UCL 490.5
 99% Chebyshev (MVUE) UCL 540.6

90% Chebyshev (MVUE) UCL 478.3
 97.5% Chebyshev (MVUE) UCL 507.4

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% CLT UCL	465.8	95% BCA Bootstrap UCL	465.4
95% Standard Bootstrap UCL	465.3	95% Bootstrap-t UCL	465.6
95% Hall's Bootstrap UCL	464.7	95% Percentile Bootstrap UCL	465.2
90% Chebyshev(Mean, Sd) UCL	477.6	95% Chebyshev(Mean, Sd) UCL	489.5
97.5% Chebyshev(Mean, Sd) UCL	506.1	99% Chebyshev(Mean, Sd) UCL	538.5

Suggested UCL to Use

95% Student's-t UCL 466.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (sulfate [mg/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	80.1	Mean	221.8
Maximum	393	Median	207
SD	74.65	Std. Error of Mean	17.13
Coefficient of Variation	0.337	Skewness	0.364

Normal GOF Test

Shapiro Wilk Test Statistic	0.983
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.109
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 251.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	251.5
95% Modified-t UCL (Johnson-1978)	251.7

Gamma GOF Test

A-D Test Statistic	0.178
5% A-D Critical Value	0.741
K-S Test Statistic	0.0876
5% K-S Critical Value	0.199

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.647	k star (bias corrected MLE)	7.316
Theta hat (MLE)	25.65	Theta star (bias corrected MLE)	30.31
nu hat (MLE)	328.6	nu star (bias corrected)	278

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

MLE Mean (bias corrected)	221.8	MLE Sd (bias corrected)	82
		Approximate Chi Square Value (0.05)	240.4
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	237.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	256.5	95% Adjusted Gamma UCL	259.8
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.961
10% Shapiro Wilk Critical Value	0.917
Lilliefors Test Statistic	0.103
10% Lilliefors Critical Value	0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.383	Mean of logged Data	5.343
Maximum of Logged Data	5.974	SD of logged Data	0.367

Assuming Lognormal Distribution

95% H-UCL	263.5	90% Chebyshev (MVUE) UCL	280.2
95% Chebyshev (MVUE) UCL	306.2	97.5% Chebyshev (MVUE) UCL	342.3
99% Chebyshev (MVUE) UCL	413.2		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	250	95% BCA Bootstrap UCL	250.3
95% Standard Bootstrap UCL	249.6	95% Bootstrap-t UCL	253.9
95% Hall's Bootstrap UCL	254.9	95% Percentile Bootstrap UCL	249.8
90% Chebyshev(Mean, Sd) UCL	273.2	95% Chebyshev(Mean, Sd) UCL	296.4
97.5% Chebyshev(Mean, Sd) UCL	328.7	99% Chebyshev(Mean, Sd) UCL	392.2

Suggested UCL to Use

95% Student's-t UCL 251.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (sulfate [mg/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	68.04	Mean	262.2
Maximum	354.9	Median	282.8
SD	66.25	Std. Error of Mean	15.2
Coefficient of Variation	0.253	Skewness	-1.439

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Normal GOF Test

Shapiro Wilk Test Statistic	0.897	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.158	Lilliefors GOF Test
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 288.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 281.8
 95% Modified-t UCL (Johnson-1978) 287.7

Gamma GOF Test

A-D Test Statistic	1.251	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.741	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.222	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.199	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.6	k star (bias corrected MLE)	8.963
Theta hat (MLE)	24.73	Theta star (bias corrected MLE)	29.25
nu hat (MLE)	402.9	nu star (bias corrected)	340.6
MLE Mean (bias corrected)	262.2	MLE Sd (bias corrected)	87.56
		Approximate Chi Square Value (0.05)	298.8
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	295.4

Assuming Gamma Distribution

95% Approximate Gamma UCL 298.8 95% Adjusted Gamma UCL 302.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.707	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.254	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.22	Mean of logged Data	5.521
Maximum of Logged Data	5.872	SD of logged Data	0.364

Assuming Lognormal Distribution

95% H-UCL	314.1	90% Chebyshev (MVUE) UCL	334.1
95% Chebyshev (MVUE) UCL	364.9	97.5% Chebyshev (MVUE) UCL	407.6
99% Chebyshev (MVUE) UCL	491.6		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCLs

95% CLT UCL	287.2	95% BCA Bootstrap UCL	283.1
95% Standard Bootstrap UCL	286.4	95% Bootstrap-t UCL	283.7
95% Hall's Bootstrap UCL	283	95% Percentile Bootstrap UCL	285.7
90% Chebyshev(Mean, Sd) UCL	307.8	95% Chebyshev(Mean, Sd) UCL	328.4
97.5% Chebyshev(Mean, Sd) UCL	357.1	99% Chebyshev(Mean, Sd) UCL	413.4

Suggested UCL to Use

95% Student's-t UCL 288.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (sulfate [mg/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	180	Mean	223.6
Maximum	272	Median	220
SD	29.64	Std. Error of Mean	6.987
Coefficient of Variation	0.133	Skewness	0.223

Normal GOF Test

Shapiro Wilk Test Statistic	0.941
1% Shapiro Wilk Critical Value	0.858
Lilliefors Test Statistic	0.104
1% Lilliefors Critical Value	0.235

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 235.7

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 235.4

95% Modified-t UCL (Johnson-1978) 235.8

Gamma GOF Test

A-D Test Statistic	0.316
5% A-D Critical Value	0.738
K-S Test Statistic	0.112
5% K-S Critical Value	0.203

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	60.44	k star (bias corrected MLE)	50.4
Theta hat (MLE)	3.699	Theta star (bias corrected MLE)	4.435

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

nu hat (MLE)	2176	nu star (bias corrected)	1815
MLE Mean (bias corrected)	223.6	MLE Sd (bias corrected)	31.49
		Approximate Chi Square Value (0.05)	1717
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	1707

Assuming Gamma Distribution

95% Approximate Gamma UCL	236.3	95% Adjusted Gamma UCL	237.6
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.945	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.108	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.185	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.193	Mean of logged Data	5.401
Maximum of Logged Data	5.606	SD of logged Data	0.133

Assuming Lognormal Distribution

95% H-UCL	236.6	90% Chebyshev (MVUE) UCL	244.6
95% Chebyshev (MVUE) UCL	254.1	97.5% Chebyshev (MVUE) UCL	267.3
99% Chebyshev (MVUE) UCL	293.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	235	95% BCA Bootstrap UCL	235.7
95% Standard Bootstrap UCL	234.8	95% Bootstrap-t UCL	236.4
95% Hall's Bootstrap UCL	235.7	95% Percentile Bootstrap UCL	235
90% Chebyshev(Mean, Sd) UCL	244.5	95% Chebyshev(Mean, Sd) UCL	254
97.5% Chebyshev(Mean, Sd) UCL	267.2	99% Chebyshev(Mean, Sd) UCL	293.1

Suggested UCL to Use

95% Student's-t UCL 235.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (sulfate [mg/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	127	Mean	198.9
Maximum	247	Median	208
SD	38.38	Std. Error of Mean	8.805

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Coefficient of Variation 0.193 Skewness -0.594

Normal GOF Test

Shapiro Wilk Test Statistic 0.92
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.143
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 214.2

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 212.1
 95% Modified-t UCL (Johnson-1978) 214

Gamma GOF Test

A-D Test Statistic 0.684
 5% A-D Critical Value 0.74
 K-S Test Statistic 0.168
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	25.64	k star (bias corrected MLE)	21.63
Theta hat (MLE)	7.759	Theta star (bias corrected MLE)	9.199
nu hat (MLE)	974.4	nu star (bias corrected)	821.9
MLE Mean (bias corrected)	198.9	MLE Sd (bias corrected)	42.78
		Approximate Chi Square Value (0.05)	756.3
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	750.8

Assuming Gamma Distribution

95% Approximate Gamma UCL 216.2 95% Adjusted Gamma UCL 217.8

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.894
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.179
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.844	Mean of logged Data	5.273
Maximum of Logged Data	5.509	SD of logged Data	0.209

Assuming Lognormal Distribution

95% H-UCL	217.8	90% Chebyshev (MVUE) UCL	228
95% Chebyshev (MVUE) UCL	241.1	97.5% Chebyshev (MVUE) UCL	259.3
99% Chebyshev (MVUE) UCL	295		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Nonparametric Distribution Free UCLs

95% CLT UCL	213.4	95% BCA Bootstrap UCL	212.3
95% Standard Bootstrap UCL	213.7	95% Bootstrap-t UCL	213.3
95% Hall's Bootstrap UCL	212.3	95% Percentile Bootstrap UCL	213.1
90% Chebyshev(Mean, Sd) UCL	225.4	95% Chebyshev(Mean, Sd) UCL	237.3
97.5% Chebyshev(Mean, Sd) UCL	253.9	99% Chebyshev(Mean, Sd) UCL	286.6

Suggested UCL to Use

95% Student's-t UCL 214.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (sulfate [mg/l]_intrawell_apw-07)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	34.7	Mean	56.43
Maximum	78	Median	56.3
SD	11.55	Std. Error of Mean	2.649
Coefficient of Variation	0.205	Skewness	-0.0244

Normal GOF Test

Shapiro Wilk Test Statistic	0.987
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.0838
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 61.02

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	60.77
95% Modified-t UCL (Johnson-1978)	61.02

Gamma GOF Test

A-D Test Statistic	0.176
5% A-D Critical Value	0.74
K-S Test Statistic	0.1
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 24.15

k star (bias corrected MLE) 20.37

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Theta hat (MLE)	2.337	Theta star (bias corrected MLE)	2.77
nu hat (MLE)	917.6	nu star (bias corrected)	774.1
MLE Mean (bias corrected)	56.43	MLE Sd (bias corrected)	12.5
		Approximate Chi Square Value (0.05)	710.5
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	705.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	61.47	95% Adjusted Gamma UCL	61.94
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.976	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0996	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.547	Mean of logged Data	4.012
Maximum of Logged Data	4.357	SD of logged Data	0.213

Assuming Lognormal Distribution

95% H-UCL	61.84	90% Chebyshev (MVUE) UCL	64.8
95% Chebyshev (MVUE) UCL	68.57	97.5% Chebyshev (MVUE) UCL	73.81
99% Chebyshev (MVUE) UCL	84.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	60.78	95% BCA Bootstrap UCL	61.05
95% Standard Bootstrap UCL	60.6	95% Bootstrap-t UCL	61.01
95% Hall's Bootstrap UCL	60.82	95% Percentile Bootstrap UCL	60.55
90% Chebyshev(Mean, Sd) UCL	64.37	95% Chebyshev(Mean, Sd) UCL	67.97
97.5% Chebyshev(Mean, Sd) UCL	72.97	99% Chebyshev(Mean, Sd) UCL	82.79

Suggested UCL to Use

95% Student's-t UCL 61.02

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Number of Missing Observations 0
 Mean 28.36
 Median 28.04
 Std. Error of Mean 0.879
 Skewness 0.178

Minimum 21.25
 Maximum 35.61
 SD 3.83
 Coefficient of Variation 0.135

Normal GOF Test

Shapiro Wilk Test Statistic 0.965
 1% Shapiro Wilk Critical Value 0.863
 Lilliefors Test Statistic 0.131
 1% Lilliefors Critical Value 0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 29.89

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 29.85
 95% Modified-t UCL (Johnson-1978) 29.89

Gamma GOF Test

A-D Test Statistic 0.3
 5% A-D Critical Value 0.74
 K-S Test Statistic 0.127
 5% K-S Critical Value 0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 57.53
 Theta hat (MLE) 0.493
 nu hat (MLE) 2186
 MLE Mean (bias corrected) 28.36
 Adjusted Level of Significance 0.0369

k star (bias corrected MLE) 48.48
 Theta star (bias corrected MLE) 0.585
 nu star (bias corrected) 1842
 MLE Sd (bias corrected) 4.074
 Approximate Chi Square Value (0.05) 1744
 Adjusted Chi Square Value 1735

Assuming Gamma Distribution

95% Approximate Gamma UCL 29.97

95% Adjusted Gamma UCL 30.11

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.966
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.138
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 3.056
 Maximum of Logged Data 3.573

Mean of logged Data 3.336
 SD of logged Data 0.136

Assuming Lognormal Distribution

95% H-UCL 30.02
 95% Chebyshev (MVUE) UCL 32.24

90% Chebyshev (MVUE) UCL 31.03
 97.5% Chebyshev (MVUE) UCL 33.92

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000
 99% Chebyshev (MVUE) UCL 37.21

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	29.81	95% BCA Bootstrap UCL	29.95
95% Standard Bootstrap UCL	29.85	95% Bootstrap-t UCL	30.04
95% Hall's Bootstrap UCL	30.07	95% Percentile Bootstrap UCL	29.85
90% Chebyshev(Mean, Sd) UCL	31	95% Chebyshev(Mean, Sd) UCL	32.19
97.5% Chebyshev(Mean, Sd) UCL	33.85	99% Chebyshev(Mean, Sd) UCL	37.11

Suggested UCL to Use

95% Student's-t UCL 29.89

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (sulfate [mg/l]_intraWell_apw-10d)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	25.03	Mean	35.45
Maximum	42.57	Median	36.28
SD	4.047	Std. Error of Mean	0.928
Coefficient of Variation	0.114	Skewness	-0.782

Normal GOF Test

Shapiro Wilk Test Statistic	0.945
1% Shapiro Wilk Critical Value	0.863
Lilliefors Test Statistic	0.188
1% Lilliefors Critical Value	0.229

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 37.06

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995)	36.8
95% Modified-t UCL (Johnson-1978)	37.03

Gamma GOF Test

A-D Test Statistic	0.597
5% A-D Critical Value	0.739
K-S Test Statistic	0.203
5% K-S Critical Value	0.198

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

k hat (MLE)	75.08	k star (bias corrected MLE)	63.26
Theta hat (MLE)	0.472	Theta star (bias corrected MLE)	0.56
nu hat (MLE)	2853	nu star (bias corrected)	2404
MLE Mean (bias corrected)	35.45	MLE Sd (bias corrected)	4.457
		Approximate Chi Square Value (0.05)	2291
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	2281

Assuming Gamma Distribution

95% Approximate Gamma UCL	37.2	95% Adjusted Gamma UCL	37.36
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Lognormal GOF Test

Shapiro Wilk Test Statistic 0.908
 10% Shapiro Wilk Critical Value 0.917
 Lilliefors Test Statistic 0.214
 10% Lilliefors Critical Value 0.18

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.22	Mean of logged Data	3.561
Maximum of Logged Data	3.751	SD of logged Data	0.121

Assuming Lognormal Distribution

95% H-UCL	37.28	90% Chebyshev (MVUE) UCL	38.43
95% Chebyshev (MVUE) UCL	39.77	97.5% Chebyshev (MVUE) UCL	41.64
99% Chebyshev (MVUE) UCL	45.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	36.98	95% BCA Bootstrap UCL	36.84
95% Standard Bootstrap UCL	36.95	95% Bootstrap-t UCL	36.94
95% Hall's Bootstrap UCL	36.92	95% Percentile Bootstrap UCL	36.92
90% Chebyshev(Mean, Sd) UCL	38.24	95% Chebyshev(Mean, Sd) UCL	39.5
97.5% Chebyshev(Mean, Sd) UCL	41.25	99% Chebyshev(Mean, Sd) UCL	44.69

Suggested UCL to Use

95% Student's-t UCL 37.06

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

x_ols (sulfate [mg/l]_intrawell_apw-10s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	3
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Number of Detects	2	Number of Non-Detects	17
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	10	Minimum Non-Detect	5
Maximum Detect	21	Maximum Non-Detect	10
Variance Detects	60.5	Percent Non-Detects	89.47%
Mean Detects	15.5	SD Detects	7.778
Median Detects	15.5	CV Detects	0.502
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	2.674	SD of Logged Detects	0.525

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

**Normal GOF Test on Detects Only
 Not Enough Data to Perform GOF Test**

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.105	KM Standard Error of Mean	1.195
90KM SD	3.683	95% KM (BCA) UCL	N/A
95% KM (t) UCL	8.178	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	8.071	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	9.69	95% KM Chebyshev UCL	11.31
97.5% KM Chebyshev UCL	13.57	99% KM Chebyshev UCL	18

**Gamma GOF Tests on Detected Observations Only
 Not Enough Data to Perform GOF Test**

Gamma Statistics on Detected Data Only

k hat (MLE)	7.594	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.041	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	30.38	nu star (bias corrected)	N/A
Mean (detects)	15.5		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.105	SD (KM)	3.683
Variance (KM)	13.57	SE of Mean (KM)	1.195
k hat (KM)	2.747	k star (KM)	2.349
nu hat (KM)	104.4	nu star (KM)	89.25
theta hat (KM)	2.222	theta star (KM)	2.6
80% gamma percentile (KM)	8.967	90% gamma percentile (KM)	11.44
95% gamma percentile (KM)	13.78	99% gamma percentile (KM)	18.91

Gamma Kaplan-Meier (KM) Statistics

Adjusted Level of Significance (β)	0.0369
Approximate Chi Square Value (89.25, α)	68.46
Adjusted Chi Square Value (89.25, β)	66.87
95% KM Approximate Gamma UCL	7.958
95% KM Adjusted Gamma UCL	8.148

**Lognormal GOF Test on Detected Observations Only
 Not Enough Data to Perform GOF Test**

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.216	Mean in Log Scale	-0.907
SD in Original Scale	5.092	SD in Log Scale	1.93
95% t UCL (assumes normality of ROS data)	4.242	95% Percentile Bootstrap UCL	4.283
95% BCA Bootstrap UCL	5.37	95% Bootstrap t UCL	12.68
95% H-UCL (Log ROS)	17.01		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.721	KM Geo Mean	5.593
KM SD (logged)	0.348	95% Critical H Value (KM-Log)	1.88
KM Standard Error of Mean (logged)	0.113	95% H-UCL (KM -Log)	6.933
KM SD (logged)	0.348	95% Critical H Value (KM-Log)	1.88
KM Standard Error of Mean (logged)	0.113		

DL/2 Statistics

DL/2 Normal

Mean in Original Scale	5.579
SD in Original Scale	4.08
95% t UCL (Assumes normality)	7.202

DL/2 Log-Transformed

Mean in Log Scale	1.576
SD in Log Scale	0.497
95% H-Stat UCL	6.915

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 8.178

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (thallium [ug/l]_intrawell_apw-02)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-02) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-03)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-03) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-05/05r)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-05/05r) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-06d)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	18
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-06d) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-06s)

General Statistics

Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-06s) was not processed!

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

x_ols (thallium [ug/l]_intrawell_apw-07)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
 Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-07) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-08)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
 Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-08) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-10d)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
 Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
 The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**

The data set for variable x_ols (thallium [ug/l]_intrawell_apw-10d) was not processed!

x_ols (thallium [ug/l]_intrawell_apw-10s)

General Statistics			
Total Number of Observations	19	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	19
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable x_ols (thallium [ug/l]_inrawell_apw-10s) was not processed!

x_ols (turbidity, field [ntu]_inrawell_apw-02)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	128	Mean	305.9
Maximum	663	Median	288.4
SD	140.3	Std. Error of Mean	42.29
Coefficient of Variation	0.459	Skewness	1.671

Normal GOF Test

Shapiro Wilk Test Statistic	0.861	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.792	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.192	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.291	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 382.5

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 398.2
 95% Modified-t UCL (Johnson-1978) 386.1

Gamma GOF Test

A-D Test Statistic	0.285	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.141	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.122	k star (bias corrected MLE)	4.513
Theta hat (MLE)	49.97	Theta star (bias corrected MLE)	67.79
nu hat (MLE)	134.7	nu star (bias corrected)	99.28
MLE Mean (bias corrected)	305.9	MLE Sd (bias corrected)	144
		Approximate Chi Square Value (0.05)	77.29
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	74.14

Assuming Gamma Distribution

95% Approximate Gamma UCL 392.9 95% Adjusted Gamma UCL 409.6

Lognormal GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Shapiro Wilk Test Statistic	0.972	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.876	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.137	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.231	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.852	Mean of logged Data	5.639
Maximum of Logged Data	6.497	SD of logged Data	0.425

Assuming Lognormal Distribution

95% H-UCL	407.4	90% Chebyshev (MVUE) UCL	424.4
95% Chebyshev (MVUE) UCL	478.4	97.5% Chebyshev (MVUE) UCL	553.4
99% Chebyshev (MVUE) UCL	700.7		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	375.5	95% BCA Bootstrap UCL	395.1
95% Standard Bootstrap UCL	373.1	95% Bootstrap-t UCL	423.7
95% Hall's Bootstrap UCL	747.1	95% Percentile Bootstrap UCL	376.4
90% Chebyshev(Mean, Sd) UCL	432.8	95% Chebyshev(Mean, Sd) UCL	490.2
97.5% Chebyshev(Mean, Sd) UCL	570	99% Chebyshev(Mean, Sd) UCL	726.7

Suggested UCL to Use

95% Student's-t UCL 382.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intrawell_apw-03)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0	Mean	4.506
Maximum	45.09	Median	0
SD	13.53	Std. Error of Mean	4.078
Coefficient of Variation	3.002	Skewness	3.26

Normal GOF Test

Shapiro Wilk Test Statistic	0.391	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.792	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.449	Lilliefors GOF Test
1% Lilliefors Critical Value	0.291	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 11.9

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 15.5
 95% Modified-t UCL (Johnson-1978) 12.57

Gamma Statistics Not Available

Lognormal Statistics Not Available

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	11.21	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	16.74	95% Chebyshev(Mean, Sd) UCL	22.28
97.5% Chebyshev(Mean, Sd) UCL	29.98	99% Chebyshev(Mean, Sd) UCL	45.09

Suggested UCL to Use

95% Student's-t UCL 11.9

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intravelwell_apw-05/05r)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	4.65	Mean	32.79
Maximum	76.1	Median	33.7
SD	24.51	Std. Error of Mean	7.39
Coefficient of Variation	0.747	Skewness	0.446

Normal GOF Test

Shapiro Wilk Test Statistic 0.919
 1% Shapiro Wilk Critical Value 0.792
 Lilliefors Test Statistic 0.196
 1% Lilliefors Critical Value 0.291

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 46.18

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 46

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

95% Modified-t UCL (Johnson-1978) 46.35

Gamma GOF Test

A-D Test Statistic 0.448
 5% A-D Critical Value 0.742
 K-S Test Statistic 0.209
 5% K-S Critical Value 0.26

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.547	k star (bias corrected MLE)	1.185
Theta hat (MLE)	21.2	Theta star (bias corrected MLE)	27.66
nu hat (MLE)	34.03	nu star (bias corrected)	26.08
MLE Mean (bias corrected)	32.79	MLE Sd (bias corrected)	30.11
		Approximate Chi Square Value (0.05)	15.44
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	14.12

Assuming Gamma Distribution

95% Approximate Gamma UCL	55.38	95% Adjusted Gamma UCL	60.55
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Lognormal GOF Test

Shapiro Wilk Test Statistic 0.9
 10% Shapiro Wilk Critical Value 0.876
 Lilliefors Test Statistic 0.199
 10% Lilliefors Critical Value 0.231

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.537	Mean of logged Data	3.133
Maximum of Logged Data	4.332	SD of logged Data	0.975

Assuming Lognormal Distribution

95% H-UCL	91.73	90% Chebyshev (MVUE) UCL	67.38
95% Chebyshev (MVUE) UCL	82.12	97.5% Chebyshev (MVUE) UCL	102.6
99% Chebyshev (MVUE) UCL	142.7		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	44.94	95% BCA Bootstrap UCL	45.05
95% Standard Bootstrap UCL	44.51	95% Bootstrap-t UCL	48.13
95% Hall's Bootstrap UCL	46.09	95% Percentile Bootstrap UCL	44.6
90% Chebyshev(Mean, Sd) UCL	54.96	95% Chebyshev(Mean, Sd) UCL	65
97.5% Chebyshev(Mean, Sd) UCL	78.94	99% Chebyshev(Mean, Sd) UCL	106.3

Suggested UCL to Use

95% Student's-t UCL 46.18

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intrawell_apw-06d)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	3.02	Mean	45.35
Maximum	181	Median	24.35
SD	52.97	Std. Error of Mean	16.75
Coefficient of Variation	1.168	Skewness	2.189

Normal GOF Test

Shapiro Wilk Test Statistic	0.736
1% Shapiro Wilk Critical Value	0.781
Lilliefors Test Statistic	0.272
1% Lilliefors Critical Value	0.304

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 76.06

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 85.29
 95% Modified-t UCL (Johnson-1978) 77.99

Gamma GOF Test

A-D Test Statistic	0.287
5% A-D Critical Value	0.747
K-S Test Statistic	0.161
5% K-S Critical Value	0.273

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.053	k star (bias corrected MLE)	0.804
Theta hat (MLE)	43.08	Theta star (bias corrected MLE)	56.44
nu hat (MLE)	21.05	nu star (bias corrected)	16.07
MLE Mean (bias corrected)	45.35	MLE Sd (bias corrected)	50.59
		Approximate Chi Square Value (0.05)	8.012
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	7.045

Assuming Gamma Distribution

95% Approximate Gamma UCL 90.97

95% Adjusted Gamma UCL 103.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.98
10% Shapiro Wilk Critical Value	0.869
Lilliefors Test Statistic	0.175
10% Lilliefors Critical Value	0.241

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal Statistics

Minimum of Logged Data	1.105	Mean of logged Data	3.269
Maximum of Logged Data	5.198	SD of logged Data	1.155

Assuming Lognormal Distribution

95% H-UCL	192.1	90% Chebyshev (MVUE) UCL	100.4
95% Chebyshev (MVUE) UCL	124.8	97.5% Chebyshev (MVUE) UCL	158.6
99% Chebyshev (MVUE) UCL	225.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	72.9	95% BCA Bootstrap UCL	87.65
95% Standard Bootstrap UCL	72.14	95% Bootstrap-t UCL	114.4
95% Hall's Bootstrap UCL	172.5	95% Percentile Bootstrap UCL	74.5
90% Chebyshev(Mean, Sd) UCL	95.6	95% Chebyshev(Mean, Sd) UCL	118.4
97.5% Chebyshev(Mean, Sd) UCL	150	99% Chebyshev(Mean, Sd) UCL	212

Suggested UCL to Use

95% Student's-t UCL 76.06

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

**If the data were collected using judgmental or other non-random methods,
 then contact a statistician to correctly calculate UCLs.**

When a data set follows an approximate distribution passing only one of the GOF tests,
 it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intrawell_apw-06s)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	1.26	Mean	8.644
Maximum	30.5	Median	5.72
SD	8.127	Std. Error of Mean	2.45
Coefficient of Variation	0.94	Skewness	2.263

Normal GOF Test

Shapiro Wilk Test Statistic 0.74
 1% Shapiro Wilk Critical Value 0.792
 Lilliefors Test Statistic 0.298

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

1% Lilliefors Critical Value 0.291

Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 13.08

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 14.46

95% Modified-t UCL (Johnson-1978) 13.36

Gamma GOF Test

A-D Test Statistic 0.395

Anderson-Darling Gamma GOF Test

5% A-D Critical Value 0.741

Detected data appear Gamma Distributed at 5% Significance Level

K-S Test Statistic 0.194

Kolmogorov-Smirnov Gamma GOF Test

5% K-S Critical Value 0.259

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 1.747

k star (bias corrected MLE) 1.331

Theta hat (MLE) 4.947

Theta star (bias corrected MLE) 6.493

nu hat (MLE) 38.44

nu star (bias corrected) 29.29

MLE Mean (bias corrected) 8.644

MLE Sd (bias corrected) 7.491

Approximate Chi Square Value (0.05) 17.93

Adjusted Level of Significance 0.0278

Adjusted Chi Square Value 16.5

Assuming Gamma Distribution

95% Approximate Gamma UCL 14.12

95% Adjusted Gamma UCL 15.34

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.971

Shapiro Wilk Lognormal GOF Test

10% Shapiro Wilk Critical Value 0.876

Data appear Lognormal at 10% Significance Level

Lilliefors Test Statistic 0.15

Lilliefors Lognormal GOF Test

10% Lilliefors Critical Value 0.231

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 0.231

Mean of logged Data 1.844

Maximum of Logged Data 3.418

SD of logged Data 0.827

Assuming Lognormal Distribution

95% H-UCL 17.93

90% Chebyshev (MVUE) UCL 15.27

95% Chebyshev (MVUE) UCL 18.3

97.5% Chebyshev (MVUE) UCL 22.52

99% Chebyshev (MVUE) UCL 30.8

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 12.67

95% BCA Bootstrap UCL 15.02

95% Standard Bootstrap UCL 12.5

95% Bootstrap-t UCL 19.98

95% Hall's Bootstrap UCL 32.49

95% Percentile Bootstrap UCL 12.85

90% Chebyshev(Mean, Sd) UCL 15.99

95% Chebyshev(Mean, Sd) UCL 19.32

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

97.5% Chebyshev(Mean, Sd) UCL 23.95

99% Chebyshev(Mean, Sd) UCL 33.02

Suggested UCL to Use

95% Adjusted Gamma UCL 15.34

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intraWell_apw-07)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0	Mean	7.648
Maximum	40.82	Median	1.163
SD	12.73	Std. Error of Mean	3.839
Coefficient of Variation	1.665	Skewness	2.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.687
1% Shapiro Wilk Critical Value	0.792
Lilliefors Test Statistic	0.288
1% Lilliefors Critical Value	0.291

Shapiro Wilk GOF Test

Data Not Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 14.61

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 16.56

95% Modified-t UCL (Johnson-1978) 15.01

Gamma Statistics Not Available

Lognormal Statistics Not Available

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	13.96	95% BCA Bootstrap UCL	16.29
95% Standard Bootstrap UCL	13.65	95% Bootstrap-t UCL	23.76
95% Hall's Bootstrap UCL	35.52	95% Percentile Bootstrap UCL	14.01
90% Chebyshev(Mean, Sd) UCL	19.17	95% Chebyshev(Mean, Sd) UCL	24.38
97.5% Chebyshev(Mean, Sd) UCL	31.62	99% Chebyshev(Mean, Sd) UCL	45.85

Suggested UCL to Use

95% Student's-t UCL 14.61

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

then contact a statistician to correctly calculate UCLs.

When a data set follows an approximate distribution passing only one of the GOF tests,
 it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intraWell_apw-08)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	23.1	Mean	123.3
Maximum	305	Median	136
SD	79	Std. Error of Mean	23.82
Coefficient of Variation	0.641	Skewness	0.937

Normal GOF Test

Shapiro Wilk Test Statistic	0.894
1% Shapiro Wilk Critical Value	0.792
Lilliefors Test Statistic	0.19
1% Lilliefors Critical Value	0.291

Shapiro Wilk GOF Test

Data appear Normal at 1% Significance Level

Lilliefors GOF Test

Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 166.4

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 169.6

95% Modified-t UCL (Johnson-1978) 167.6

Gamma GOF Test

A-D Test Statistic	0.564
5% A-D Critical Value	0.738
K-S Test Statistic	0.205
5% K-S Critical Value	0.258

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.238	k star (bias corrected MLE)	1.688
Theta hat (MLE)	55.07	Theta star (bias corrected MLE)	73.01
nu hat (MLE)	49.24	nu star (bias corrected)	37.14
MLE Mean (bias corrected)	123.3	MLE Sd (bias corrected)	94.86
		Approximate Chi Square Value (0.05)	24.19
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	22.5

Assuming Gamma Distribution

95% Approximate Gamma UCL 189.3

95% Adjusted Gamma UCL 203.5

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.877	Shapiro Wilk Lognormal GOF Test
10% Shapiro Wilk Critical Value	0.876	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.237	Lilliefors Lognormal GOF Test
10% Lilliefors Critical Value	0.231	Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.14	Mean of logged Data	4.575
Maximum of Logged Data	5.72	SD of logged Data	0.804

Assuming Lognormal Distribution

95% H-UCL	262	90% Chebyshev (MVUE) UCL	227.4
95% Chebyshev (MVUE) UCL	271.9	97.5% Chebyshev (MVUE) UCL	333.6
99% Chebyshev (MVUE) UCL	454.9		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	162.4	95% BCA Bootstrap UCL	167.2
95% Standard Bootstrap UCL	160.9	95% Bootstrap-t UCL	173.7
95% Hall's Bootstrap UCL	193.2	95% Percentile Bootstrap UCL	163.1
90% Chebyshev(Mean, Sd) UCL	194.7	95% Chebyshev(Mean, Sd) UCL	227.1
97.5% Chebyshev(Mean, Sd) UCL	272	99% Chebyshev(Mean, Sd) UCL	360.3

Suggested UCL to Use

95% Student's-t UCL 166.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intraWell_apw-10d)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	4.76	Mean	85.92
Maximum	198	Median	45.3
SD	80.07	Std. Error of Mean	24.14
Coefficient of Variation	0.932	Skewness	0.575

Normal GOF Test

Shapiro Wilk Test Statistic	0.791	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.792	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.323	Lilliefors GOF Test
1% Lilliefors Critical Value	0.291	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Assuming Normal Distribution

95% Normal UCL

95% Student's-t UCL 129.7

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 130.1

95% Modified-t UCL (Johnson-1978) 130.4

Gamma GOF Test

A-D Test Statistic 0.592

5% A-D Critical Value 0.754

K-S Test Statistic 0.222

5% K-S Critical Value 0.263

Anderson-Darling Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Kolmogorov-Smirnov Gamma GOF Test

Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE) 0.954

Theta hat (MLE) 90.02

nu hat (MLE) 21

MLE Mean (bias corrected) 85.92

Adjusted Level of Significance 0.0278

k star (bias corrected MLE) 0.755

Theta star (bias corrected MLE) 113.8

nu star (bias corrected) 16.6

MLE Sd (bias corrected) 98.9

Approximate Chi Square Value (0.05) 8.39

Adjusted Chi Square Value 7.457

Assuming Gamma Distribution

95% Approximate Gamma UCL 170

95% Adjusted Gamma UCL 191.3

Lognormal GOF Test

Shapiro Wilk Test Statistic 0.875

10% Shapiro Wilk Critical Value 0.876

Lilliefors Test Statistic 0.195

10% Lilliefors Critical Value 0.231

Shapiro Wilk Lognormal GOF Test

Data Not Lognormal at 10% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 1.56

Maximum of Logged Data 5.288

Mean of logged Data 3.845

SD of logged Data 1.339

Assuming Lognormal Distribution

95% H-UCL 546.7

95% Chebyshev (MVUE) UCL 291.4

99% Chebyshev (MVUE) UCL 535.9

90% Chebyshev (MVUE) UCL 231.9

97.5% Chebyshev (MVUE) UCL 373.9

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 125.6

95% Standard Bootstrap UCL 124.2

95% Hall's Bootstrap UCL 116.7

90% Chebyshev(Mean, Sd) UCL 158.3

97.5% Chebyshev(Mean, Sd) UCL 236.7

95% BCA Bootstrap UCL 129.3

95% Bootstrap-t UCL 145.3

95% Percentile Bootstrap UCL 126.1

95% Chebyshev(Mean, Sd) UCL 191.2

99% Chebyshev(Mean, Sd) UCL 326.1

UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM
 From File filec804af5b2f.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Suggested UCL to Use

95% Adjusted Gamma UCL 191.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

x_ols (turbidity, field [ntu]_intrawell_apw-10s)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	3.78	Mean	33.64
Maximum	63.6	Median	34.3
SD	22.28	Std. Error of Mean	6.719
Coefficient of Variation	0.662	Skewness	0.129

Normal GOF Test

Shapiro Wilk Test Statistic	0.906	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.792	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.178	Lilliefors GOF Test
1% Lilliefors Critical Value	0.291	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	45.81	95% Adjusted-CLT UCL (Chen-1995)	44.97
		95% Modified-t UCL (Johnson-1978)	45.86

Gamma GOF Test

A-D Test Statistic	0.368	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.259	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.831	k star (bias corrected MLE)	1.393
Theta hat (MLE)	18.37	Theta star (bias corrected MLE)	24.15
nu hat (MLE)	40.29	nu star (bias corrected)	30.64
MLE Mean (bias corrected)	33.64	MLE Sd (bias corrected)	28.5
		Approximate Chi Square Value (0.05)	18.99
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	17.51

Assuming Gamma Distribution

95% Approximate Gamma UCL	54.25	95% Adjusted Gamma UCL	58.84
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Lognormal GOF Test
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UCL Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation ProUCL 5.2 1/27/2025 11:32:53 AM

From File filec804af5b2f.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

10% Shapiro Wilk Critical Value 0.876 Data appear Lognormal at 10% Significance Level

Lilliefors Test Statistic 0.181

Lilliefors Lognormal GOF Test

10% Lilliefors Critical Value 0.231

Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data 1.33

Mean of logged Data 3.218

Maximum of Logged Data 4.153

SD of logged Data 0.915

Assuming Lognormal Distribution

95% H-UCL 86.29

90% Chebyshev (MVUE) UCL 67.67

95% Chebyshev (MVUE) UCL 81.94

97.5% Chebyshev (MVUE) UCL 101.8

99% Chebyshev (MVUE) UCL 140.7

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL 44.69

95% BCA Bootstrap UCL 44.19

95% Standard Bootstrap UCL 44.1

95% Bootstrap-t UCL 46.92

95% Hall's Bootstrap UCL 43.66

95% Percentile Bootstrap UCL 43.59

90% Chebyshev(Mean, Sd) UCL 53.79

95% Chebyshev(Mean, Sd) UCL 62.92

97.5% Chebyshev(Mean, Sd) UCL 75.6

99% Chebyshev(Mean, Sd) UCL 100.5

Suggested UCL to Use

95% Student's-t UCL 45.81

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

group	D	x	ols	x	ols
pH, Lab [SU] Intrawell APW-03		1			7.88
pH, Lab [SU] Intrawell APW-03		1			7.46
pH, Lab [SU] Intrawell APW-03		1			7.65
pH, Lab [SU] Intrawell APW-03		1			7.93
pH, Lab [SU] Intrawell APW-03		1			7.5
pH, Lab [SU] Intrawell APW-03		1			7.48
pH, Lab [SU] Intrawell APW-03		1			7.26
pH, Lab [SU] Intrawell APW-03		1			7.78
pH, Lab [SU] Intrawell APW-03		1			7.85
pH, Lab [SU] Intrawell APW-03		1			7.46
pH, Lab [SU] Intrawell APW-03		1			7.21
pH, Lab [SU] Intrawell APW-03		1			7.45
pH, Lab [SU] Intrawell APW-03		1			7.77
pH, Lab [SU] Intrawell APW-03		1			7.84
pH, Lab [SU] Intrawell APW-03		1			7.24
pH, Lab [SU] Intrawell APW-03		1			7.4
pH, Lab [SU] Intrawell APW-03		1			7.8
pH, Lab [SU] Intrawell APW-03		1			7.88
pH, Lab [SU] Intrawell APW-03		1			7.94
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Mercury [ug/L] Intrawell APW-03		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			582.3025808
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			631.1819221
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			602.158712
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			565.1355018
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			668.2097403
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			616.7967358
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			609.7248014
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			566.7503156
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			757.3274157
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			630.8935051
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			635.1904589
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			546.2182771
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			629.0558062
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			646.9142414
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			563.5522652
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			494.3596721
Dissolved Solids, Total [mg/L] Intrawell APW-03		1			627
Chloride [mg/L] Intrawell APW-03		1			14.37925419
Chloride [mg/L] Intrawell APW-03		1			13.44674635
Chloride [mg/L] Intrawell APW-03		1			13.50836963
Chloride [mg/L] Intrawell APW-03		1			14.56999292
Chloride [mg/L] Intrawell APW-03		1			11.62574731
Chloride [mg/L] Intrawell APW-03		1			12.71084613
Chloride [mg/L] Intrawell APW-03		1			8.775403853
Chloride [mg/L] Intrawell APW-03		1			15.83409269
Chloride [mg/L] Intrawell APW-03		1			17.49692099
Chloride [mg/L] Intrawell APW-03		1			13.76395521
Chloride [mg/L] Intrawell APW-03		1			17.9869728
Chloride [mg/L] Intrawell APW-03		1			19.16597376
Chloride [mg/L] Intrawell APW-03		1			15.59733674
Chloride [mg/L] Intrawell APW-03		1			14.8467643

group	D	x	ols	x	ols
Chloride [mg/L] Intrawell APW-03		1			10.0492408
Chloride [mg/L] Intrawell APW-03		1			7.221290689
Chloride [mg/L] Intrawell APW-03		1			14.50407931
Chloride [mg/L] Intrawell APW-03		1			11.47675344
Chloride [mg/L] Intrawell APW-03		1			10.5
Sulfate [mg/L] Intrawell APW-03		1			175
Sulfate [mg/L] Intrawell APW-03		1			222
Sulfate [mg/L] Intrawell APW-03		1			201
Sulfate [mg/L] Intrawell APW-03		1			207
Sulfate [mg/L] Intrawell APW-03		1			204
Sulfate [mg/L] Intrawell APW-03		1			168
Sulfate [mg/L] Intrawell APW-03		1			152
Sulfate [mg/L] Intrawell APW-03		1			194
Sulfate [mg/L] Intrawell APW-03		1			393
Sulfate [mg/L] Intrawell APW-03		1			150
Sulfate [mg/L] Intrawell APW-03		1			226
Sulfate [mg/L] Intrawell APW-03		1			322
Sulfate [mg/L] Intrawell APW-03		1			292
Sulfate [mg/L] Intrawell APW-03		1			280
Sulfate [mg/L] Intrawell APW-03		1			133
Sulfate [mg/L] Intrawell APW-03		1			80.1
Sulfate [mg/L] Intrawell APW-03		1			285
Sulfate [mg/L] Intrawell APW-03		1			259
Sulfate [mg/L] Intrawell APW-03		1			271
Fluoride [mg/L] Intrawell APW-03		1			0.220342279
Fluoride [mg/L] Intrawell APW-03		1			0.23087063
Fluoride [mg/L] Intrawell APW-03		1			0.231353037
Fluoride [mg/L] Intrawell APW-03		1			0.251835445
Fluoride [mg/L] Intrawell APW-03		1			0.212271908
Fluoride [mg/L] Intrawell APW-03		1			0.23293809
Fluoride [mg/L] Intrawell APW-03		1			0.233443469
Fluoride [mg/L] Intrawell APW-03		1			0.283902905
Fluoride [mg/L] Intrawell APW-03		1			0.240405069
Fluoride [mg/L] Intrawell APW-03		1			0.182495501
Fluoride [mg/L] Intrawell APW-03		1			0.244241357
Fluoride [mg/L] Intrawell APW-03		1			0.215642635
Fluoride [mg/L] Intrawell APW-03		1			0.219019488
Fluoride [mg/L] Intrawell APW-03		1			0.240972089
Fluoride [mg/L] Intrawell APW-03		1			0.232557142
Fluoride [mg/L] Intrawell APW-03		1			0.195590872
Fluoride [mg/L] Intrawell APW-03		1			0.366117769
Fluoride [mg/L] Intrawell APW-03		1			0.284035185
Fluoride [mg/L] Intrawell APW-03		0			0.15
Lead [ug/L] Intrawell APW-03		1			2.1
Lead [ug/L] Intrawell APW-03		1			4.2
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		1			1.3
Lead [ug/L] Intrawell APW-03		1			2.3
Lead [ug/L] Intrawell APW-03		1			2.9
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		1			4.4
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			1
Lead [ug/L] Intrawell APW-03		0			2
Lead [ug/L] Intrawell APW-03		0			2
Lead [ug/L] Intrawell APW-03		0			2
Lithium [ug/L] Intrawell APW-03		1			31.40204276
Lithium [ug/L] Intrawell APW-03		1			31.75242898
Lithium [ug/L] Intrawell APW-03		1			31.40712944
Lithium [ug/L] Intrawell APW-03		1			29.9618299
Lithium [ug/L] Intrawell APW-03		1			36.22084461
Lithium [ug/L] Intrawell APW-03		1			32.3582881
Lithium [ug/L] Intrawell APW-03		1			40.31083145

group	D	x	ols	x	ols
Selenium [ug/L] Intrawell APW-03		1			1.1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		0			1
Selenium [ug/L] Intrawell APW-03		1			1.9
Selenium [ug/L] Intrawell APW-03		0			2
Selenium [ug/L] Intrawell APW-03		0			2
Selenium [ug/L] Intrawell APW-03		0			2
Selenium [ug/L] Intrawell APW-03		0			2
Molybdenum [ug/L] Intrawell APW-03		1			49.37153714
Molybdenum [ug/L] Intrawell APW-03		1			47.22331021
Molybdenum [ug/L] Intrawell APW-03		1			48.15318996
Molybdenum [ug/L] Intrawell APW-03		1			43.58306971
Molybdenum [ug/L] Intrawell APW-03		1			40.89105616
Molybdenum [ug/L] Intrawell APW-03		1			47.60850915
Molybdenum [ug/L] Intrawell APW-03		1			55.44933556
Molybdenum [ug/L] Intrawell APW-03		1			58.16826866
Molybdenum [ug/L] Intrawell APW-03		1			50.76250334
Molybdenum [ug/L] Intrawell APW-03		1			32.95864894
Molybdenum [ug/L] Intrawell APW-03		1			54.59059472
Molybdenum [ug/L] Intrawell APW-03		1			45.95834067
Molybdenum [ug/L] Intrawell APW-03		1			50.06749894
Molybdenum [ug/L] Intrawell APW-03		1			51.49796461
Molybdenum [ug/L] Intrawell APW-03		1			28.3532838
Molybdenum [ug/L] Intrawell APW-03		1			23.14588327
Molybdenum [ug/L] Intrawell APW-03		1			58.95001532
Molybdenum [ug/L] Intrawell APW-03		1			65.14024049
Molybdenum [ug/L] Intrawell APW-03		1			60.8
Nickel [ug/L] Intrawell APW-03		1			5.5
Nickel [ug/L] Intrawell APW-03		1			5.1
Nickel [ug/L] Intrawell APW-03		1			1.9
Nickel [ug/L] Intrawell APW-03		0			1
Nickel [ug/L] Intrawell APW-03		0			1
Nickel [ug/L] Intrawell APW-03		1			2.6
Nickel [ug/L] Intrawell APW-03		1			2.5
Nickel [ug/L] Intrawell APW-03		1			1
Nickel [ug/L] Intrawell APW-03		1			3.3
Nickel [ug/L] Intrawell APW-03		1			10
Nickel [ug/L] Intrawell APW-03		0			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2.58
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			1.37
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2.09
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			0.776
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			2
Radium-226/228 [pCi/L] Intrawell APW-03		1			3.18
Radium-226/228 [pCi/L] Intrawell APW-03		1			1.18
Radium-226/228 [pCi/L] Intrawell APW-03		1			1.9
Radium-226/228 [pCi/L] Intrawell APW-03		1			1.15
pH, Lab [SU] Intrawell APW-05/05R		1			7.551899744
pH, Lab [SU] Intrawell APW-05/05R		1			7.480358815
pH, Lab [SU] Intrawell APW-05/05R		1			7.438887927
pH, Lab [SU] Intrawell APW-05/05R		1			7.47741704
pH, Lab [SU] Intrawell APW-05/05R		1			7.436016195
pH, Lab [SU] Intrawell APW-05/05R		1			7.484055011
pH, Lab [SU] Intrawell APW-05/05R		1			7.402514082

group	D	x	ols	x	ols
pH, Lab [SU] Intrawell APW-05/05R		1			7.351113237
pH, Lab [SU] Intrawell APW-05/05R		1			7.409746046
pH, Lab [SU] Intrawell APW-05/05R		1			7.603442243
pH, Lab [SU] Intrawell APW-05/05R		1			7.288189074
pH, Lab [SU] Intrawell APW-05/05R		1			7.353636327
pH, Lab [SU] Intrawell APW-05/05R		1			7.303410157
pH, Lab [SU] Intrawell APW-05/05R		1			7.387456565
pH, Lab [SU] Intrawell APW-05/05R		1			7.352623649
pH, Lab [SU] Intrawell APW-05/05R		1			7.439611832
pH, Lab [SU] Intrawell APW-05/05R		1			7.611767099
pH, Lab [SU] Intrawell APW-05/05R		1			7.562871733
pH, Lab [SU] Intrawell APW-05/05R		1			7.53
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Mercury [ug/L] Intrawell APW-05/05R		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			757.5156266
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			748.2808206
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			721.0112331
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			743.7416455
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			708.4372764
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			711.4111597
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			472.1763537
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			724.8719846
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			626.1746415
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			729.3049806
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			695.9135965
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			680.1743969
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			729.2525025
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			672.2089339
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			699.6088605
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			673.1044669
Dissolved Solids, Total [mg/L] Intrawell APW-05/05R		1			764
Chloride [mg/L] Intrawell APW-05/05R		1			18.5404884
Chloride [mg/L] Intrawell APW-05/05R		1			18.51049582
Chloride [mg/L] Intrawell APW-05/05R		1			18.48186653
Chloride [mg/L] Intrawell APW-05/05R		1			17.45323725
Chloride [mg/L] Intrawell APW-05/05R		1			19.42597126
Chloride [mg/L] Intrawell APW-05/05R		1			19.38779888
Chloride [mg/L] Intrawell APW-05/05R		1			19.35780629
Chloride [mg/L] Intrawell APW-05/05R		1			19.3305403
Chloride [mg/L] Intrawell APW-05/05R		1			20.16289434
Chloride [mg/L] Intrawell APW-05/05R		1			16.0401974
Chloride [mg/L] Intrawell APW-05/05R		1			19.93794995
Chloride [mg/L] Intrawell APW-05/05R		1			18.84933549
Chloride [mg/L] Intrawell APW-05/05R		1			17.65029379
Chloride [mg/L] Intrawell APW-05/05R		1			14.53441334
Chloride [mg/L] Intrawell APW-05/05R		1			16.44034569
Chloride [mg/L] Intrawell APW-05/05R		1			17.28172382
Chloride [mg/L] Intrawell APW-05/05R		1			16.02903429
Chloride [mg/L] Intrawell APW-05/05R		1			28.15589527
Chloride [mg/L] Intrawell APW-05/05R		1			18.9
Sulfate [mg/L] Intrawell APW-05/05R		1			251.4587377
Sulfate [mg/L] Intrawell APW-05/05R		1			305.7763764

group	D	x	ols	x	ols
Sulfate [mg/L] Intrawell APW-05/05R		1			246.0341224
Sulfate [mg/L] Intrawell APW-05/05R		1			261.2918685
Sulfate [mg/L] Intrawell APW-05/05R		1			230.4897219
Sulfate [mg/L] Intrawell APW-05/05R		1			245.1667166
Sulfate [mg/L] Intrawell APW-05/05R		1			291.4843554
Sulfate [mg/L] Intrawell APW-05/05R		1			231.6822087
Sulfate [mg/L] Intrawell APW-05/05R		1			172.911553
Sulfate [mg/L] Intrawell APW-05/05R		1			333.3018933
Sulfate [mg/L] Intrawell APW-05/05R		1			282.7938435
Sulfate [mg/L] Intrawell APW-05/05R		1			287.686867
Sulfate [mg/L] Intrawell APW-05/05R		1			306.4311967
Sulfate [mg/L] Intrawell APW-05/05R		1			319.5220736
Sulfate [mg/L] Intrawell APW-05/05R		1			310.6546678
Sulfate [mg/L] Intrawell APW-05/05R		1			289.2300526
Sulfate [mg/L] Intrawell APW-05/05R		1			354.9380315
Sulfate [mg/L] Intrawell APW-05/05R		1			68.04440056
Sulfate [mg/L] Intrawell APW-05/05R		1			192
Fluoride [mg/L] Intrawell APW-05/05R		1			0.34
Fluoride [mg/L] Intrawell APW-05/05R		1			0.34
Fluoride [mg/L] Intrawell APW-05/05R		1			0.32
Fluoride [mg/L] Intrawell APW-05/05R		1			0.32
Fluoride [mg/L] Intrawell APW-05/05R		1			0.32
Fluoride [mg/L] Intrawell APW-05/05R		1			0.33
Fluoride [mg/L] Intrawell APW-05/05R		1			0.36
Fluoride [mg/L] Intrawell APW-05/05R		1			0.32
Fluoride [mg/L] Intrawell APW-05/05R		1			0.35
Fluoride [mg/L] Intrawell APW-05/05R		1			0.33
Fluoride [mg/L] Intrawell APW-05/05R		1			0.37
Fluoride [mg/L] Intrawell APW-05/05R		1			0.33
Fluoride [mg/L] Intrawell APW-05/05R		1			0.3
Fluoride [mg/L] Intrawell APW-05/05R		1			0.35
Fluoride [mg/L] Intrawell APW-05/05R		1			0.38
Fluoride [mg/L] Intrawell APW-05/05R		1			0.298
Fluoride [mg/L] Intrawell APW-05/05R		0			0.15
Fluoride [mg/L] Intrawell APW-05/05R		1			0.347
Fluoride [mg/L] Intrawell APW-05/05R		1			0.199
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		0			1
Lead [ug/L] Intrawell APW-05/05R		1			1.1
Lead [ug/L] Intrawell APW-05/05R		1			2.6
Lead [ug/L] Intrawell APW-05/05R		1			2
Lead [ug/L] Intrawell APW-05/05R		0			2
Lead [ug/L] Intrawell APW-05/05R		0			2
Lead [ug/L] Intrawell APW-05/05R		0			2
Lead [ug/L] Intrawell APW-05/05R		1			2.37
Lithium [ug/L] Intrawell APW-05/05R		1			36.3
Lithium [ug/L] Intrawell APW-05/05R		1			44.3
Lithium [ug/L] Intrawell APW-05/05R		1			39.3
Lithium [ug/L] Intrawell APW-05/05R		1			40.5
Lithium [ug/L] Intrawell APW-05/05R		1			41.5
Lithium [ug/L] Intrawell APW-05/05R		1			43.3
Lithium [ug/L] Intrawell APW-05/05R		1			40.4
Lithium [ug/L] Intrawell APW-05/05R		1			39.7
Lithium [ug/L] Intrawell APW-05/05R		1			33.1
Lithium [ug/L] Intrawell APW-05/05R		1			40.8
Lithium [ug/L] Intrawell APW-05/05R		1			37.3
Lithium [ug/L] Intrawell APW-05/05R		1			39.9
Lithium [ug/L] Intrawell APW-05/05R		1			42.3
Lithium [ug/L] Intrawell APW-05/05R		1			36.7

group	D	x	ols	x	ols
Barium [ug/L] Intrawell APW-05/05R		1			142.6939482
Barium [ug/L] Intrawell APW-05/05R		1			168.7367736
Barium [ug/L] Intrawell APW-05/05R		1			137.663726
Barium [ug/L] Intrawell APW-05/05R		1			125.2695196
Barium [ug/L] Intrawell APW-05/05R		1			131.6612074
Barium [ug/L] Intrawell APW-05/05R		1			172.7871524
Barium [ug/L] Intrawell APW-05/05R		1			153.6070519
Barium [ug/L] Intrawell APW-05/05R		1			218.084382
Barium [ug/L] Intrawell APW-05/05R		1			145.005037
Barium [ug/L] Intrawell APW-05/05R		1			191.4030222
Barium [ug/L] Intrawell APW-05/05R		1			101.1221661
Barium [ug/L] Intrawell APW-05/05R		1			158
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			2
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			1
Beryllium [ug/L] Intrawell APW-05/05R		0			2
Beryllium [ug/L] Intrawell APW-05/05R		0			2
Beryllium [ug/L] Intrawell APW-05/05R		0			2
Beryllium [ug/L] Intrawell APW-05/05R		0			2
Beryllium [ug/L] Intrawell APW-05/05R		0			2
Boron [mg/L] Intrawell APW-05/05R		1			6.531960196
Boron [mg/L] Intrawell APW-05/05R		1			7.555409127
Boron [mg/L] Intrawell APW-05/05R		1			6.167792198
Boron [mg/L] Intrawell APW-05/05R		1			7.28017527
Boron [mg/L] Intrawell APW-05/05R		1			6.42149248
Boron [mg/L] Intrawell APW-05/05R		1			7.181336575
Boron [mg/L] Intrawell APW-05/05R		1			6.624785507
Boron [mg/L] Intrawell APW-05/05R		1			6.126102718
Boron [mg/L] Intrawell APW-05/05R		1			6.760820965
Boron [mg/L] Intrawell APW-05/05R		1			6.946748413
Boron [mg/L] Intrawell APW-05/05R		1			6.746687953
Boron [mg/L] Intrawell APW-05/05R		1			6.685968888
Boron [mg/L] Intrawell APW-05/05R		1			8.251584526
Boron [mg/L] Intrawell APW-05/05R		1			6.702182671
Boron [mg/L] Intrawell APW-05/05R		1			9.275727048
Boron [mg/L] Intrawell APW-05/05R		1			9.10093543
Boron [mg/L] Intrawell APW-05/05R		1			2.136299718
Boron [mg/L] Intrawell APW-05/05R		1			6.19
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Cadmium [ug/L] Intrawell APW-05/05R		0			1
Chromium [ug/L] Intrawell APW-05/05R		1			13.7

group	D	x	ols	x	ols
Selenium [ug/L] Intrawell APW-05/05R		0			1
Selenium [ug/L] Intrawell APW-05/05R		0			1
Selenium [ug/L] Intrawell APW-05/05R		0			2
Selenium [ug/L] Intrawell APW-05/05R		0			2
Selenium [ug/L] Intrawell APW-05/05R		0			2
Selenium [ug/L] Intrawell APW-05/05R		0			2
Molybdenum [ug/L] Intrawell APW-05/05R		1			172
Molybdenum [ug/L] Intrawell APW-05/05R		1			195
Molybdenum [ug/L] Intrawell APW-05/05R		1			201
Molybdenum [ug/L] Intrawell APW-05/05R		1			168
Molybdenum [ug/L] Intrawell APW-05/05R		1			193
Molybdenum [ug/L] Intrawell APW-05/05R		1			246
Molybdenum [ug/L] Intrawell APW-05/05R		1			244
Molybdenum [ug/L] Intrawell APW-05/05R		1			249
Molybdenum [ug/L] Intrawell APW-05/05R		1			203
Molybdenum [ug/L] Intrawell APW-05/05R		1			235
Molybdenum [ug/L] Intrawell APW-05/05R		1			223
Molybdenum [ug/L] Intrawell APW-05/05R		1			217
Molybdenum [ug/L] Intrawell APW-05/05R		1			212
Molybdenum [ug/L] Intrawell APW-05/05R		1			223
Molybdenum [ug/L] Intrawell APW-05/05R		1			203
Molybdenum [ug/L] Intrawell APW-05/05R		1			227
Molybdenum [ug/L] Intrawell APW-05/05R		1			221
Molybdenum [ug/L] Intrawell APW-05/05R		1			109
Molybdenum [ug/L] Intrawell APW-05/05R		1			164
Nickel [ug/L] Intrawell APW-05/05R		1			7.4
Nickel [ug/L] Intrawell APW-05/05R		1			1.2
Nickel [ug/L] Intrawell APW-05/05R		1			2.3
Nickel [ug/L] Intrawell APW-05/05R		0			1
Nickel [ug/L] Intrawell APW-05/05R		0			1
Nickel [ug/L] Intrawell APW-05/05R		1			4.3
Nickel [ug/L] Intrawell APW-05/05R		1			2.1
Nickel [ug/L] Intrawell APW-05/05R		0			1
Nickel [ug/L] Intrawell APW-05/05R		1			3.7
Nickel [ug/L] Intrawell APW-05/05R		1			2
Nickel [ug/L] Intrawell APW-05/05R		0			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			1.48
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			1.75
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			0.798
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			6.34
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			2
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			3.86
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			1.12
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			0.645
Radium-226/228 [pCi/L] Intrawell APW-05/05R		1			0.73
pH, Lab [SU] Intrawell APW-02		1			7.09
pH, Lab [SU] Intrawell APW-02		1			7.05
pH, Lab [SU] Intrawell APW-02		1			7.08
pH, Lab [SU] Intrawell APW-02		1			7.07
pH, Lab [SU] Intrawell APW-02		1			7.05
pH, Lab [SU] Intrawell APW-02		1			7.14
pH, Lab [SU] Intrawell APW-02		1			7.06
pH, Lab [SU] Intrawell APW-02		1			6.96
pH, Lab [SU] Intrawell APW-02		1			7.21
pH, Lab [SU] Intrawell APW-02		1			7.32
pH, Lab [SU] Intrawell APW-02		1			7.01
pH, Lab [SU] Intrawell APW-02		1			6.98
pH, Lab [SU] Intrawell APW-02		1			6.9
pH, Lab [SU] Intrawell APW-02		1			7.15
pH, Lab [SU] Intrawell APW-02		1			7.11

group	D	x	ols	x	ols
pH, Lab [SU] Intrawell APW-02		1			7.52
pH, Lab [SU] Intrawell APW-02		1			7.14
pH, Lab [SU] Intrawell APW-02		1			7.18
pH, Lab [SU] Intrawell APW-02		1			7.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		1			0.43
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Mercury [ug/L] Intrawell APW-02		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			858
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			880
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			934
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			916
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			870
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			848
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			836
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			888
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			930
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			890
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			885
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			852
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			920
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			845
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			920
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			820
Dissolved Solids, Total [mg/L] Intrawell APW-02		1			845
Chloride [mg/L] Intrawell APW-02		1			8.540674054
Chloride [mg/L] Intrawell APW-02		1			7.578464952
Chloride [mg/L] Intrawell APW-02		1			6.61625585
Chloride [mg/L] Intrawell APW-02		1			6.650611211
Chloride [mg/L] Intrawell APW-02		1			7.684966573
Chloride [mg/L] Intrawell APW-02		1			7.733064079
Chloride [mg/L] Intrawell APW-02		1			7.772572745
Chloride [mg/L] Intrawell APW-02		1			7.805210339
Chloride [mg/L] Intrawell APW-02		1			7.536461592
Chloride [mg/L] Intrawell APW-02		1			9.69106072
Chloride [mg/L] Intrawell APW-02		1			7.821611094
Chloride [mg/L] Intrawell APW-02		1			8.931548252
Chloride [mg/L] Intrawell APW-02		1			6.182342392
Chloride [mg/L] Intrawell APW-02		1			6.328352679
Chloride [mg/L] Intrawell APW-02		1			7.446878677
Chloride [mg/L] Intrawell APW-02		1			7.300742705
Chloride [mg/L] Intrawell APW-02		1			5.09313273
Chloride [mg/L] Intrawell APW-02		1			7.481289277
Chloride [mg/L] Intrawell APW-02		0			10
Sulfate [mg/L] Intrawell APW-02		1			462
Sulfate [mg/L] Intrawell APW-02		1			460
Sulfate [mg/L] Intrawell APW-02		1			472
Sulfate [mg/L] Intrawell APW-02		1			479
Sulfate [mg/L] Intrawell APW-02		1			472
Sulfate [mg/L] Intrawell APW-02		1			426
Sulfate [mg/L] Intrawell APW-02		1			443
Sulfate [mg/L] Intrawell APW-02		1			416
Sulfate [mg/L] Intrawell APW-02		1			496
Sulfate [mg/L] Intrawell APW-02		1			491

group	D	x	ols	x	ols
Sulfate [mg/L] Intrawell APW-02		1			418
Sulfate [mg/L] Intrawell APW-02		1			459
Sulfate [mg/L] Intrawell APW-02		1			500
Sulfate [mg/L] Intrawell APW-02		1			460
Sulfate [mg/L] Intrawell APW-02		1			440
Sulfate [mg/L] Intrawell APW-02		1			411
Sulfate [mg/L] Intrawell APW-02		1			510
Sulfate [mg/L] Intrawell APW-02		1			376
Sulfate [mg/L] Intrawell APW-02		1			385
Fluoride [mg/L] Intrawell APW-02		1			0.24
Fluoride [mg/L] Intrawell APW-02		1			0.26
Fluoride [mg/L] Intrawell APW-02		1			0.25
Fluoride [mg/L] Intrawell APW-02		1			0.24
Fluoride [mg/L] Intrawell APW-02		1			0.24
Fluoride [mg/L] Intrawell APW-02		1			0.25
Fluoride [mg/L] Intrawell APW-02		1			0.26
Fluoride [mg/L] Intrawell APW-02		1			0.24
Fluoride [mg/L] Intrawell APW-02		1			0.25
Fluoride [mg/L] Intrawell APW-02		1			0.22
Fluoride [mg/L] Intrawell APW-02		1			0.25
Fluoride [mg/L] Intrawell APW-02		1			0.23
Fluoride [mg/L] Intrawell APW-02		1			0.22
Fluoride [mg/L] Intrawell APW-02		1			0.24
Fluoride [mg/L] Intrawell APW-02		1			0.26
Fluoride [mg/L] Intrawell APW-02		1			0.23
Fluoride [mg/L] Intrawell APW-02		1			0.25
Fluoride [mg/L] Intrawell APW-02		1			0.197
Fluoride [mg/L] Intrawell APW-02		0			1.5
Lead [ug/L] Intrawell APW-02		1			11.5
Lead [ug/L] Intrawell APW-02		1			5.4
Lead [ug/L] Intrawell APW-02		1			20.1
Lead [ug/L] Intrawell APW-02		1			9.6
Lead [ug/L] Intrawell APW-02		1			7.5
Lead [ug/L] Intrawell APW-02		1			3.1
Lead [ug/L] Intrawell APW-02		1			4.8
Lead [ug/L] Intrawell APW-02		1			23.9
Lead [ug/L] Intrawell APW-02		1			2.2
Lead [ug/L] Intrawell APW-02		1			11.9
Lead [ug/L] Intrawell APW-02		1			3.3
Lead [ug/L] Intrawell APW-02		1			2.7
Lead [ug/L] Intrawell APW-02		1			2.5
Lead [ug/L] Intrawell APW-02		1			2
Lead [ug/L] Intrawell APW-02		1			5.7
Lead [ug/L] Intrawell APW-02		1			2.35
Lead [ug/L] Intrawell APW-02		0			2
Lead [ug/L] Intrawell APW-02		1			6.62
Lead [ug/L] Intrawell APW-02		1			17.6
Lithium [ug/L] Intrawell APW-02		1			50
Lithium [ug/L] Intrawell APW-02		1			45.5
Lithium [ug/L] Intrawell APW-02		1			64.7
Lithium [ug/L] Intrawell APW-02		1			52.1
Lithium [ug/L] Intrawell APW-02		1			54.2
Lithium [ug/L] Intrawell APW-02		1			47.4
Lithium [ug/L] Intrawell APW-02		1			45
Lithium [ug/L] Intrawell APW-02		1			60.4
Lithium [ug/L] Intrawell APW-02		1			50.7
Lithium [ug/L] Intrawell APW-02		1			55.9
Lithium [ug/L] Intrawell APW-02		1			38.6
Lithium [ug/L] Intrawell APW-02		1			41.7
Lithium [ug/L] Intrawell APW-02		1			45.9
Lithium [ug/L] Intrawell APW-02		1			42.2
Lithium [ug/L] Intrawell APW-02		1			56
Lithium [ug/L] Intrawell APW-02		1			41.6
Lithium [ug/L] Intrawell APW-02		1			45
Lithium [ug/L] Intrawell APW-02		1			40.8
Lithium [ug/L] Intrawell APW-02		1			48
Thallium [ug/L] Intrawell APW-02		0			1
Thallium [ug/L] Intrawell APW-02		0			1
Thallium [ug/L] Intrawell APW-02		0			1

group	D	x	ols	x	ols
Barium [ug/L] Intrawell APW-02		1		119.7682114	
Barium [ug/L] Intrawell APW-02		1		123.9114383	
Barium [ug/L] Intrawell APW-02		1		156.9488475	
Barium [ug/L] Intrawell APW-02		1		173	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		1		1.1	
Beryllium [ug/L] Intrawell APW-02		0		2	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		1	
Beryllium [ug/L] Intrawell APW-02		0		2	
Beryllium [ug/L] Intrawell APW-02		0		2	
Beryllium [ug/L] Intrawell APW-02		0		2	
Beryllium [ug/L] Intrawell APW-02		0		2	
Beryllium [ug/L] Intrawell APW-02		0		2	
Boron [mg/L] Intrawell APW-02		1		8.16	
Boron [mg/L] Intrawell APW-02		1		8.73	
Boron [mg/L] Intrawell APW-02		1		8.94	
Boron [mg/L] Intrawell APW-02		1		9	
Boron [mg/L] Intrawell APW-02		1		8.98	
Boron [mg/L] Intrawell APW-02		1		8.39	
Boron [mg/L] Intrawell APW-02		1		8.19	
Boron [mg/L] Intrawell APW-02		1		8.24	
Boron [mg/L] Intrawell APW-02		1		8.13	
Boron [mg/L] Intrawell APW-02		1		9.43	
Boron [mg/L] Intrawell APW-02		1		8.97	
Boron [mg/L] Intrawell APW-02		1		7.75	
Boron [mg/L] Intrawell APW-02		1		9.14	
Boron [mg/L] Intrawell APW-02		1		8.24	
Boron [mg/L] Intrawell APW-02		1		9.62	
Boron [mg/L] Intrawell APW-02		1		10.2	
Boron [mg/L] Intrawell APW-02		1		8.24	
Boron [mg/L] Intrawell APW-02		1		8.09	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		1		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Cadmium [ug/L] Intrawell APW-02		0		1	
Chromium [ug/L] Intrawell APW-02		1		1	
Chromium [ug/L] Intrawell APW-02		1		1	
Chromium [ug/L] Intrawell APW-02		1		1	
Chromium [ug/L] Intrawell APW-02		1		1	
Chromium [ug/L] Intrawell APW-02		1		1	
Chromium [ug/L] Intrawell APW-02		1		1.361417805	
Chromium [ug/L] Intrawell APW-02		1		72.27288616	
Chromium [ug/L] Intrawell APW-02		1		57.69540349	
Chromium [ug/L] Intrawell APW-02		1		6.45343316	

group	D	x	ols	x	ols
Molybdenum [ug/L] Intrawell APW-02		1			214
Molybdenum [ug/L] Intrawell APW-02		1			175
Molybdenum [ug/L] Intrawell APW-02		1			165
Molybdenum [ug/L] Intrawell APW-02		1			111
Molybdenum [ug/L] Intrawell APW-02		1			95.1
Molybdenum [ug/L] Intrawell APW-02		1			131
Molybdenum [ug/L] Intrawell APW-02		1			240
Molybdenum [ug/L] Intrawell APW-02		1			174
Molybdenum [ug/L] Intrawell APW-02		1			128
Molybdenum [ug/L] Intrawell APW-02		1			165
Molybdenum [ug/L] Intrawell APW-02		1			229
Molybdenum [ug/L] Intrawell APW-02		1			198
Molybdenum [ug/L] Intrawell APW-02		1			147
Molybdenum [ug/L] Intrawell APW-02		1			158
Molybdenum [ug/L] Intrawell APW-02		1			332
Molybdenum [ug/L] Intrawell APW-02		1			162
Molybdenum [ug/L] Intrawell APW-02		1			129
Nickel [ug/L] Intrawell APW-02		1			28.8
Nickel [ug/L] Intrawell APW-02		1			26.3
Nickel [ug/L] Intrawell APW-02		1			41.2
Nickel [ug/L] Intrawell APW-02		1			20.2
Nickel [ug/L] Intrawell APW-02		1			13.5
Nickel [ug/L] Intrawell APW-02		1			29.5
Nickel [ug/L] Intrawell APW-02		1			63.1
Nickel [ug/L] Intrawell APW-02		1			72.5
Nickel [ug/L] Intrawell APW-02		1			14.2
Nickel [ug/L] Intrawell APW-02		1			4.5
Nickel [ug/L] Intrawell APW-02		1			2.37
Radium-226/228 [pCi/L] Intrawell APW-02		1			3.04
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			1.67
Radium-226/228 [pCi/L] Intrawell APW-02		1			2.38
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			0.711
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			1.14
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			4.09
Radium-226/228 [pCi/L] Intrawell APW-02		1			2
Radium-226/228 [pCi/L] Intrawell APW-02		1			0.476
Radium-226/228 [pCi/L] Intrawell APW-02		1			1.29
Radium-226/228 [pCi/L] Intrawell APW-02		1			1.55
Radium-226/228 [pCi/L] Intrawell APW-02		1			1.51
pH, Lab [SU] Intrawell APW-06D		1			7.479788196
pH, Lab [SU] Intrawell APW-06D		1			7.497672162
pH, Lab [SU] Intrawell APW-06D		1			7.475652312
pH, Lab [SU] Intrawell APW-06D		1			7.433632461
pH, Lab [SU] Intrawell APW-06D		1			7.441804977
pH, Lab [SU] Intrawell APW-06D		1			7.45901566
pH, Lab [SU] Intrawell APW-06D		1			7.446899626
pH, Lab [SU] Intrawell APW-06D		1			7.434879775
pH, Lab [SU] Intrawell APW-06D		1			7.49348409
pH, Lab [SU] Intrawell APW-06D		1			7.276174154
pH, Lab [SU] Intrawell APW-06D		1			7.349922236
pH, Lab [SU] Intrawell APW-06D		1			7.435879465
pH, Lab [SU] Intrawell APW-06D		1			7.337703879
pH, Lab [SU] Intrawell APW-06D		1			7.391067227
pH, Lab [SU] Intrawell APW-06D		1			7.756931342
pH, Lab [SU] Intrawell APW-06D		1			7.556158805
pH, Lab [SU] Intrawell APW-06D		1			7.463943518
pH, Lab [SU] Intrawell APW-06D		1			7.42
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2

group	D	x	ols	x	ols
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Mercury [ug/L] Intrawell APW-06D		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			558
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			560
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			562
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			564
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			590
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			482
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			584
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			670
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			580
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			582
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			735
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			565
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			560
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			536
Dissolved Solids, Total [mg/L] Intrawell APW-06D		1			549
Chloride [mg/L] Intrawell APW-06D		1			17
Chloride [mg/L] Intrawell APW-06D		1			17
Chloride [mg/L] Intrawell APW-06D		1			16
Chloride [mg/L] Intrawell APW-06D		1			16
Chloride [mg/L] Intrawell APW-06D		1			16
Chloride [mg/L] Intrawell APW-06D		1			16
Chloride [mg/L] Intrawell APW-06D		1			17
Chloride [mg/L] Intrawell APW-06D		1			17
Chloride [mg/L] Intrawell APW-06D		1			14
Chloride [mg/L] Intrawell APW-06D		1			17
Chloride [mg/L] Intrawell APW-06D		1			16
Chloride [mg/L] Intrawell APW-06D		1			15
Chloride [mg/L] Intrawell APW-06D		1			16
Chloride [mg/L] Intrawell APW-06D		1			22
Chloride [mg/L] Intrawell APW-06D		1			21.2
Chloride [mg/L] Intrawell APW-06D		1			21.5
Chloride [mg/L] Intrawell APW-06D		1			15
Chloride [mg/L] Intrawell APW-06D		1			14.7
Sulfate [mg/L] Intrawell APW-06D		1			215
Sulfate [mg/L] Intrawell APW-06D		1			228
Sulfate [mg/L] Intrawell APW-06D		1			206
Sulfate [mg/L] Intrawell APW-06D		1			222
Sulfate [mg/L] Intrawell APW-06D		1			230
Sulfate [mg/L] Intrawell APW-06D		1			236
Sulfate [mg/L] Intrawell APW-06D		1			211
Sulfate [mg/L] Intrawell APW-06D		1			189
Sulfate [mg/L] Intrawell APW-06D		1			272
Sulfate [mg/L] Intrawell APW-06D		1			254
Sulfate [mg/L] Intrawell APW-06D		1			269
Sulfate [mg/L] Intrawell APW-06D		1			270
Sulfate [mg/L] Intrawell APW-06D		1			218
Sulfate [mg/L] Intrawell APW-06D		1			184
Sulfate [mg/L] Intrawell APW-06D		1			180
Sulfate [mg/L] Intrawell APW-06D		1			184
Sulfate [mg/L] Intrawell APW-06D		1			242
Sulfate [mg/L] Intrawell APW-06D		1			214
Fluoride [mg/L] Intrawell APW-06D		1			0.22
Fluoride [mg/L] Intrawell APW-06D		1			0.23
Fluoride [mg/L] Intrawell APW-06D		1			0.21
Fluoride [mg/L] Intrawell APW-06D		1			0.22
Fluoride [mg/L] Intrawell APW-06D		1			0.21

group	D	x	ols	x	ols
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			1
Antimony [ug/L] Intrawell APW-06D		0			4
Antimony [ug/L] Intrawell APW-06D		0			4
Antimony [ug/L] Intrawell APW-06D		0			4
Antimony [ug/L] Intrawell APW-06D		0			4
Arsenic [ug/L] Intrawell APW-06D		1		9.341738149	
Arsenic [ug/L] Intrawell APW-06D		1		12.62020629	
Arsenic [ug/L] Intrawell APW-06D		1		9.99965315	
Arsenic [ug/L] Intrawell APW-06D		1		9.879100012	
Arsenic [ug/L] Intrawell APW-06D		1		11.46050431	
Arsenic [ug/L] Intrawell APW-06D		1		11.93212141	
Arsenic [ug/L] Intrawell APW-06D		1		13.01058955	
Arsenic [ug/L] Intrawell APW-06D		1		11.99003641	
Arsenic [ug/L] Intrawell APW-06D		1		11.14774276	
Arsenic [ug/L] Intrawell APW-06D		1		11.77335997	
Arsenic [ug/L] Intrawell APW-06D		1		11.30974311	
Arsenic [ug/L] Intrawell APW-06D		1		11.96684986	
Arsenic [ug/L] Intrawell APW-06D		1		11.28365859	
Arsenic [ug/L] Intrawell APW-06D		1		13.81612685	
Arsenic [ug/L] Intrawell APW-06D		1		10.47404185	
Arsenic [ug/L] Intrawell APW-06D		1		10.96442511	
Arsenic [ug/L] Intrawell APW-06D		1		10.34012756	
Arsenic [ug/L] Intrawell APW-06D		1		10.3	
Barium [ug/L] Intrawell APW-06D		1		139.4578872	
Barium [ug/L] Intrawell APW-06D		1		138.7420329	
Barium [ug/L] Intrawell APW-06D		1		109.0132629	
Barium [ug/L] Intrawell APW-06D		1		120.284493	
Barium [ug/L] Intrawell APW-06D		1		122.5298916	
Barium [ug/L] Intrawell APW-06D		1		130.9044473	
Barium [ug/L] Intrawell APW-06D		1		134.188593	
Barium [ug/L] Intrawell APW-06D		1		116.4598231	
Barium [ug/L] Intrawell APW-06D		1		133.1323935	
Barium [ug/L] Intrawell APW-06D		1		133.1139878	
Barium [ug/L] Intrawell APW-06D		1		125.9535093	
Barium [ug/L] Intrawell APW-06D		1		138.8392038	
Barium [ug/L] Intrawell APW-06D		1		122.9370396	
Barium [ug/L] Intrawell APW-06D		1		146.8282239	
Barium [ug/L] Intrawell APW-06D		1		111.3835997	
Barium [ug/L] Intrawell APW-06D		1		116.8301598	
Barium [ug/L] Intrawell APW-06D		1		128.4704557	
Barium [ug/L] Intrawell APW-06D		1		119	
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			1
Beryllium [ug/L] Intrawell APW-06D		0			2
Beryllium [ug/L] Intrawell APW-06D		0			2
Beryllium [ug/L] Intrawell APW-06D		0			2

group	D	x	ols	x	ols
Beryllium [ug/L] Intrawell APW-06D		0			2
Boron [mg/L] Intrawell APW-06D		1			3.72
Boron [mg/L] Intrawell APW-06D		1			3.87
Boron [mg/L] Intrawell APW-06D		1			3.55
Boron [mg/L] Intrawell APW-06D		1			3.58
Boron [mg/L] Intrawell APW-06D		1			3.9
Boron [mg/L] Intrawell APW-06D		1			3.84
Boron [mg/L] Intrawell APW-06D		1			3.3
Boron [mg/L] Intrawell APW-06D		1			3.09
Boron [mg/L] Intrawell APW-06D		1			5.51
Boron [mg/L] Intrawell APW-06D		1			4.29
Boron [mg/L] Intrawell APW-06D		1			3.95
Boron [mg/L] Intrawell APW-06D		1			4.99
Boron [mg/L] Intrawell APW-06D		1			3.81
Boron [mg/L] Intrawell APW-06D		1			3.8
Boron [mg/L] Intrawell APW-06D		1			3.13
Boron [mg/L] Intrawell APW-06D		1			4.31
Boron [mg/L] Intrawell APW-06D		1			3.99
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Cadmium [ug/L] Intrawell APW-06D		0			1
Chromium [ug/L] Intrawell APW-06D		0			1
Chromium [ug/L] Intrawell APW-06D		1			1.3
Chromium [ug/L] Intrawell APW-06D		0			1
Chromium [ug/L] Intrawell APW-06D		0			1
Chromium [ug/L] Intrawell APW-06D		0			1
Chromium [ug/L] Intrawell APW-06D		1			1.7
Chromium [ug/L] Intrawell APW-06D		1			3
Chromium [ug/L] Intrawell APW-06D		1			1.4
Chromium [ug/L] Intrawell APW-06D		0			1.5
Chromium [ug/L] Intrawell APW-06D		1			6.3
Chromium [ug/L] Intrawell APW-06D		0			1.5
Chromium [ug/L] Intrawell APW-06D		1			5.7
Chromium [ug/L] Intrawell APW-06D		1			72.7
Chromium [ug/L] Intrawell APW-06D		0			1.5
Chromium [ug/L] Intrawell APW-06D		1			8.61
Chromium [ug/L] Intrawell APW-06D		0			2
Chromium [ug/L] Intrawell APW-06D		0			2
Chromium [ug/L] Intrawell APW-06D		0			2
Cobalt [ug/L] Intrawell APW-06D		1			1.2
Cobalt [ug/L] Intrawell APW-06D		1			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		0			1
Cobalt [ug/L] Intrawell APW-06D		1			3.5
Cobalt [ug/L] Intrawell APW-06D		1			1.3
Cobalt [ug/L] Intrawell APW-06D		1			5.4
Cobalt [ug/L] Intrawell APW-06D		1			3.5
Cobalt [ug/L] Intrawell APW-06D		1			1.3
Cobalt [ug/L] Intrawell APW-06D		0			2

group	D	x	ols	x	ols
Cobalt [ug/L] Intrawell APW-06D		0			2
Cobalt [ug/L] Intrawell APW-06D		0			2
Cobalt [ug/L] Intrawell APW-06D		0			2
Calcium [mg/L] Intrawell APW-06D		1		112.7479602	
Calcium [mg/L] Intrawell APW-06D		1		122.7391212	
Calcium [mg/L] Intrawell APW-06D		1		109.3352293	
Calcium [mg/L] Intrawell APW-06D		1		112.5313374	
Calcium [mg/L] Intrawell APW-06D		1		122.43734	
Calcium [mg/L] Intrawell APW-06D		1		119.2938703	
Calcium [mg/L] Intrawell APW-06D		1		117.1850312	
Calcium [mg/L] Intrawell APW-06D		1		117.0811394	
Calcium [mg/L] Intrawell APW-06D		1		126.7796849	
Calcium [mg/L] Intrawell APW-06D		1		113.4036953	
Calcium [mg/L] Intrawell APW-06D		1		119.0821252	
Calcium [mg/L] Intrawell APW-06D		1		130.3598294	
Calcium [mg/L] Intrawell APW-06D		1		107.9393148	
Calcium [mg/L] Intrawell APW-06D		1		99.99795578	
Calcium [mg/L] Intrawell APW-06D		1		112.3852248	
Calcium [mg/L] Intrawell APW-06D		1		114.8311349	
Calcium [mg/L] Intrawell APW-06D		1		124.2028365	
Calcium [mg/L] Intrawell APW-06D		1		120	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		1	
Selenium [ug/L] Intrawell APW-06D		0		2	
Selenium [ug/L] Intrawell APW-06D		0		2	
Selenium [ug/L] Intrawell APW-06D		0		2	
Selenium [ug/L] Intrawell APW-06D		0		2	
Molybdenum [ug/L] Intrawell APW-06D		1		64.6	
Molybdenum [ug/L] Intrawell APW-06D		1		60.6	
Molybdenum [ug/L] Intrawell APW-06D		1		58.2	
Molybdenum [ug/L] Intrawell APW-06D		1		58.9	
Molybdenum [ug/L] Intrawell APW-06D		1		60	
Molybdenum [ug/L] Intrawell APW-06D		1		58.4	
Molybdenum [ug/L] Intrawell APW-06D		1		46.5	
Molybdenum [ug/L] Intrawell APW-06D		1		46.3	
Molybdenum [ug/L] Intrawell APW-06D		1		71.9	
Molybdenum [ug/L] Intrawell APW-06D		1		69.6	
Molybdenum [ug/L] Intrawell APW-06D		1		68.3	
Molybdenum [ug/L] Intrawell APW-06D		1		60.2	
Molybdenum [ug/L] Intrawell APW-06D		1		67.2	
Molybdenum [ug/L] Intrawell APW-06D		1		55.7	
Molybdenum [ug/L] Intrawell APW-06D		1		60.5	
Molybdenum [ug/L] Intrawell APW-06D		1		72	
Molybdenum [ug/L] Intrawell APW-06D		1		62.8	
Molybdenum [ug/L] Intrawell APW-06D		1		52.7	
Nickel [ug/L] Intrawell APW-06D		1		3.2	
Nickel [ug/L] Intrawell APW-06D		1		2.8	
Nickel [ug/L] Intrawell APW-06D		1		1.8	
Nickel [ug/L] Intrawell APW-06D		1		2	
Nickel [ug/L] Intrawell APW-06D		1		1.7	
Nickel [ug/L] Intrawell APW-06D		1		2.2	
Nickel [ug/L] Intrawell APW-06D		1		3.2	
Nickel [ug/L] Intrawell APW-06D		1		2.5	
Nickel [ug/L] Intrawell APW-06D		1		9.3	
Nickel [ug/L] Intrawell APW-06D		1		8.25	
Radium-226/228 [pCi/L] Intrawell APW-06D		1		2	
Radium-226/228 [pCi/L] Intrawell APW-06D		1		2	

group	D	x	ols	x	ols
Radium-226/228 [pCi/L] Intrawell APW-06D		1			1.77
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			1.38
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2.8
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2
Radium-226/228 [pCi/L] Intrawell APW-06D		1			1.82
Radium-226/228 [pCi/L] Intrawell APW-06D		1			1.52
Radium-226/228 [pCi/L] Intrawell APW-06D		1			2.27
Radium-226/228 [pCi/L] Intrawell APW-06D		1			0.9
pH, Lab [SU] Intrawell APW-06S		1			7.16
pH, Lab [SU] Intrawell APW-06S		1			7.06
pH, Lab [SU] Intrawell APW-06S		1			7.18
pH, Lab [SU] Intrawell APW-06S		1			7.23
pH, Lab [SU] Intrawell APW-06S		1			7.09
pH, Lab [SU] Intrawell APW-06S		1			7.13
pH, Lab [SU] Intrawell APW-06S		1			7.09
pH, Lab [SU] Intrawell APW-06S		1			7.02
pH, Lab [SU] Intrawell APW-06S		1			7.24
pH, Lab [SU] Intrawell APW-06S		1			7.38
pH, Lab [SU] Intrawell APW-06S		1			7.04
pH, Lab [SU] Intrawell APW-06S		1			7.12
pH, Lab [SU] Intrawell APW-06S		1			7.05
pH, Lab [SU] Intrawell APW-06S		1			7.21
pH, Lab [SU] Intrawell APW-06S		1			7.12
pH, Lab [SU] Intrawell APW-06S		1			7.67
pH, Lab [SU] Intrawell APW-06S		1			7.35
pH, Lab [SU] Intrawell APW-06S		1			7.2
pH, Lab [SU] Intrawell APW-06S		1			7.27
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Mercury [ug/L] Intrawell APW-06S		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			567.7267953
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			613.1133784
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			640.5278442
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			593.9423099
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			631.4125408
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			652.6039459
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			661.9905291
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			729.4049948
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			619.0995697
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			646.6180197
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			619.4989434
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			650.6865755
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			623.6157183
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			571.2456987
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			639.3218004

group	D	x	ols	x	ols
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			647.1228493
Dissolved Solids, Total [mg/L] Intrawell APW-06S		1			678
Chloride [mg/L] Intrawell APW-06S		1			24.64482965
Chloride [mg/L] Intrawell APW-06S		1			21.69866628
Chloride [mg/L] Intrawell APW-06S		1			20.7500558
Chloride [mg/L] Intrawell APW-06S		1			20.80144532
Chloride [mg/L] Intrawell APW-06S		1			19.8479406
Chloride [mg/L] Intrawell APW-06S		1			20.91890707
Chloride [mg/L] Intrawell APW-06S		1			19.97274371
Chloride [mg/L] Intrawell APW-06S		1			19.02413323
Chloride [mg/L] Intrawell APW-06S		1			21.91260673
Chloride [mg/L] Intrawell APW-06S		1			23.1304004
Chloride [mg/L] Intrawell APW-06S		1			22.31638152
Chloride [mg/L] Intrawell APW-06S		1			22.47544431
Chloride [mg/L] Intrawell APW-06S		1			21.83272381
Chloride [mg/L] Intrawell APW-06S		1			19.040729
Chloride [mg/L] Intrawell APW-06S		1			21.20958028
Chloride [mg/L] Intrawell APW-06S		1			20.51480643
Chloride [mg/L] Intrawell APW-06S		1			21.18888386
Chloride [mg/L] Intrawell APW-06S		1			20.99966808
Chloride [mg/L] Intrawell APW-06S		1			19.4
Sulfate [mg/L] Intrawell APW-06S		1			127
Sulfate [mg/L] Intrawell APW-06S		1			177
Sulfate [mg/L] Intrawell APW-06S		1			167
Sulfate [mg/L] Intrawell APW-06S		1			151
Sulfate [mg/L] Intrawell APW-06S		1			189
Sulfate [mg/L] Intrawell APW-06S		1			201
Sulfate [mg/L] Intrawell APW-06S		1			233
Sulfate [mg/L] Intrawell APW-06S		1			220
Sulfate [mg/L] Intrawell APW-06S		1			200
Sulfate [mg/L] Intrawell APW-06S		1			227
Sulfate [mg/L] Intrawell APW-06S		1			243
Sulfate [mg/L] Intrawell APW-06S		1			247
Sulfate [mg/L] Intrawell APW-06S		1			208
Sulfate [mg/L] Intrawell APW-06S		1			221
Sulfate [mg/L] Intrawell APW-06S		1			237
Sulfate [mg/L] Intrawell APW-06S		1			240
Sulfate [mg/L] Intrawell APW-06S		1			211
Sulfate [mg/L] Intrawell APW-06S		1			133
Sulfate [mg/L] Intrawell APW-06S		1			148
Fluoride [mg/L] Intrawell APW-06S		1			0.41
Fluoride [mg/L] Intrawell APW-06S		1			0.26
Fluoride [mg/L] Intrawell APW-06S		1			0.25
Fluoride [mg/L] Intrawell APW-06S		1			0.26
Fluoride [mg/L] Intrawell APW-06S		1			0.25
Fluoride [mg/L] Intrawell APW-06S		1			0.25
Fluoride [mg/L] Intrawell APW-06S		1			0.27
Fluoride [mg/L] Intrawell APW-06S		1			0.24
Fluoride [mg/L] Intrawell APW-06S		1			0.29
Fluoride [mg/L] Intrawell APW-06S		1			0.28
Fluoride [mg/L] Intrawell APW-06S		1			0.32
Fluoride [mg/L] Intrawell APW-06S		1			0.29
Fluoride [mg/L] Intrawell APW-06S		1			0.26
Fluoride [mg/L] Intrawell APW-06S		1			0.3
Fluoride [mg/L] Intrawell APW-06S		1			0.33
Fluoride [mg/L] Intrawell APW-06S		1			0.277
Fluoride [mg/L] Intrawell APW-06S		0			0.15
Fluoride [mg/L] Intrawell APW-06S		1			0.242
Fluoride [mg/L] Intrawell APW-06S		0			0.15
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		0			1
Lead [ug/L] Intrawell APW-06S		1			2.8

group	D	x	ols	x	ols
Arsenic [ug/L] Intrawell APW-06S		1			2.112528997
Arsenic [ug/L] Intrawell APW-06S		1			1.411684918
Arsenic [ug/L] Intrawell APW-06S		1			1.310396588
Arsenic [ug/L] Intrawell APW-06S		1			1.209419234
Arsenic [ug/L] Intrawell APW-06S		1			1.208486305
Arsenic [ug/L] Intrawell APW-06S		1			1.037894684
Arsenic [ug/L] Intrawell APW-06S		1			1.233940842
Arsenic [ug/L] Intrawell APW-06S		1			1.030564528
Arsenic [ug/L] Intrawell APW-06S		1			1.127676891
Arsenic [ug/L] Intrawell APW-06S		0			1
Arsenic [ug/L] Intrawell APW-06S		1			1.217414673
Arsenic [ug/L] Intrawell APW-06S		1			1.614349335
Arsenic [ug/L] Intrawell APW-06S		0			2
Arsenic [ug/L] Intrawell APW-06S		0			2
Arsenic [ug/L] Intrawell APW-06S		0			2
Arsenic [ug/L] Intrawell APW-06S		1			222
Barium [ug/L] Intrawell APW-06S		1			237
Barium [ug/L] Intrawell APW-06S		1			205
Barium [ug/L] Intrawell APW-06S		1			226
Barium [ug/L] Intrawell APW-06S		1			214
Barium [ug/L] Intrawell APW-06S		1			213
Barium [ug/L] Intrawell APW-06S		1			224
Barium [ug/L] Intrawell APW-06S		1			205
Barium [ug/L] Intrawell APW-06S		1			250
Barium [ug/L] Intrawell APW-06S		1			221
Barium [ug/L] Intrawell APW-06S		1			190
Barium [ug/L] Intrawell APW-06S		1			202
Barium [ug/L] Intrawell APW-06S		1			224
Barium [ug/L] Intrawell APW-06S		1			206
Barium [ug/L] Intrawell APW-06S		1			305
Barium [ug/L] Intrawell APW-06S		1			204
Barium [ug/L] Intrawell APW-06S		1			230
Barium [ug/L] Intrawell APW-06S		1			232
Barium [ug/L] Intrawell APW-06S		1			233
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			1
Beryllium [ug/L] Intrawell APW-06S		0			2
Beryllium [ug/L] Intrawell APW-06S		0			2
Beryllium [ug/L] Intrawell APW-06S		0			2
Boron [mg/L] Intrawell APW-06S		1			4.65
Boron [mg/L] Intrawell APW-06S		1			5.93
Boron [mg/L] Intrawell APW-06S		1			5.83
Boron [mg/L] Intrawell APW-06S		1			5.64
Boron [mg/L] Intrawell APW-06S		1			5.8
Boron [mg/L] Intrawell APW-06S		1			6.93
Boron [mg/L] Intrawell APW-06S		1			7.42
Boron [mg/L] Intrawell APW-06S		1			6.66
Boron [mg/L] Intrawell APW-06S		1			4.77
Boron [mg/L] Intrawell APW-06S		1			6.61
Boron [mg/L] Intrawell APW-06S		1			6.31
Boron [mg/L] Intrawell APW-06S		1			6.84
Boron [mg/L] Intrawell APW-06S		1			5.84
Boron [mg/L] Intrawell APW-06S		1			5.79
Boron [mg/L] Intrawell APW-06S		1			9.19

group	D	x	ols	x	ols
Calcium [mg/L] Intrawell APW-06S		1			109.526226
Calcium [mg/L] Intrawell APW-06S		1			107.0759731
Calcium [mg/L] Intrawell APW-06S		1			100.7908884
Calcium [mg/L] Intrawell APW-06S		1			111.825929
Calcium [mg/L] Intrawell APW-06S		1			95.02235677
Calcium [mg/L] Intrawell APW-06S		1			91.91357459
Calcium [mg/L] Intrawell APW-06S		1			102.6588263
Calcium [mg/L] Intrawell APW-06S		1			120.9952958
Calcium [mg/L] Intrawell APW-06S		1			131.2428996
Calcium [mg/L] Intrawell APW-06S		1			126
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			1
Selenium [ug/L] Intrawell APW-06S		0			2
Selenium [ug/L] Intrawell APW-06S		0			2
Selenium [ug/L] Intrawell APW-06S		0			2
Selenium [ug/L] Intrawell APW-06S		0			2
Molybdenum [ug/L] Intrawell APW-06S		1			177.5381681
Molybdenum [ug/L] Intrawell APW-06S		1			216.1435436
Molybdenum [ug/L] Intrawell APW-06S		1			201.7214021
Molybdenum [ug/L] Intrawell APW-06S		1			173.2992606
Molybdenum [ug/L] Intrawell APW-06S		1			204.8220849
Molybdenum [ug/L] Intrawell APW-06S		1			245.62008
Molybdenum [ug/L] Intrawell APW-06S		1			256.2254555
Molybdenum [ug/L] Intrawell APW-06S		1			255.803314
Molybdenum [ug/L] Intrawell APW-06S		1			213.5279389
Molybdenum [ug/L] Intrawell APW-06S		1			249.9769582
Molybdenum [ug/L] Intrawell APW-06S		1			240.0682555
Molybdenum [ug/L] Intrawell APW-06S		1			247.8568651
Molybdenum [ug/L] Intrawell APW-06S		1			221.8743574
Molybdenum [ug/L] Intrawell APW-06S		1			214.2133084
Molybdenum [ug/L] Intrawell APW-06S		1			198.1119862
Molybdenum [ug/L] Intrawell APW-06S		1			247.2952203
Molybdenum [ug/L] Intrawell APW-06S		1			226.3771322
Molybdenum [ug/L] Intrawell APW-06S		1			174.8718001
Molybdenum [ug/L] Intrawell APW-06S		1			187
Nickel [ug/L] Intrawell APW-06S		1			2.1
Nickel [ug/L] Intrawell APW-06S		1			9
Nickel [ug/L] Intrawell APW-06S		1			2.1
Nickel [ug/L] Intrawell APW-06S		1			1.2
Nickel [ug/L] Intrawell APW-06S		0			1
Nickel [ug/L] Intrawell APW-06S		1			3.1
Nickel [ug/L] Intrawell APW-06S		1			1.6
Nickel [ug/L] Intrawell APW-06S		1			1.2
Nickel [ug/L] Intrawell APW-06S		1			2.7
Nickel [ug/L] Intrawell APW-06S		1			2.3
Nickel [ug/L] Intrawell APW-06S		0			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			1.07
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2
Radium-226/228 [pCi/L] Intrawell APW-06S		1			0.497
Radium-226/228 [pCi/L] Intrawell APW-06S		1			2.93

group	D	x	ols	x	ols
Fluoride [mg/L] Intrawell APW-10D		1			0.1
Fluoride [mg/L] Intrawell APW-10D		1			0.11
Fluoride [mg/L] Intrawell APW-10D		0			0.1
Fluoride [mg/L] Intrawell APW-10D		1			0.12
Fluoride [mg/L] Intrawell APW-10D		1			0.1
Fluoride [mg/L] Intrawell APW-10D		1			0.12
Fluoride [mg/L] Intrawell APW-10D		1			0.12
Fluoride [mg/L] Intrawell APW-10D		1			0.11
Fluoride [mg/L] Intrawell APW-10D		1			0.11
Fluoride [mg/L] Intrawell APW-10D		1			0.14
Fluoride [mg/L] Intrawell APW-10D		0			0.15
Fluoride [mg/L] Intrawell APW-10D		0			0.15
Fluoride [mg/L] Intrawell APW-10D		0			0.15
Fluoride [mg/L] Intrawell APW-10D		0			0.15
Chloride [mg/L] Intrawell APW-10D		1			21.39053669
Chloride [mg/L] Intrawell APW-10D		1			14.41064816
Chloride [mg/L] Intrawell APW-10D		1			14.43277078
Chloride [mg/L] Intrawell APW-10D		1			12.45388782
Chloride [mg/L] Intrawell APW-10D		1			14.47299372
Chloride [mg/L] Intrawell APW-10D		1			13.50316092
Chloride [mg/L] Intrawell APW-10D		1			11.52427797
Chloride [mg/L] Intrawell APW-10D		1			13.54640059
Chloride [mg/L] Intrawell APW-10D		1			15.14224578
Chloride [mg/L] Intrawell APW-10D		1			17.23576412
Chloride [mg/L] Intrawell APW-10D		1			13.31017656
Chloride [mg/L] Intrawell APW-10D		1			12.37553884
Chloride [mg/L] Intrawell APW-10D		1			13.52034143
Chloride [mg/L] Intrawell APW-10D		1			9.605815176
Chloride [mg/L] Intrawell APW-10D		1			9.67519975
Chloride [mg/L] Intrawell APW-10D		1			15.12045056
Chloride [mg/L] Intrawell APW-10D		1			10.73106365
Chloride [mg/L] Intrawell APW-10D		1			25.45977706
Chloride [mg/L] Intrawell APW-10D		1			15
Sulfate [mg/L] Intrawell APW-10D		1			30.21790257
Sulfate [mg/L] Intrawell APW-10D		1			36.2778802
Sulfate [mg/L] Intrawell APW-10D		1			35.34385559
Sulfate [mg/L] Intrawell APW-10D		1			34.40683211
Sulfate [mg/L] Intrawell APW-10D		1			34.46381085
Sulfate [mg/L] Intrawell APW-10D		1			36.5537773
Sulfate [mg/L] Intrawell APW-10D		1			36.61675381
Sulfate [mg/L] Intrawell APW-10D		1			36.6827292
Sulfate [mg/L] Intrawell APW-10D		1			38.4419541
Sulfate [mg/L] Intrawell APW-10D		1			40.72085008
Sulfate [mg/L] Intrawell APW-10D		1			39.94276731
Sulfate [mg/L] Intrawell APW-10D		1			37.1376946
Sulfate [mg/L] Intrawell APW-10D		1			42.56953354
Sulfate [mg/L] Intrawell APW-10D		1			29.82443846
Sulfate [mg/L] Intrawell APW-10D		1			25.03136128
Sulfate [mg/L] Intrawell APW-10D		1			34.66631095
Sulfate [mg/L] Intrawell APW-10D		1			34.79618791
Sulfate [mg/L] Intrawell APW-10D		1			36.98004474
Sulfate [mg/L] Intrawell APW-10D		1			32.9
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		1			1
Lead [ug/L] Intrawell APW-10D		1			2
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			1
Lead [ug/L] Intrawell APW-10D		0			2
Lead [ug/L] Intrawell APW-10D		0			2

group	D	x	ols	x	ols
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		1		1.1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Cadmium [ug/L] Intrawell APW-10D		0		1	1
Chromium [ug/L] Intrawell APW-10D		1		3.6	1
Chromium [ug/L] Intrawell APW-10D		1		7.8	1
Chromium [ug/L] Intrawell APW-10D		1		2.2	1
Chromium [ug/L] Intrawell APW-10D		1		1.1	1
Chromium [ug/L] Intrawell APW-10D		0		1	1
Chromium [ug/L] Intrawell APW-10D		0		1	1
Chromium [ug/L] Intrawell APW-10D		1		4.2	1
Chromium [ug/L] Intrawell APW-10D		0		1	1
Chromium [ug/L] Intrawell APW-10D		0		1.5	1
Chromium [ug/L] Intrawell APW-10D		1		14.8	1
Chromium [ug/L] Intrawell APW-10D		1		2.4	1
Chromium [ug/L] Intrawell APW-10D		0		1.5	1
Chromium [ug/L] Intrawell APW-10D		1		1.5	1
Chromium [ug/L] Intrawell APW-10D		1		4.2	1
Chromium [ug/L] Intrawell APW-10D		1		2.1	1
Chromium [ug/L] Intrawell APW-10D		0		2	1
Chromium [ug/L] Intrawell APW-10D		0		2	1
Chromium [ug/L] Intrawell APW-10D		0		2	1
Cobalt [ug/L] Intrawell APW-10D		1		3.9	1
Cobalt [ug/L] Intrawell APW-10D		1		2.4	1
Cobalt [ug/L] Intrawell APW-10D		1		2.5	1
Cobalt [ug/L] Intrawell APW-10D		1		3.2	1
Cobalt [ug/L] Intrawell APW-10D		1		1.7	1
Cobalt [ug/L] Intrawell APW-10D		1		1.3	1
Cobalt [ug/L] Intrawell APW-10D		1		2.6	1
Cobalt [ug/L] Intrawell APW-10D		1		2.6	1
Cobalt [ug/L] Intrawell APW-10D		1		3.4	1
Cobalt [ug/L] Intrawell APW-10D		1		4.9	1
Cobalt [ug/L] Intrawell APW-10D		1		3	1
Cobalt [ug/L] Intrawell APW-10D		1		3.3	1
Cobalt [ug/L] Intrawell APW-10D		1		7	1
Cobalt [ug/L] Intrawell APW-10D		1		3.1	1
Cobalt [ug/L] Intrawell APW-10D		1		3.9	1
Cobalt [ug/L] Intrawell APW-10D		1		2.61	1
Cobalt [ug/L] Intrawell APW-10D		1		2.71	1
Cobalt [ug/L] Intrawell APW-10D		0		2	1
Cobalt [ug/L] Intrawell APW-10D		1		2.42	1
Calcium [mg/L] Intrawell APW-10D		1		118	1
Calcium [mg/L] Intrawell APW-10D		1		136	1
Calcium [mg/L] Intrawell APW-10D		1		120	1
Calcium [mg/L] Intrawell APW-10D		1		121	1
Calcium [mg/L] Intrawell APW-10D		1		125	1
Calcium [mg/L] Intrawell APW-10D		1		123	1
Calcium [mg/L] Intrawell APW-10D		1		148	1
Calcium [mg/L] Intrawell APW-10D		1		124	1
Calcium [mg/L] Intrawell APW-10D		1		135	1
Calcium [mg/L] Intrawell APW-10D		1		374	1
Calcium [mg/L] Intrawell APW-10D		1		115	1
Calcium [mg/L] Intrawell APW-10D		1		122	1
Calcium [mg/L] Intrawell APW-10D		1		611	1
Calcium [mg/L] Intrawell APW-10D		1		118	1
Calcium [mg/L] Intrawell APW-10D		1		120	1
Calcium [mg/L] Intrawell APW-10D		1		125	1

group	D x ols	x ols
Calcium [mg/L] Intrawell APW-10D	1	141
Calcium [mg/L] Intrawell APW-10D	1	98.5
Calcium [mg/L] Intrawell APW-10D	1	129
Selenium [ug/L] Intrawell APW-10D	0	1
Selenium [ug/L] Intrawell APW-10D	1	1.1
Selenium [ug/L] Intrawell APW-10D	1	1.2
Selenium [ug/L] Intrawell APW-10D	1	1.3
Selenium [ug/L] Intrawell APW-10D	0	1
Selenium [ug/L] Intrawell APW-10D	1	1.4
Selenium [ug/L] Intrawell APW-10D	1	1.6
Selenium [ug/L] Intrawell APW-10D	1	1.6
Selenium [ug/L] Intrawell APW-10D	0	1
Selenium [ug/L] Intrawell APW-10D	1	2.1
Selenium [ug/L] Intrawell APW-10D	1	1.3
Selenium [ug/L] Intrawell APW-10D	1	2.7
Selenium [ug/L] Intrawell APW-10D	1	1.6
Selenium [ug/L] Intrawell APW-10D	1	1.3
Selenium [ug/L] Intrawell APW-10D	1	3.3
Selenium [ug/L] Intrawell APW-10D	1	2.69
Selenium [ug/L] Intrawell APW-10D	1	2.64
Selenium [ug/L] Intrawell APW-10D	0	2
Selenium [ug/L] Intrawell APW-10D	0	2
Molybdenum [ug/L] Intrawell APW-10D	1	2.4
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	1.5
Molybdenum [ug/L] Intrawell APW-10D	0	5
Molybdenum [ug/L] Intrawell APW-10D	0	5
Molybdenum [ug/L] Intrawell APW-10D	0	5
Molybdenum [ug/L] Intrawell APW-10D	0	5
Nickel [ug/L] Intrawell APW-10D	1	9.5
Nickel [ug/L] Intrawell APW-10D	1	7.7
Nickel [ug/L] Intrawell APW-10D	1	6.5
Nickel [ug/L] Intrawell APW-10D	1	5.7
Nickel [ug/L] Intrawell APW-10D	1	3.5
Nickel [ug/L] Intrawell APW-10D	1	2.5
Nickel [ug/L] Intrawell APW-10D	1	7.2
Nickel [ug/L] Intrawell APW-10D	1	5.3
Nickel [ug/L] Intrawell APW-10D	1	7
Nickel [ug/L] Intrawell APW-10D	1	6.3
Nickel [ug/L] Intrawell APW-10D	1	5.13
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.360592342
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.365520339
Radium-226/228 [pCi/L] Intrawell APW-10D	1	0.700941136
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.376115534
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.380797131
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.388189127
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.393363524
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.398784322
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.229820912
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.8127361
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.83096969
Radium-226/228 [pCi/L] Intrawell APW-10D	1	0.876985682
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.882467263
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.903411252
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.920412843
Radium-226/228 [pCi/L] Intrawell APW-10D	1	1.461500837
Radium-226/228 [pCi/L] Intrawell APW-10D	1	0.978604822

group	D	x	ols	x	ols
Radium-226/228 [pCi/L] Intrawell APW-10D		1			0.494
Radium-226/228 [pCi/L] Intrawell APW-10D		1			0.712
pH, Lab [SU] Intrawell APW-10S		1			7.188270592
pH, Lab [SU] Intrawell APW-10S		1			7.156742495
pH, Lab [SU] Intrawell APW-10S		1			7.145061588
pH, Lab [SU] Intrawell APW-10S		1			7.173457086
pH, Lab [SU] Intrawell APW-10S		1			7.162005394
pH, Lab [SU] Intrawell APW-10S		1			7.169713248
pH, Lab [SU] Intrawell APW-10S		1			7.248108746
pH, Lab [SU] Intrawell APW-10S		1			7.09642784
pH, Lab [SU] Intrawell APW-10S		1			7.155173339
pH, Lab [SU] Intrawell APW-10S		1			7.258144093
pH, Lab [SU] Intrawell APW-10S		1			7.002413729
pH, Lab [SU] Intrawell APW-10S		1			7.247447413
pH, Lab [SU] Intrawell APW-10S		1			7.046445115
pH, Lab [SU] Intrawell APW-10S		1			7.199950702
pH, Lab [SU] Intrawell APW-10S		1			7.034678767
pH, Lab [SU] Intrawell APW-10S		1			7.601240549
pH, Lab [SU] Intrawell APW-10S		1			7.192836015
pH, Lab [SU] Intrawell APW-10S		1			6.963056194
pH, Lab [SU] Intrawell APW-10S		1			7.16
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Mercury [ug/L] Intrawell APW-10S		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			754.8491458
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			766.4630795
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			724.0384065
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			753.6330369
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			779.2662739
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			814.6871745
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			805.8571319
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			748.2227708
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			781.4468659
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			759.9991172
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			788.7444017
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			730.9647244
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			779.3239426
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			902.9920138
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			694.1233647
Dissolved Solids, Total [mg/L] Intrawell APW-10S		1			744
Fluoride [mg/L] Intrawell APW-10S		1			0.19
Fluoride [mg/L] Intrawell APW-10S		1			0.21
Fluoride [mg/L] Intrawell APW-10S		1			0.16
Fluoride [mg/L] Intrawell APW-10S		1			0.16
Fluoride [mg/L] Intrawell APW-10S		1			0.16
Fluoride [mg/L] Intrawell APW-10S		1			0.17
Fluoride [mg/L] Intrawell APW-10S		1			0.17
Fluoride [mg/L] Intrawell APW-10S		1			0.16
Fluoride [mg/L] Intrawell APW-10S		1			0.17
Fluoride [mg/L] Intrawell APW-10S		1			0.15
Fluoride [mg/L] Intrawell APW-10S		1			0.17
Fluoride [mg/L] Intrawell APW-10S		1			0.15
Fluoride [mg/L] Intrawell APW-10S		1			0.15

group	D	x	ols	x	ols
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			1
Selenium [ug/L] Intrawell APW-10S		0			2
Selenium [ug/L] Intrawell APW-10S		0			2
Selenium [ug/L] Intrawell APW-10S		0			2
Selenium [ug/L] Intrawell APW-10S		0			2
Molybdenum [ug/L] Intrawell APW-10S		1			1.7
Molybdenum [ug/L] Intrawell APW-10S		1			1.6
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		0			1.5
Molybdenum [ug/L] Intrawell APW-10S		1			2.1
Molybdenum [ug/L] Intrawell APW-10S		0			5
Molybdenum [ug/L] Intrawell APW-10S		0			5
Molybdenum [ug/L] Intrawell APW-10S		0			5
Molybdenum [ug/L] Intrawell APW-10S		0			5
Nickel [ug/L] Intrawell APW-10S		1			5.1
Nickel [ug/L] Intrawell APW-10S		1			1.2
Nickel [ug/L] Intrawell APW-10S		0			1
Nickel [ug/L] Intrawell APW-10S		1			1.5
Nickel [ug/L] Intrawell APW-10S		0			1
Nickel [ug/L] Intrawell APW-10S		0			1
Nickel [ug/L] Intrawell APW-10S		1			1.4
Nickel [ug/L] Intrawell APW-10S		0			1
Nickel [ug/L] Intrawell APW-10S		1			1.4
Nickel [ug/L] Intrawell APW-10S		1			3.1
Nickel [ug/L] Intrawell APW-10S		0			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			1.63
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			3
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			1.25
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2.82
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			1.24
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			4.83
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2
Radium-226/228 [pCi/L] Intrawell APW-10S		1			2.42
Radium-226/228 [pCi/L] Intrawell APW-10S		1			0.646
Radium-226/228 [pCi/L] Intrawell APW-10S		1			0.652
Radium-226/228 [pCi/L] Intrawell APW-10S		1			1.17
pH, Lab [SU] Intrawell APW-08		1			7.344606091
pH, Lab [SU] Intrawell APW-08		1			7.37214202
pH, Lab [SU] Intrawell APW-08		1			7.299795286
pH, Lab [SU] Intrawell APW-08		1			7.417331215
pH, Lab [SU] Intrawell APW-08		1			7.545101818
pH, Lab [SU] Intrawell APW-08		1			7.401581716

group	D	x	ols	x	ols
pH, Lab [SU] Intrawell APW-08		1		7.329117646	
pH, Lab [SU] Intrawell APW-08		1		7.326536238	
pH, Lab [SU] Intrawell APW-08		1		7.440088211	
pH, Lab [SU] Intrawell APW-08		1		7.559410571	
pH, Lab [SU] Intrawell APW-08		1		7.330492981	
pH, Lab [SU] Intrawell APW-08		1		7.382983432	
pH, Lab [SU] Intrawell APW-08		1		7.236086946	
pH, Lab [SU] Intrawell APW-08		1		7.206113326	
pH, Lab [SU] Intrawell APW-08		1		7.307899756	
pH, Lab [SU] Intrawell APW-08		1		7.712736941	
pH, Lab [SU] Intrawell APW-08		1		7.549829903	
pH, Lab [SU] Intrawell APW-08		1		7.204928142	
pH, Lab [SU] Intrawell APW-08		1		7.33	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Mercury [ug/L] Intrawell APW-08		0		0.2	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		382.2449073	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		402.727337	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		381.1867939	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		391.6692236	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		412.1057077	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		356.794893	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		345.2773227	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		389.7827253	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		366.2865746	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		358.3771034	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		358.1230396	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		367.5933016	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		412.9013912	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		434.8540829	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		391.462182	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		367.4729871	
Dissolved Solids, Total [mg/L] Intrawell APW-08		1		371	
Fluoride [mg/L] Intrawell APW-08		1		0.259550571	
Fluoride [mg/L] Intrawell APW-08		1		0.259877782	
Fluoride [mg/L] Intrawell APW-08		1		0.250189411	
Fluoride [mg/L] Intrawell APW-08		1		0.250516621	
Fluoride [mg/L] Intrawell APW-08		1		0.240812668	
Fluoride [mg/L] Intrawell APW-08		1		0.241280112	
Fluoride [mg/L] Intrawell APW-08		1		0.261607322	
Fluoride [mg/L] Intrawell APW-08		1		0.241950114	
Fluoride [mg/L] Intrawell APW-08		1		0.276709028	
Fluoride [mg/L] Intrawell APW-08		1		0.24812694	
Fluoride [mg/L] Intrawell APW-08		1		0.269311129	
Fluoride [mg/L] Intrawell APW-08		1		0.250308342	
Fluoride [mg/L] Intrawell APW-08		1		0.25255207	
Fluoride [mg/L] Intrawell APW-08		1		0.253876493	
Fluoride [mg/L] Intrawell APW-08		1		0.284967194	
Fluoride [mg/L] Intrawell APW-08		1		0.227652777	
Fluoride [mg/L] Intrawell APW-08		1		0.333366736	
Fluoride [mg/L] Intrawell APW-08		1		0.253345579	
Fluoride [mg/L] Intrawell APW-08		0		0.15	
Chloride [mg/L] Intrawell APW-08		1		9	

group	D	x	ols	x	ols
Chloride [mg/L] Intrawell APW-08		1			10
Chloride [mg/L] Intrawell APW-08		1			10
Chloride [mg/L] Intrawell APW-08		1			10
Chloride [mg/L] Intrawell APW-08		1			10
Chloride [mg/L] Intrawell APW-08		1			11
Chloride [mg/L] Intrawell APW-08		1			12
Chloride [mg/L] Intrawell APW-08		1			11
Chloride [mg/L] Intrawell APW-08		1			9
Chloride [mg/L] Intrawell APW-08		1			11
Chloride [mg/L] Intrawell APW-08		1			12
Chloride [mg/L] Intrawell APW-08		1			13
Chloride [mg/L] Intrawell APW-08		1			10
Chloride [mg/L] Intrawell APW-08		1			10
Chloride [mg/L] Intrawell APW-08		1			11
Chloride [mg/L] Intrawell APW-08		1			10.6
Chloride [mg/L] Intrawell APW-08		1			10.2
Chloride [mg/L] Intrawell APW-08		1			8.97
Chloride [mg/L] Intrawell APW-08		1			8.61
Sulfate [mg/L] Intrawell APW-08		1			31.45390249
Sulfate [mg/L] Intrawell APW-08		1			28.54730312
Sulfate [mg/L] Intrawell APW-08		1			26.63625611
Sulfate [mg/L] Intrawell APW-08		1			28.72965674
Sulfate [mg/L] Intrawell APW-08		1			27.81416208
Sulfate [mg/L] Intrawell APW-08		1			26.94759156
Sulfate [mg/L] Intrawell APW-08		1			28.04099219
Sulfate [mg/L] Intrawell APW-08		1			26.13884048
Sulfate [mg/L] Intrawell APW-08		1			35.20615517
Sulfate [mg/L] Intrawell APW-08		1			35.61089125
Sulfate [mg/L] Intrawell APW-08		1			30.9489126
Sulfate [mg/L] Intrawell APW-08		1			26.23356215
Sulfate [mg/L] Intrawell APW-08		1			28.87402365
Sulfate [mg/L] Intrawell APW-08		1			21.25207384
Sulfate [mg/L] Intrawell APW-08		1			22.56340929
Sulfate [mg/L] Intrawell APW-08		1			23.45910585
Sulfate [mg/L] Intrawell APW-08		1			27.84834727
Sulfate [mg/L] Intrawell APW-08		1			33.21319873
Sulfate [mg/L] Intrawell APW-08		1			29.4
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		1			2.4
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		1			1.2
Lead [ug/L] Intrawell APW-08		0			1
Lead [ug/L] Intrawell APW-08		1			2.8
Lead [ug/L] Intrawell APW-08		1			1.5
Lead [ug/L] Intrawell APW-08		1			1.8
Lead [ug/L] Intrawell APW-08		0			2
Lead [ug/L] Intrawell APW-08		0			2
Lead [ug/L] Intrawell APW-08		0			2
Lead [ug/L] Intrawell APW-08		0			2
Lithium [ug/L] Intrawell APW-08		1			14.93254963
Lithium [ug/L] Intrawell APW-08		1			15.97030635
Lithium [ug/L] Intrawell APW-08		1			16.10626514
Lithium [ug/L] Intrawell APW-08		1			17.04402186
Lithium [ug/L] Intrawell APW-08		1			17.77818271
Lithium [ug/L] Intrawell APW-08		1			17.13212089
Lithium [ug/L] Intrawell APW-08		1			14.76987761
Lithium [ug/L] Intrawell APW-08		1			15.20943227
Lithium [ug/L] Intrawell APW-08		1			14.46635779
Lithium [ug/L] Intrawell APW-08		1			14.62997027
Lithium [ug/L] Intrawell APW-08		1			13.46661365
Lithium [ug/L] Intrawell APW-08		1			14.38168177
Lithium [ug/L] Intrawell APW-08		1			14.84058502

group	D	x	ols	x	ols
Chromium [ug/L] Intrawell APW-08		1			1.8
Chromium [ug/L] Intrawell APW-08		1			2.3
Chromium [ug/L] Intrawell APW-08		0			1
Chromium [ug/L] Intrawell APW-08		1			5.9
Chromium [ug/L] Intrawell APW-08		0			1
Chromium [ug/L] Intrawell APW-08		1			2.1
Chromium [ug/L] Intrawell APW-08		0			1
Chromium [ug/L] Intrawell APW-08		0			1
Chromium [ug/L] Intrawell APW-08		1			5.4
Chromium [ug/L] Intrawell APW-08		1			1.6
Chromium [ug/L] Intrawell APW-08		1			3.6
Chromium [ug/L] Intrawell APW-08		1			2.7
Chromium [ug/L] Intrawell APW-08		1			8.2
Chromium [ug/L] Intrawell APW-08		1			3.1
Chromium [ug/L] Intrawell APW-08		1			4.9
Chromium [ug/L] Intrawell APW-08		0			2
Chromium [ug/L] Intrawell APW-08		0			2
Chromium [ug/L] Intrawell APW-08		0			2
Chromium [ug/L] Intrawell APW-08		1			7.38
Cobalt [ug/L] Intrawell APW-08		1			1.7
Cobalt [ug/L] Intrawell APW-08		1			1.3
Cobalt [ug/L] Intrawell APW-08		1			1
Cobalt [ug/L] Intrawell APW-08		1			1.2
Cobalt [ug/L] Intrawell APW-08		0			1
Cobalt [ug/L] Intrawell APW-08		0			1
Cobalt [ug/L] Intrawell APW-08		0			1
Cobalt [ug/L] Intrawell APW-08		0			1
Cobalt [ug/L] Intrawell APW-08		1			2
Cobalt [ug/L] Intrawell APW-08		1			1.3
Cobalt [ug/L] Intrawell APW-08		1			1.6
Cobalt [ug/L] Intrawell APW-08		1			1.2
Cobalt [ug/L] Intrawell APW-08		1			1.9
Cobalt [ug/L] Intrawell APW-08		1			1.4
Cobalt [ug/L] Intrawell APW-08		1			2.1
Cobalt [ug/L] Intrawell APW-08		0			2
Cobalt [ug/L] Intrawell APW-08		0			2
Cobalt [ug/L] Intrawell APW-08		0			2
Cobalt [ug/L] Intrawell APW-08		0			2
Calcium [mg/L] Intrawell APW-08		1			97.4
Calcium [mg/L] Intrawell APW-08		1			105
Calcium [mg/L] Intrawell APW-08		1			92.6
Calcium [mg/L] Intrawell APW-08		1			101
Calcium [mg/L] Intrawell APW-08		1			102
Calcium [mg/L] Intrawell APW-08		1			98.6
Calcium [mg/L] Intrawell APW-08		1			95
Calcium [mg/L] Intrawell APW-08		1			97.8
Calcium [mg/L] Intrawell APW-08		1			93.3
Calcium [mg/L] Intrawell APW-08		1			85.1
Calcium [mg/L] Intrawell APW-08		1			82.8
Calcium [mg/L] Intrawell APW-08		1			79.4
Calcium [mg/L] Intrawell APW-08		1			99.4
Calcium [mg/L] Intrawell APW-08		1			86.4
Calcium [mg/L] Intrawell APW-08		1			81.2
Calcium [mg/L] Intrawell APW-08		1			82.8
Calcium [mg/L] Intrawell APW-08		1			87.8
Calcium [mg/L] Intrawell APW-08		1			98.3
Calcium [mg/L] Intrawell APW-08		1			102
Selenium [ug/L] Intrawell APW-08		1			8
Selenium [ug/L] Intrawell APW-08		1			14.1
Selenium [ug/L] Intrawell APW-08		1			13.2
Selenium [ug/L] Intrawell APW-08		1			14.9
Selenium [ug/L] Intrawell APW-08		1			13.5
Selenium [ug/L] Intrawell APW-08		1			14.1
Selenium [ug/L] Intrawell APW-08		1			14.9
Selenium [ug/L] Intrawell APW-08		1			13
Selenium [ug/L] Intrawell APW-08		1			3.6
Selenium [ug/L] Intrawell APW-08		1			7.7
Selenium [ug/L] Intrawell APW-08		1			11
Selenium [ug/L] Intrawell APW-08		1			14.8

group	D	x	ols	x	ols
Selenium [ug/L] Intrawell APW-08		1			12.9
Selenium [ug/L] Intrawell APW-08		1			12.2
Selenium [ug/L] Intrawell APW-08		1			22.1
Selenium [ug/L] Intrawell APW-08		1			16.9
Selenium [ug/L] Intrawell APW-08		1			18.2
Selenium [ug/L] Intrawell APW-08		1			5.29
Selenium [ug/L] Intrawell APW-08		1			18.7
Molybdenum [ug/L] Intrawell APW-08		1			1.1
Molybdenum [ug/L] Intrawell APW-08		0			1
Molybdenum [ug/L] Intrawell APW-08		0			1
Molybdenum [ug/L] Intrawell APW-08		1			1.1
Molybdenum [ug/L] Intrawell APW-08		0			1
Molybdenum [ug/L] Intrawell APW-08		0			1
Molybdenum [ug/L] Intrawell APW-08		0			1
Molybdenum [ug/L] Intrawell APW-08		0			1
Molybdenum [ug/L] Intrawell APW-08		1			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			1.5
Molybdenum [ug/L] Intrawell APW-08		0			5
Molybdenum [ug/L] Intrawell APW-08		0			5
Molybdenum [ug/L] Intrawell APW-08		0			5
Molybdenum [ug/L] Intrawell APW-08		0			5
Nickel [ug/L] Intrawell APW-08		1			3.9
Nickel [ug/L] Intrawell APW-08		1			4.3
Nickel [ug/L] Intrawell APW-08		1			2.9
Nickel [ug/L] Intrawell APW-08		1			6.2
Nickel [ug/L] Intrawell APW-08		1			2.6
Nickel [ug/L] Intrawell APW-08		1			2.7
Nickel [ug/L] Intrawell APW-08		1			2.6
Nickel [ug/L] Intrawell APW-08		1			2.6
Nickel [ug/L] Intrawell APW-08		1			5.4
Nickel [ug/L] Intrawell APW-08		1			7.7
Nickel [ug/L] Intrawell APW-08		1			3.54
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			1.61
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			0.735
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2.08
Radium-226/228 [pCi/L] Intrawell APW-08		1			0.611
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2
Radium-226/228 [pCi/L] Intrawell APW-08		1			2.39
Radium-226/228 [pCi/L] Intrawell APW-08		1			0.595
Radium-226/228 [pCi/L] Intrawell APW-08		1			1.26
Radium-226/228 [pCi/L] Intrawell APW-08		1			1.04
pH, Lab [SU] Intrawell APW-07		1			6.970137088
pH, Lab [SU] Intrawell APW-07		1			6.969084362
pH, Lab [SU] Intrawell APW-07		1			6.988031635
pH, Lab [SU] Intrawell APW-07		1			6.996978908
pH, Lab [SU] Intrawell APW-07		1			6.956026441
pH, Lab [SU] Intrawell APW-07		1			7.084572675
pH, Lab [SU] Intrawell APW-07		1			7.093469818
pH, Lab [SU] Intrawell APW-07		1			7.002417092
pH, Lab [SU] Intrawell APW-07		1			6.922760761
pH, Lab [SU] Intrawell APW-07		1			7.058249075
pH, Lab [SU] Intrawell APW-07		1			6.814389077
pH, Lab [SU] Intrawell APW-07		1			7.261331156
pH, Lab [SU] Intrawell APW-07		1			6.813962068

group	D	x	ols	x	ols
pH, Lab [SU] Intrawell APW-07		1			6.959701031
pH, Lab [SU] Intrawell APW-07		1			6.876191941
pH, Lab [SU] Intrawell APW-07		1			7.323986228
pH, Lab [SU] Intrawell APW-07		1			7.028471945
pH, Lab [SU] Intrawell APW-07		1			7.032105454
pH, Lab [SU] Intrawell APW-07		1			6.93
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Mercury [ug/L] Intrawell APW-07		0			0.2
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			762
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			786
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			624
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			730
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			742
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			736
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			720
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			740
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			780
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			815
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			800
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			824
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			665
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			740
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			790
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			734
Dissolved Solids, Total [mg/L] Intrawell APW-07		1			737
Fluoride [mg/L] Intrawell APW-07		1			0.301404395
Fluoride [mg/L] Intrawell APW-07		1			0.161797503
Fluoride [mg/L] Intrawell APW-07		1			0.142190611
Fluoride [mg/L] Intrawell APW-07		1			0.152583719
Fluoride [mg/L] Intrawell APW-07		1			0.152939388
Fluoride [mg/L] Intrawell APW-07		1			0.143482251
Fluoride [mg/L] Intrawell APW-07		1			0.153894078
Fluoride [mg/L] Intrawell APW-07		1			0.134287186
Fluoride [mg/L] Intrawell APW-07		1			0.164032338
Fluoride [mg/L] Intrawell APW-07		1			0.155717085
Fluoride [mg/L] Intrawell APW-07		1			0.16715848
Fluoride [mg/L] Intrawell APW-07		1			0.178300365
Fluoride [mg/L] Intrawell APW-07		1			0.161052119
Fluoride [mg/L] Intrawell APW-07		1			0.172643269
Fluoride [mg/L] Intrawell APW-07		1			0.193953629
Fluoride [mg/L] Intrawell APW-07		1			0.166777283
Fluoride [mg/L] Intrawell APW-07		0			0.15
Fluoride [mg/L] Intrawell APW-07		1			0.198213785
Fluoride [mg/L] Intrawell APW-07		0			0.15
Chloride [mg/L] Intrawell APW-07		1			10.05975542
Chloride [mg/L] Intrawell APW-07		1			10.09971888
Chloride [mg/L] Intrawell APW-07		1			9.139682335
Chloride [mg/L] Intrawell APW-07		1			10.17964579
Chloride [mg/L] Intrawell APW-07		1			11.21580321
Chloride [mg/L] Intrawell APW-07		1			10.27099084
Chloride [mg/L] Intrawell APW-07		1			10.31285732
Chloride [mg/L] Intrawell APW-07		1			10.35282078

group	D	x	ols	x	ols
Barium [ug/L] Intrawell APW-07		1		296.105017	
Barium [ug/L] Intrawell APW-07		1		516.333131	
Barium [ug/L] Intrawell APW-07		1		355.1050884	
Barium [ug/L] Intrawell APW-07		1		346.0349819	
Barium [ug/L] Intrawell APW-07		1		308.2631316	
Barium [ug/L] Intrawell APW-07		1		351	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		1	
Beryllium [ug/L] Intrawell APW-07		0		2	
Beryllium [ug/L] Intrawell APW-07		0		2	
Beryllium [ug/L] Intrawell APW-07		0		2	
Beryllium [ug/L] Intrawell APW-07		0		2	
Boron [mg/L] Intrawell APW-07		1		0.235	
Boron [mg/L] Intrawell APW-07		1		0.308	
Boron [mg/L] Intrawell APW-07		1		0.302	
Boron [mg/L] Intrawell APW-07		1		0.3	
Boron [mg/L] Intrawell APW-07		1		0.278	
Boron [mg/L] Intrawell APW-07		1		0.342	
Boron [mg/L] Intrawell APW-07		1		0.298	
Boron [mg/L] Intrawell APW-07		1		0.318	
Boron [mg/L] Intrawell APW-07		1		0.168	
Boron [mg/L] Intrawell APW-07		1		0.208	
Boron [mg/L] Intrawell APW-07		1		0.217	
Boron [mg/L] Intrawell APW-07		1		0.246	
Boron [mg/L] Intrawell APW-07		1		0.237	
Boron [mg/L] Intrawell APW-07		1		0.181	
Boron [mg/L] Intrawell APW-07		1		0.274	
Boron [mg/L] Intrawell APW-07		0		0.2	
Boron [mg/L] Intrawell APW-07		1		0.526	
Boron [mg/L] Intrawell APW-07		1		0.228	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Cadmium [ug/L] Intrawell APW-07		0		1	
Chromium [ug/L] Intrawell APW-07		1		1.7	
Chromium [ug/L] Intrawell APW-07		1		6.3	
Chromium [ug/L] Intrawell APW-07		1		2.6	
Chromium [ug/L] Intrawell APW-07		0		1	
Chromium [ug/L] Intrawell APW-07		0		1	
Chromium [ug/L] Intrawell APW-07		1		32.9	
Chromium [ug/L] Intrawell APW-07		0		1	

group	D x ols	x ols
Molybdenum [ug/L] Intrawell APW-07	1	5.222823316
Molybdenum [ug/L] Intrawell APW-07	1	4.217785069
Molybdenum [ug/L] Intrawell APW-07	1	3.912746822
Molybdenum [ug/L] Intrawell APW-07	1	2.907708575
Molybdenum [ug/L] Intrawell APW-07	1	3.603150161
Molybdenum [ug/L] Intrawell APW-07	1	4.996192581
Molybdenum [ug/L] Intrawell APW-07	1	4.290914418
Molybdenum [ug/L] Intrawell APW-07	1	4.18587617
Molybdenum [ug/L] Intrawell APW-07	1	3.704648802
Molybdenum [ug/L] Intrawell APW-07	1	3.183056314
Molybdenum [ug/L] Intrawell APW-07	1	3.064582741
Molybdenum [ug/L] Intrawell APW-07	1	3.249947832
Molybdenum [ug/L] Intrawell APW-07	1	2.914680102
Molybdenum [ug/L] Intrawell APW-07	1	2.994287197
Molybdenum [ug/L] Intrawell APW-07	1	4.27749304
Molybdenum [ug/L] Intrawell APW-07	0	5
Molybdenum [ug/L] Intrawell APW-07	0	5
Molybdenum [ug/L] Intrawell APW-07	0	5
Molybdenum [ug/L] Intrawell APW-07	0	5
Nickel [ug/L] Intrawell APW-07	1	1.4
Nickel [ug/L] Intrawell APW-07	1	3.3
Nickel [ug/L] Intrawell APW-07	1	1.3
Nickel [ug/L] Intrawell APW-07	0	1
Nickel [ug/L] Intrawell APW-07	0	1
Nickel [ug/L] Intrawell APW-07	1	15
Nickel [ug/L] Intrawell APW-07	0	1
Nickel [ug/L] Intrawell APW-07	0	1
Nickel [ug/L] Intrawell APW-07	1	4.2
Nickel [ug/L] Intrawell APW-07	0	1
Nickel [ug/L] Intrawell APW-07	0	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	1.29
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	1.1
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2.1
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2
Radium-226/228 [pCi/L] Intrawell APW-07	1	2.7
Radium-226/228 [pCi/L] Intrawell APW-07	1	1.42
Radium-226/228 [pCi/L] Intrawell APW-07	1	0.933
Radium-226/228 [pCi/L] Intrawell APW-07	1	2.01
Turbidity, Field [NTU] Intrawell APW-10S	1	61.5
Turbidity, Field [NTU] Intrawell APW-10S	1	34.3
Turbidity, Field [NTU] Intrawell APW-10S	1	52.6
Turbidity, Field [NTU] Intrawell APW-10S	1	37.3
Turbidity, Field [NTU] Intrawell APW-10S	1	57.2
Turbidity, Field [NTU] Intrawell APW-10S	1	63.6
Turbidity, Field [NTU] Intrawell APW-10S	1	13.1
Turbidity, Field [NTU] Intrawell APW-10S	1	3.78
Turbidity, Field [NTU] Intrawell APW-10S	1	17.1
Turbidity, Field [NTU] Intrawell APW-10S	1	9.12
Turbidity, Field [NTU] Intrawell APW-10S	1	20.4
Iron [mg/L] Intrawell APW-10S	1	19.6
Iron [mg/L] Intrawell APW-10S	1	17.2
Manganese [mg/L] Intrawell APW-10S	1	0.243
Manganese [mg/L] Intrawell APW-10S	1	0.174
Turbidity, Field [NTU] Intrawell APW-10D	1	46.9
Turbidity, Field [NTU] Intrawell APW-10D	1	21.9
Turbidity, Field [NTU] Intrawell APW-10D	1	36.4
Turbidity, Field [NTU] Intrawell APW-10D	1	45.3
Turbidity, Field [NTU] Intrawell APW-10D	1	176

group	D	x	ols	x	ols
Turbidity, Field [NTU] Intrawell APW-10D			1		169
Turbidity, Field [NTU] Intrawell APW-10D			1		196
Turbidity, Field [NTU] Intrawell APW-10D			1		4.76
Turbidity, Field [NTU] Intrawell APW-10D			1		198
Turbidity, Field [NTU] Intrawell APW-10D			1		5.56
Turbidity, Field [NTU] Intrawell APW-10D			1		45.3
Iron [mg/L] Intrawell APW-10D			1		0.758
Iron [mg/L] Intrawell APW-10D			1		0.175
Manganese [mg/L] Intrawell APW-10D			1		1.16
Manganese [mg/L] Intrawell APW-10D			1		0.88
Turbidity, Field [NTU] Intrawell APW-08			1		119
Turbidity, Field [NTU] Intrawell APW-08			1		139
Turbidity, Field [NTU] Intrawell APW-08			1		305
Turbidity, Field [NTU] Intrawell APW-08			1		26.9
Turbidity, Field [NTU] Intrawell APW-08			1		152
Turbidity, Field [NTU] Intrawell APW-08			1		141
Turbidity, Field [NTU] Intrawell APW-08			1		169
Turbidity, Field [NTU] Intrawell APW-08			1		23.1
Turbidity, Field [NTU] Intrawell APW-08			1		136
Turbidity, Field [NTU] Intrawell APW-08			1		97.4
Turbidity, Field [NTU] Intrawell APW-08			1		47.5
Iron [mg/L] Intrawell APW-08			1		3.14
Iron [mg/L] Intrawell APW-08			1		0.44
Manganese [mg/L] Intrawell APW-08			1		0.202
Manganese [mg/L] Intrawell APW-08			1		0.0435
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		45.08940135
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		0
Turbidity, Field [NTU] Intrawell APW-03			1		4.48
Iron [mg/L] Intrawell APW-03			1		1.66
Iron [mg/L] Intrawell APW-03			1		0.367
Manganese [mg/L] Intrawell APW-03			1		0.321
Manganese [mg/L] Intrawell APW-03			1		0.435
Turbidity, Field [NTU] Intrawell APW-06S			1		30.5
Turbidity, Field [NTU] Intrawell APW-06S			1		15.1
Turbidity, Field [NTU] Intrawell APW-06S			1		5.56
Turbidity, Field [NTU] Intrawell APW-06S			1		6.67
Turbidity, Field [NTU] Intrawell APW-06S			1		9.06
Turbidity, Field [NTU] Intrawell APW-06S			1		8.99
Turbidity, Field [NTU] Intrawell APW-06S			1		1.26
Turbidity, Field [NTU] Intrawell APW-06S			1		3.32
Turbidity, Field [NTU] Intrawell APW-06S			1		3.81
Turbidity, Field [NTU] Intrawell APW-06S			1		5.09
Turbidity, Field [NTU] Intrawell APW-06S			1		5.72
Iron [mg/L] Intrawell APW-06S			1		9.35
Iron [mg/L] Intrawell APW-06S			1		9.18
Manganese [mg/L] Intrawell APW-06S			1		0.53
Manganese [mg/L] Intrawell APW-06S			1		0.512
Turbidity, Field [NTU] Intrawell APW-02			1		353.9365669
Turbidity, Field [NTU] Intrawell APW-02			1		301.7629859
Turbidity, Field [NTU] Intrawell APW-02			1		386.3808508
Turbidity, Field [NTU] Intrawell APW-02			1		324.2485265
Turbidity, Field [NTU] Intrawell APW-02			1		280.8091618
Turbidity, Field [NTU] Intrawell APW-02			1		241.9896686
Turbidity, Field [NTU] Intrawell APW-02			1		288.4032565
Turbidity, Field [NTU] Intrawell APW-02			1		207.4581011
Turbidity, Field [NTU] Intrawell APW-02			1		128.0265337
Turbidity, Field [NTU] Intrawell APW-02			1		188.8327027
Turbidity, Field [NTU] Intrawell APW-02			1		663
Iron [mg/L] Intrawell APW-02			1		11.7
Iron [mg/L] Intrawell APW-02			1		7.63
Manganese [mg/L] Intrawell APW-02			1		0.752

group	D	x	ols	x	ols
Manganese [mg/L] Intrawell APW-02			1		0.669
Turbidity, Field [NTU] Intrawell APW-05/05R			1		51.8
Turbidity, Field [NTU] Intrawell APW-05/05R			1		9.19
Turbidity, Field [NTU] Intrawell APW-05/05R			1		4.65
Turbidity, Field [NTU] Intrawell APW-05/05R			1		8.21
Turbidity, Field [NTU] Intrawell APW-05/05R			1		42.6
Turbidity, Field [NTU] Intrawell APW-05/05R			1		33.7
Turbidity, Field [NTU] Intrawell APW-05/05R			1		76.1
Turbidity, Field [NTU] Intrawell APW-05/05R			1		38.9
Turbidity, Field [NTU] Intrawell APW-05/05R			1		8.02
Turbidity, Field [NTU] Intrawell APW-05/05R			1		64.1
Turbidity, Field [NTU] Intrawell APW-05/05R			1		23.4
Iron [mg/L] Intrawell APW-05/05R			1		2.77
Iron [mg/L] Intrawell APW-05/05R			1		5.89
Manganese [mg/L] Intrawell APW-05/05R			1		0.9
Manganese [mg/L] Intrawell APW-05/05R			1		0.554
Turbidity, Field [NTU] Intrawell APW-07			1		13.81228283
Turbidity, Field [NTU] Intrawell APW-07			1		0
Turbidity, Field [NTU] Intrawell APW-07			1		0
Turbidity, Field [NTU] Intrawell APW-07			1		40.81509586
Turbidity, Field [NTU] Intrawell APW-07			1		0
Turbidity, Field [NTU] Intrawell APW-07			1		18.76357228
Turbidity, Field [NTU] Intrawell APW-07			1		1.162681542
Turbidity, Field [NTU] Intrawell APW-07			1		0
Turbidity, Field [NTU] Intrawell APW-07			1		0
Turbidity, Field [NTU] Intrawell APW-07			1		2.690534442
Turbidity, Field [NTU] Intrawell APW-07			1		6.88
Iron [mg/L] Intrawell APW-07			1		17.3
Iron [mg/L] Intrawell APW-07			1		18.9
Manganese [mg/L] Intrawell APW-07			1		1.11
Manganese [mg/L] Intrawell APW-07			1		1.19
Turbidity, Field [NTU] Intrawell APW-06D			1		18.5
Turbidity, Field [NTU] Intrawell APW-06D			1		74.4
Turbidity, Field [NTU] Intrawell APW-06D			1		26.9
Turbidity, Field [NTU] Intrawell APW-06D			1		181
Turbidity, Field [NTU] Intrawell APW-06D			1		65.5
Turbidity, Field [NTU] Intrawell APW-06D			1		3.02
Turbidity, Field [NTU] Intrawell APW-06D			1		18.2
Turbidity, Field [NTU] Intrawell APW-06D			1		35.8
Turbidity, Field [NTU] Intrawell APW-06D			1		21.8
Turbidity, Field [NTU] Intrawell APW-06D			1		8.39
Iron [mg/L] Intrawell APW-06D			1		3.65
Manganese [mg/L] Intrawell APW-06D			1		0.622



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Germany	Singapore
Ghana	South Africa
Guyana	South Korea
Hong Kong	Spain
India	Switzerland
Indonesia	Taiwan
Ireland	Tanzania
Italy	Thailand
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2024 Grand Tower Energy Center Annual Inspection Report

PREPARED FOR
Grand Tower Energy Center, LLC

DATE
January 2025

REFERENCE
0761817



2024 Grand Tower Energy Center Annual Inspection Report

0761817



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1. INTRODUCTION

Environmental Resources Management (ERM) Inc. is submitting the 2024 Annual Inspection Report in accordance with 35 Illinois Administrative Code (IAC) §845.550(a)(2) for the Grand Tower Energy Center (GTEC) facility located at 1820 Power Plant Rd, Grand Tower, Illinois (the "Site"). This report summarizes the results and findings of the GTEC quarterly post-closure coal combustion residuals (CCR) impoundment inspection events during 2024 and remote satellite observations conducted during July, August and November of 2024. Copies of each CCR Impoundment inspection event, each of which contains an inspection form, a figure markup, and a photolog, for all four quarters of 2024, are attached as Appendix A, and satellite imagery and imagery reviews are attached as Appendix B.

2. BACKGROUND

GTEC historically operated as a merchant facility which sold energy into the Midcontinent Independent System Operator (MISO) distribution system and has been idled since late 2020. The immediate project site, south of the idled power generation facility, consists of an approximately 21-acre area consisting of an impoundment and associated drainage basin. The GTEC CCR Impoundment was capped and closed in 2020 and is subject to USEPA 40 CFR 257 and IEPA 35 IAC 845, as applicable. Approximately 235,000 cubic yards of CCR materials are present in the closed impoundment. These materials have been excavated, consolidated, and covered by a 40-mil linear low-density polyethylene (LLDPE) liner, cover soil, and geotextile liner which covers a 14-acre footprint within the Site.

3. KEY ACTIONS COMPLETED DURING 2024

3.1 QUARTERLY IMPOUNDMENT INSPECTIONS

3.1.1 FIRST QUARTER 2024 INSPECTION SUMMARY

Repairs to the USACE and GTEC levees completed in September 2021 continue to hold, and successful revegetation of levee face was reportedly progressing. Live woody vegetation growth was noted to be limited in the riprap at the toe of the capped impoundment slope and was last treated with herbicide during the Q3 2023 event. During the Q1 2024 event, erosion noted above the riprap has increased from 10-inches to 13-inches in the deepest locations as compared to prior inspections dating back to 2022. ERM will continue to monitor and address woody vegetation and erosion on the impoundment cap. Ponding was noted in the southwest corner of the basin near the outfall. No significant degradation or issues were noted associated with the overall CCR impoundment cover system.

3.1.2 SECOND QUARTER 2024 INSPECTION SUMMARY

Repairs to the USACE and GTEC levees completed in September 2021 continue to hold, and successful revegetation of levee face was reportedly progressing. Live woody vegetation growth was noted to be limited in the impoundment riprap at the toe of the capped impoundment slope and was last treated with herbicide during the Q3 2023 event. During the Q2 2024 event, erosion



noted above the riprap has remained consistent at 13-inches in the deepest locations. Ponding was noted in the southwest corner of the basin near the outfall. ERM will continue to monitor the woody vegetation and erosion on the impoundment cap. No other significant degradation or issues were noted associated with the overall closed CCR impoundment cover system. The impoundment cap was mowed during Q2 2024 and was found to be in generally good condition. The Inspector recommended continued treatment of woody growth within the riprap with herbicide, and the filling of the noted erosional channels.

3.1.3 THIRD QUARTER 2024 INSPECTION SUMMARY

Repairs to the USACE and GTEC levees completed in September 2021 continue to hold, and successful revegetation of levee face was reportedly progressing. Live woody vegetation growth was noted to be limited in the impoundment riprap at the toe of the capped impoundment slope and was treated with herbicide during the Q3 2023 event. Erosion noted above the riprap ranges from 10-inches to 13-inches in the deepest locations. Ponding was noted in the southwest corner of the basin near the outfall. ERM will continue to monitor the woody vegetation and erosion on the impoundment cap. The erosional features noted on the cap will be addressed prior to the next sampling event. No other significant degradation or issues were noted associated with the overall closed CCR impoundment cover system.

3.1.4 FOURTH QUARTER 2024 INSPECTION SUMMARY

Repairs to the USACE and GTEC levees completed in September 2021 continue to hold, and successful revegetation of levee face was reportedly progressing. Erosion was noted above the riprap on the north, west, and southern CCR impoundment cap. The largest of the erosional features, on the northern impoundment cap face, was repaired during the Q4 2024 sampling event. The remaining erosional channels on the west, south, and east faces are all less than 6" deep in the deepest locations and will continue to be monitored. The woody vegetation was noted to be within the riprap at the toe of the capped impoundment slope on the north, west, and southern impoundment cap faces despite being treated with herbicide in Q3 2023. Ponding was noted in the southwest corner of the basin near the outfall. The impoundment cap was mowed during Q4 2024 and was found to be in generally good condition. The Inspector recommended continued treatment of woody growth within the riprap with herbicide, and the filling of the noted erosional channels.

3.2 REMOTE SATELLITE INSPECTIONS

Beginning in July 2024, due to a reduction in on-site presence of GTEC staff, ERM was tasked with collecting remote satellite images of the Site and conducting a comparison to previous satellite imagery of the Site to observe whether there appears to be damage to the impoundment cap or the levee system, and to make any other general observations about conditions at the Site. Remote satellite inspections were conducted for July, August and November 2024.

Remote satellite inspections did not reveal indications of damage to the impoundment cap or the levees. The July satellite imagery determined that the retention basin around the south and west sides of the capped impoundment had been inundated with water from the Mississippi river, but the flooding did not exceed the top of the rip rap located on the toe of the slope of the capped



impoundment. August satellite imagery showed that the retention basin was no longer inundated. November satellite imagery appears to indicate that the retention basin is not inundated, and there does not appear to be any damage to the impoundment cap or the associated levees.

3.3 ANNUAL STRUCTURAL STABILITY ASSESSMENT

In accordance with 35 Illinois Administrative Code (IAC) §845.540 ERM conducted a structural stability assessment of the closed CCR impoundment to ensure that the design, construction, operation, and maintenance of the CCR surface impoundment is consistent with recognized and generally accepted engineering standards. A summary of the assessment is provided in Appendix C. Based on the annual assessment, the design, construction, operation, and maintenance of the CCR Unit is consistent with recognized and generally accepted good engineering standards.

4. SUMMARY

During 2024, ERM conducted visual inspections, remote satellite inspections and a structural stability assessment of the capped GTEC CCR impoundment and surrounding levees. Inspections revealed no indication of damage to the levees or the impoundment cap that would jeopardize its integrity, and the findings of the structural stability assessment indicate that the design, construction, operation, and maintenance of the CCR Unit is consistent with recognized and generally accepted good engineering standards. ERM will continue to conduct visual inspections of the CCR impoundment and surrounding levees on a quarterly basis, and remote satellite inspections during the months that on-site inspections are not conducted.





APPENDIX A 2024 QUARTERLY CCR IMPOUNDMENT
INSPECTION REPORTS



**Grand Tower Energy Center
Closed CCR Impoundment
Quarterly Inspection Form**

Date: 1/11/2024
Time: 7:45-8:20
Name: Marshall Arendell
(Inspector)

Weather:

Temperature:

45 deg. F

- Sunny
- Cloudy
- Raining
- Other

Observations:

- Erosion / Gullies
- Cracking / Sloughing
- Ponding / Damp Areas
- No Problems Identified
- Woody Vegetation Growth
- Other

Conditions Limiting Visibility:

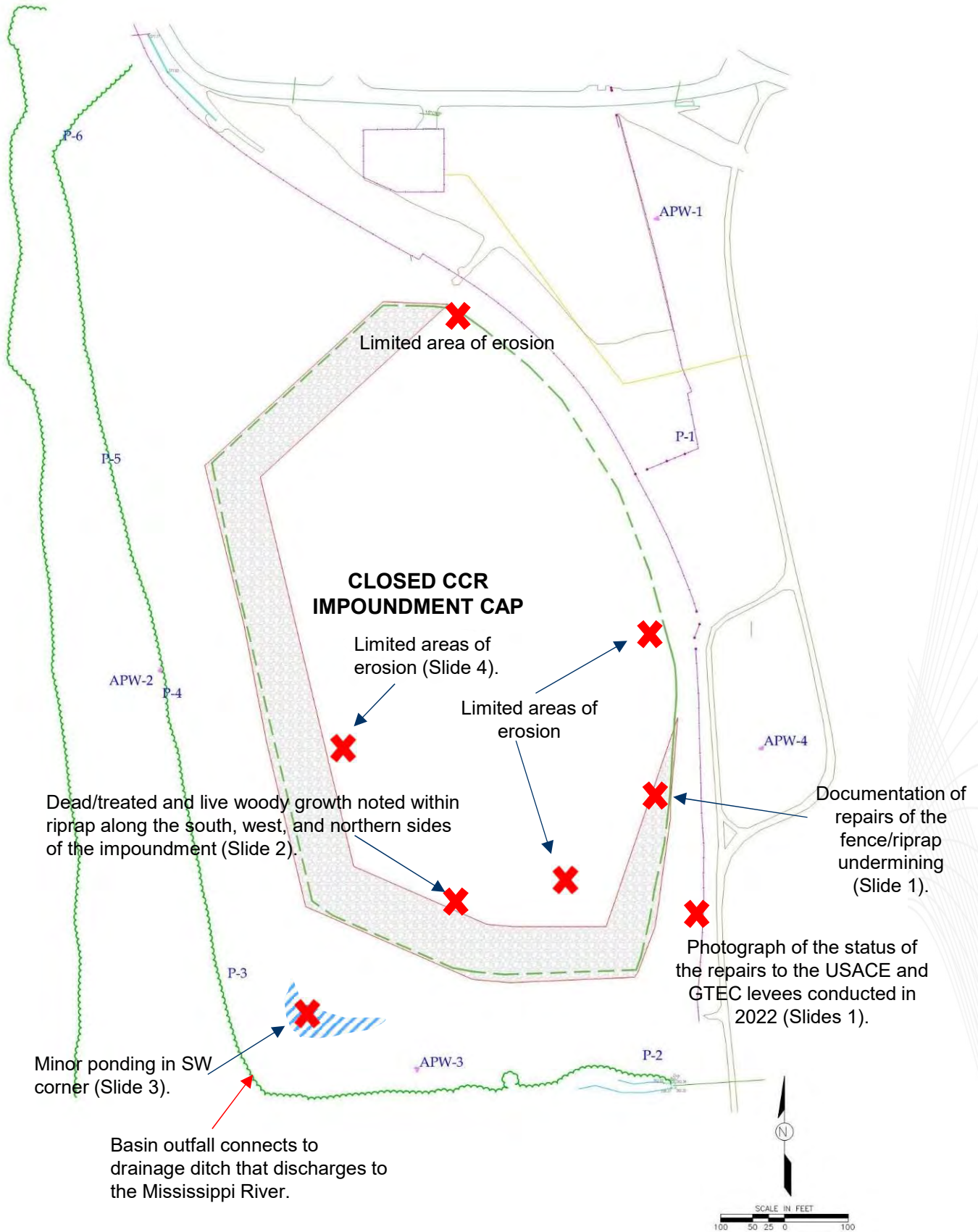
- Snow Cover
- Vegetation
- None
- Other

Observations in Detail Below:

- ERM onsite for the Q1 2024 inspection of the CCR impoundment and groundwater sampling event.
- Repairs to the United States Army Corps of Engineers (USACE) and GTEC levees continue to hold, and successful revegetation of levee face continues to progress.
- Erosion noted across north, west, and southern CCR impoundment cap faces up to 10" deep.
- The woody vegetation (up to 1" diameter) noted to be within the riprap on the north, west, and southern impoundment cap faces during 2022 was treated with herbicide during Q3 2023.
- Ponding continues to be noted in the SW corner of the basin near the outfall.
- The impoundment cap was mowed during Q3 2023 and found to be in generally good condition.
- The inspector recommends continued treatment of woody growth within the riprap with herbicide, and the filling of the erosional channels noted above.

Please see observation locations on figure on the following page.

Observation Locations Map



Grand Tower Energy Center Q1 2024 Closed CCR Impoundment Cap Inspection

Repairs to the Fenceline and Levee area on the SE Side of Closed CCR Impoundment Cap



January 11th, 2024, at 8:17:53 AM

Facing north along the repaired fence-line, riprap, and levee area.



January 11th, 2024, at 3:00:20 PM

Facing northeast along the repaired fence-line, riprap, and levee area.

Levee has successfully revegetated since repairs were initiated during 2022.

Woody Growth Observations

Dead/herbicide treated woody vegetation noted within riprap up to 1" diameter. Limited amount of live woody growth remains.



January 9th, 2024, at 12:47:21 PM

Sparse woody vegetation on riprap facing south and west.

Picturing facing northeast towards south facing riprap.



January 11th, 2024, at 7:59:17 AM

Woody vegetation on southeast facing riprap. Picture facing south from impoundment cap.

Ponding in the SW Corner of Site Basin Near the Outfall



Ponded area in southwest corner of site as viewed from mowed impoundment cap.



Ponded area in southwest corner of site and impoundment cap as viewed from southwest corner.

Note: Mississippi River backwater enters the GTEC CCR Impoundment Basin when the river level gage operated by the U.S. Army Corps of Engineers at Grand Tower, IL reaches a stage of approximately 27 ft.

Erosional Channel Observations



Erosion from western side of impoundment cap.



Grand Tower Energy Center
Closed CCR Impoundment
Quarterly Inspection Form

Date: 4/30/2024
Time: 10:45 - 11:45
Name: Marshall Arendell
(Inspector)

Weather:

Temperature:

70 deg. F

- Sunny
- Cloudy
- Raining
- Other

Observations:

- Erosion / Gullies
- Cracking / Sloughing
- Ponding / Damp Areas
- No Problems Identified
- Woody Vegetation Growth
- Other

Conditions Limiting Visibility:

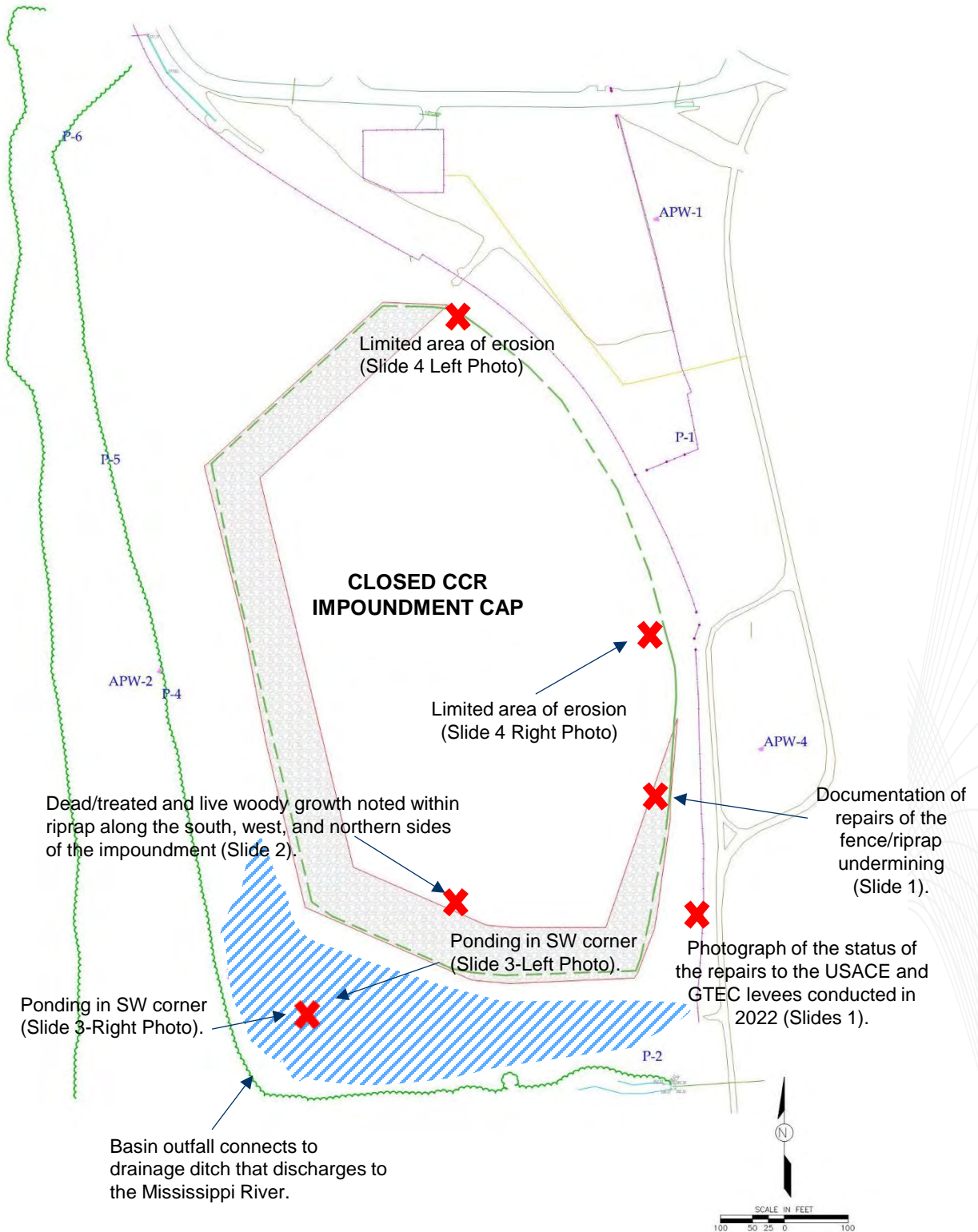
- Snow Cover
- Vegetation
- None
- Other

Observations in Detail Below:

- ERM onsite for the Q2 2024 inspection of the closed CCR impoundment and groundwater sampling event.
- Repairs to the United States Army Corps of Engineers (USACE) and GTEC levees continue to hold, and successful revegetation of levee face continues to progress.
- Erosion channels noted across north, west, and southern closed CCR impoundment cap faces up to 13" deep.
- Ponding continues to be noted in the SW corner of the basin near the outfall.
- The impoundment cap was mowed during Q2 2024 and found to be in generally good condition.
- The inspector recommends continued treatment of woody growth within the riprap with herbicide, and the filling of the erosional channels noted above.

Please see observation locations on figure on the following page.

Observation Locations Map



Grand Tower Energy Center Q2 2024 Closed CCR Impoundment Cap Inspection

Repairs to the Fenceline and Levee area on the SE Side of Closed CCR Impoundment Cap



Facing north along the repaired fence-line, riprap, and levee area.



Facing northeast along the repaired fence-line, riprap, and levee area.

Levee has successfully revegetated since repairs were initiated during 2022.

Woody Growth Observations

Dead/herbicide treated woody vegetation noted within riprap up to 1" diameter. Limited amount of live woody growth remains.



Sparse woody vegetation on riprap facing south and west.

Picture facing southeast from impoundment cap.



Woody vegetation on southeast facing riprap. Picture facing south from impoundment cap.

Ponding in the SW Corner of Site Basin Near the Outfall



Ponded area in southwest corner of site as viewed from mowed impoundment cap.



Ponded area in southwest corner of site and impoundment cap as viewed from southwest corner.

Note: Mississippi River backwater enters the GTEC CCR Impoundment Basin when the river level gage operated by the U.S. Army Corps of Engineers at Grand Tower, IL reaches a stage of approximately 27 ft.

Erosional Channel Observations



Two erosional features located on the eastern side of impoundment cap.
Left photo facing west.
Right photo facing east.



Grand Tower Energy Center
Closed CCR Impoundment
Quarterly Inspection Form

Date: 9/6/2024
Time: 7:40 – 8:10
Name: Marshall Arendell
(Inspector)

Weather:

Temperature:

80 deg. F

Sunny

Cloudy

Raining

Other

Observations:

Erosion / Gullies

Cracking / Sloughing

Ponding / Damp Areas

No Problems Identified

Woody Vegetation Growth

Other

Conditions Limiting Visibility:

Snow Cover

Vegetation

None

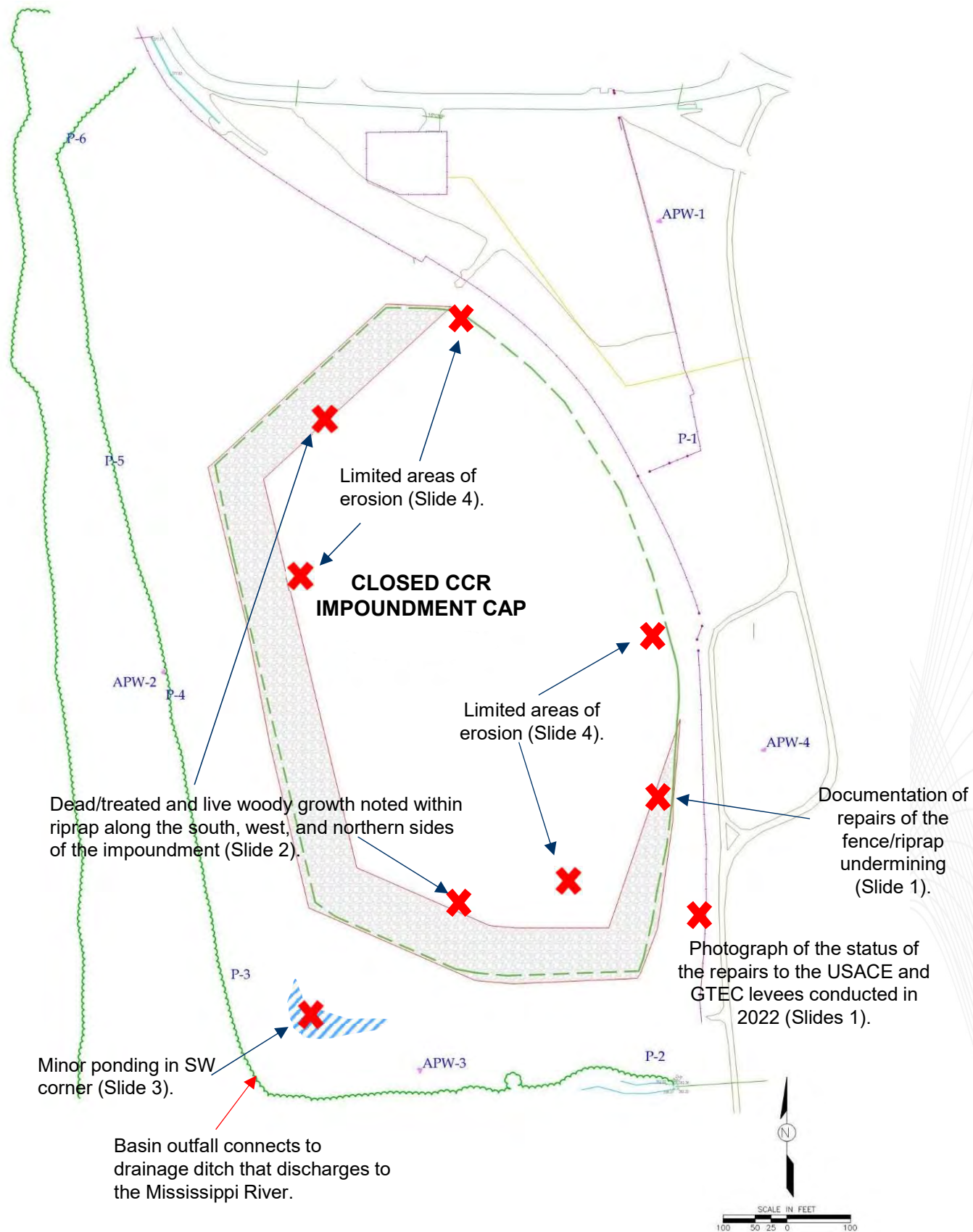
Other

Observations in Detail Below:

- ERM onsite for the Q3 2024 inspection of the closed CCR impoundment and groundwater sampling event.
- Repairs to the United States Army Corps of Engineers (USACE) and GTEC levees continue to hold, and successful revegetation of levee face continues to progress.
- Erosion channels noted across north, west, east, and southern closed CCR impoundment cap faces up to 13" deep.
- Ponding continues to be noted in the SW corner of the basin near the outfall.
- The impoundment cap was mowed during Q3 2024 and found to be in generally good condition.
- The inspector recommends continued treatment of woody growth within the riprap with herbicide, and the filling of the erosional channels noted above.

Please see observation locations on figure on the following page.

Observation Locations Map



Grand Tower Energy Center Q3 2024 Closed CCR Impoundment Cap Inspection

Repairs to the Fenceline and Levee area on the SE Side of Closed CCR Impoundment Cap



September 6th, 2024, at 08:06:32 AM



September 6th, 2024, at 08:06:36 AM

Levee has successfully revegetated since repairs were initiated during 2022.

Facing west along the repaired fence-line, riprap, and levee area.

Facing south along the repaired fence-line, riprap, and levee area.

Woody Growth Observations

Dead/herbicide treated woody vegetation noted within riprap up to 1" diameter. Limited amount of live woody growth remains.



September 6th, 2024, at 07:52:42 AM

Sparse woody vegetation on riprap facing north.

Picture facing south towards impoundment cap.



September 6th, 2024, at 07:44:04 AM

Woody vegetation on south facing riprap.
Picture facing south from impoundment cap.

Ponding in the SW Corner of Site Basin Near the Outfall



Ponded area in southwest corner of site as viewed from mowed impoundment cap.

Note: Mississippi River backwater enters the GTEC CCR Impoundment Basin when the river level gage operated by the U.S. Army Corps of Engineers at Grand Tower, IL reaches a stage of approximately 27 ft.

Erosional Channel Observations

Erosion channel on north side of impoundment cap.



Erosion channel on west side of impoundment cap.

Erosion channel on south side of impoundment cap.



Erosion channel on east side of impoundment cap.



**Grand Tower Energy Center
Closed CCR Impoundment
Quarterly Inspection Form**

Date: 10/16/2024
Time: 13:10 – 13:40
Name: Marshall Arendell
(Inspector)

Weather:

Temperature:

60 deg. F

Sunny

Cloudy

Raining

Other

Observations:

Erosion / Gullies

Cracking / Sloughing

Ponding / Damp Areas

No Problems Identified

Woody Vegetation Growth

Other

Conditions Limiting Visibility:

Snow Cover

Vegetation

None

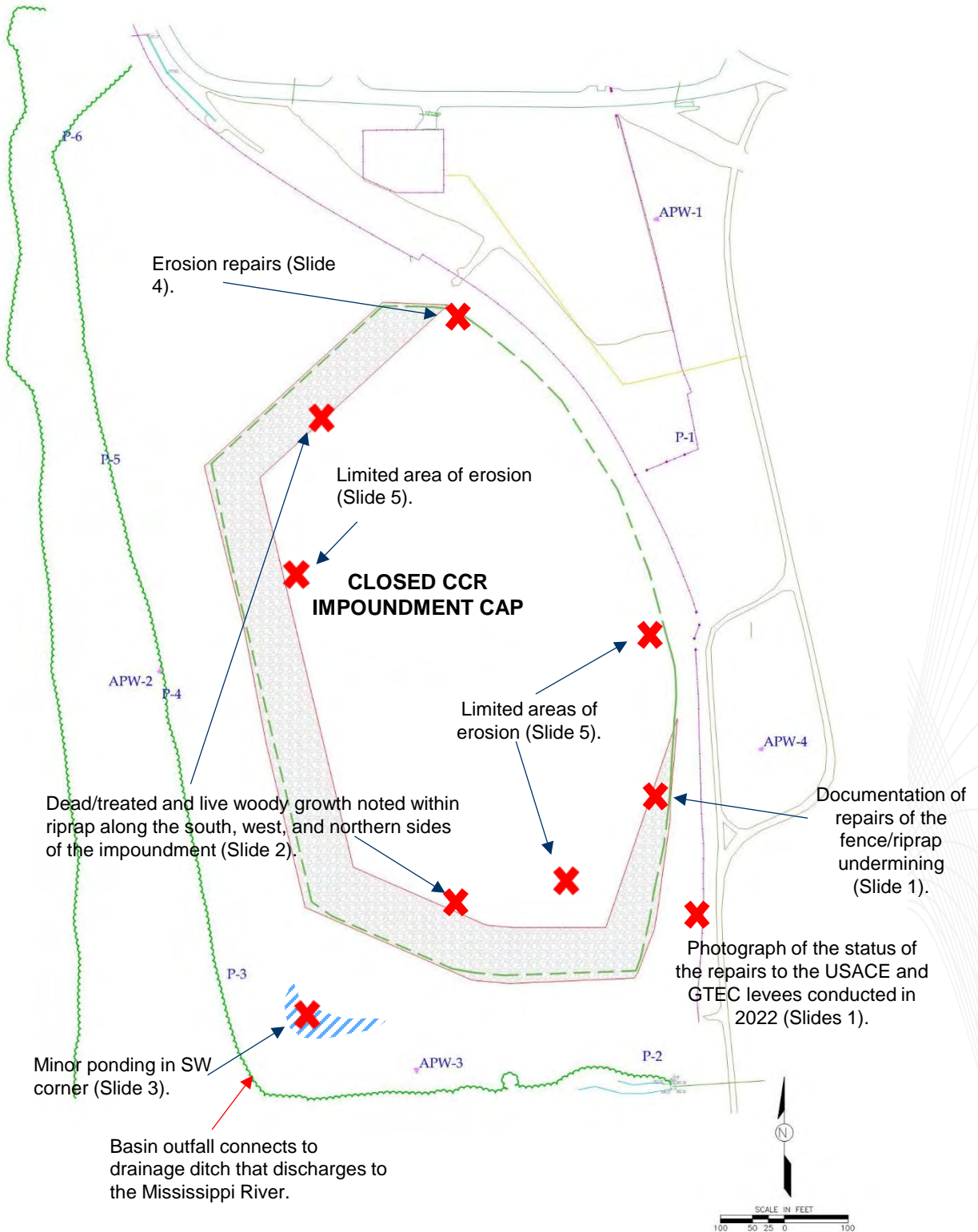
Other

Observations in Detail Below:

- ERM onsite for the Q4 2024 inspection of the closed CCR impoundment and groundwater sampling event.
- Repairs to the United States Army Corps of Engineers (USACE) and GTEC levees continue to hold, and successful revegetation of levee face continues to progress.
- Erosion channels noted across west, east, and southern closed CCR impoundment cap faces up to 6" deep.
- Ponding continues to be noted in the SW corner of the basin near the outfall.
- The impoundment cap was mowed during Q4 2024 and found to be in generally good condition.
- The inspector recommends continued treatment of woody growth within the riprap with herbicide, and the monitoring of additional minor erosional channels listed below.

Please see observation locations on figure on the following page.

Observation Locations Map



Grand Tower Energy Center Q4 2024 Closed CCR Impoundment Cap Inspection

Repairs to the Fenceline and Levee area on the SE Side of Closed CCR Impoundment Cap



October 16th, 2024, at 10:19:54 AM

Facing west along the repaired fence-line, riprap, and levee area.



October 16th, 2024, at 10:20:49 AM

Facing north along the repaired fence-line, riprap, and levee area.

Levee has successfully revegetated since repairs were initiated during 2022.

Woody Growth Observations

Dead/herbicide treated woody vegetation noted within riprap up to 1" diameter. Limited amount of live woody growth remains.



Sparse woody vegetation on southern riprap

Picture facing north towards impoundment cap.



Woody vegetation on south facing riprap. Picture facing south from atop impoundment cap.

Ponding in the SW Corner of Site Basin Near the Outfall

October 16th, 2024, at 01:21:26 PM



Ponded area in southwest corner of site as viewed from mowed impoundment cap.

October 16th, 2024, at 10:40:00 AM



Ponded area in southwest corner of site as viewed from southwest corner.

Note: Mississippi River backwater enters the GTEC CCR Impoundment Basin when the river level gage operated by the U.S. Army Corps of Engineers at Grand Tower, IL reaches a stage of approximately 27 ft.

Erosion Repairs

October 16th, 2024, at 1:10:44 AM



Erosion repairs made near the northeastern section of the impoundment cap. Photo taken from northeastern section of impoundment cap, facing south.

Erosion repairs made near the northeastern section of the impoundment cap. Photo taken from northeastern section of impoundment cap, facing west.

October 16th, 2024, at 1:10:59 AM



Minor Erosional Channels

October 16th, 2024, at 1:26:02 PM



Erosion on the south side of impoundment cap. Photo taken facing north towards the impoundment cap.

Erosion on the west side of impoundment cap. Photo taken facing west from the top of the impoundment cap.

October 16th, 2024, at 1:17:02 PM



October 16th, 2024, at 1:35:26 PM

Erosion on the east side of impoundment cap. Photo taken facing west from the bottom of the impoundment cap.



APPENDIX B JULY, AUGUST AND NOVEMBER REMOTE
SATELLITE INSPECTIONS



ERM

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MEMO

TO	John Brodhead, Plant Manager, Grand Tower Energy Center
FROM	Randy Homburg, Managing Consultant, ERM
DATE	31 July 2024
REFERENCE	0742590
SUBJECT	GTEC Remote Satellite Observation – July 2024

ERM was tasked with assessing potential damage to the Grand Tower Energy Center (GTEC) coal combustion residual (CCR) impoundment facility (the Site) and the surrounding infrastructure. The primary concern for this assessment is the levee that runs parallel to the river and the stability of the impoundment cap.

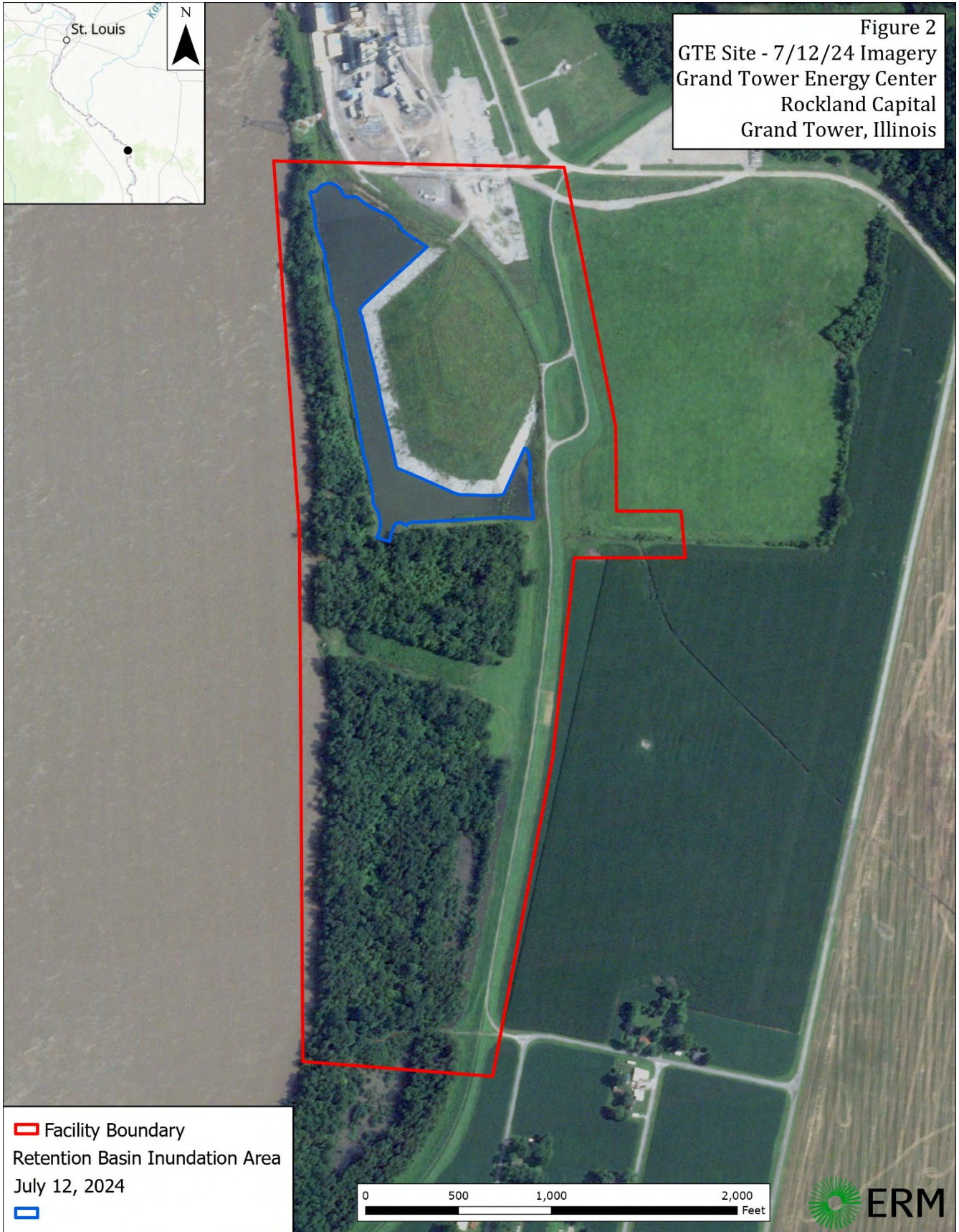
To assess if there was any damage to the CCR impoundment, ERM compared satellite images of the site from June 2023 to satellite images of the site collected in July 2024. The attached Figure 1 represents 50cm satellite imagery from Planet Labs of the Site in June 2023 and Figure 2 represents 50cm satellite imagery from Planet Labs of the Site in July 2024. The assessment of the satellite imagery determined that the retention basin had been inundated, but that the flooding had not exceeded the top of the rip rap slope base. This is due to a flooding event along the Mississippi River in Grand Tower, Illinois through late June and early July 2024. Per the July 12, 2024 imagery, the retention basin inundation area occupied 3.18 hectares. The imagery displayed no evidence of sustained damage to either levee or the impoundment cap.

ERM will conduct a remote satellite inspection of the Site in August 2024, and a visual inspection of the site during the Third Quarter 2024 sampling event.



Figure 1
GTE Site - 6/9/23 Imagery
Grand Tower Energy Center
Rockland Capital
Grand Tower, Illinois







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MEMO

TO	John Brodhead, Plant Manager, Grand Tower Energy Center
FROM	Randy Homburg, Managing Consultant, ERM
DATE	31 August 2024
REFERENCE	0742590
SUBJECT	GTEC Remote Satellite Observation – August 2024

ERM was tasked with assessing potential damage to the Grand Tower Energy Center (GTEC) coal combustion residual (CCR) impoundment facility (the Site) and the surrounding infrastructure. The primary concern for this assessment is the levee that runs parallel to the river and the stability of the impoundment cap.

To assess if there was any damage to the CCR impoundment, ERM compared satellite images of the site from August 2024 to satellite images of the site collected in July 2024. The attached Figure 1 represents 50cm satellite imagery from Planet Labs of the Site in July 2024 and Figure 2 represents 50cm satellite imagery from Planet Labs of the Site in August 2024. Assessment of the satellite images determined that the retention basin, which had previously been inundated, shows no indication of inundation or ponding. The rip rap slope base does not appear to have indications of damage, and there does not appear to be evidence of sustained damage to either levee or the impoundment cap.

ERM will conduct a visual inspection of the site during the Third Quarter 2024 sampling event, currently scheduled for September 2024.







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MEMO

TO	John Brodhead, Plant Manager, Grand Tower Energy Center
FROM	Randy Homburg, Managing Consultant, ERM
DATE	30 November 2024
REFERENCE	0742590
SUBJECT	GTEC Remote Satellite Observation – November 2024

ERM was tasked with assessing potential damage to the Grand Tower Energy Center (GTEC) coal combustion residual (CCR) impoundment facility (the Site) and the surrounding infrastructure. The primary concern for this assessment is the levee that runs parallel to the river and the stability of the impoundment cap.



To assess if there was any damage to the CCR impoundment, ERM compared satellite images of the site from November 2024 to satellite images of the site collected in August 2024. The attached Figure 1 represents 50cm satellite imagery from Planet Labs of the Site in August 2024 and Figure 2 represents 50cm satellite imagery from Planet Labs of the Site in November 2024. Assessment of the satellite images determined that there appears to be a small amount of ponding in the southwest corner of the retention basin. The rip rap slope base does not appear to have indications of damage, and there does not appear to be evidence of sustained damage to either levee or the impoundment cap.

ERM will conduct a remote satellite inspection of the Site in December 2024, and a visual inspection of the site during the First Quarter 2025 sampling event.



Figure 2

GTEC Site – November Imagery
Grand Tower Energy Center
Grand Tower, Illinois

 Facility Boundary
Retention Basin Inundation Area
July 12, 2024


0 500 1,000 2,000
Feet



APPENDIX C ANNUAL STRUCTURAL STABILITY
ASSESSMENT

ANNUAL INSPECTION BY A QUALIFIED PROFESSIONAL ENGINEER

35 IAC § 845.540

(b)(1) The CCR surface impoundment must be inspected on an annual basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR surface impoundment is consistent with recognized and generally accepted engineering standards. The inspection must, at a minimum, include:

- A) A review of available information regarding the status and condition of the CCR surface impoundment, including files available in the operating record (e.g., CCR surface impoundment design and construction information required by Sections 845.220(a)(1) and 845.230(d)(2)(A), previous structural stability assessments required under Section 845.450, the results of inspections by a qualified person, and results of previous annual inspections);
- B) A visual inspection of the CCR surface impoundment to identify signs of distress or malfunction of the CCR surface impoundment and appurtenant structures;
- C) A visual inspection of any hydraulic structures underlying the base of the CCR surface impoundment or passing through the dike of the CCR surface impoundment for structural integrity and continued safe and reliable operation;
- D) The annual hazard potential classification certification, if applicable (see Section 845.440);
- E) The annual structural stability assessment certification, if applicable (see Section 845.450);
- F) The annual safety factor assessment certification, if applicable (see Section 845.460); and
- G) The inflow design flood control system plan certification (see Section 845.510(c)).

SITE INFORMATION

Site Name / Address / Date of Inspection	Grand Tower Energy Center Grand Tower, Jackson County, IL, 62942 10/15/2024
Operator Name / Address	Grand Tower Energy Center LLC 1820 Power Plant Rd, Grand Tower, IL, 62942
CCR unit	Grand Tower CCR Inactive Ash Basin

INSPECTION REPORT 35 IAC § 845.540

(b)(1)(D) The annual hazard potential classification certification, if applicable (see Section 845.440).	Based on a review of the closed and capped CCR impoundment's annual hazard potential classification, it would be classified as a Class II CCR surface impoundment.
(b)(2)(A) Any changes in geometry of the structure since the previous annual inspection.	Based on a review of the CCR unit's quarterly groundwater monitoring and visual observation during the on-site inspection, no other changes which may have affected the stability or operation of the CCR unit have taken place since the previous annual inspection.
(b)(2)(B) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection	Not Applicable: No instrumentation present; the CCR impoundment was capped and closed in 2020 and is no longer in operation.
b)(2)(C) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;	Not Applicable: The CCR impoundment was capped and closed in 2020 and is no longer in operation, no surface water is present.
b)(2)(D) The storage capacity of the impounding structure at the time of the inspection	Approximately 235,000 cubic yards, which has not changed since the CCR impoundment was capped and closed in 2020.
(b)(2)(E) The approximate volume of the impounded water and CCR contained in the unit at the time of the inspection.	Not Applicable: No impounded water, the CCR impoundment was capped and closed in 2020 and is no longer in operation.
(b)(2)(F) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit	Based on a review of the CCR unit's quarterly groundwater monitoring and visual observation during the on-site inspection, there was no appearance of an actual or potential structural weakness of the CCR unit, nor an existing condition that is disrupting or would disrupt the operation and safety of the unit.

(b)(2)(G) Any other changes that may have affected the stability or operation of the impounding structure since the previous annual inspection.

Based on a review of the CCR unit's quarterly groundwater monitoring and visual observation during the on-site inspection, no other changes which may have affected the stability or operation of the CCR unit have taken place since the previous annual inspection.

(b)(1)(G) The inflow design flood control system plan certification (see Section 845.510(c))

This CCR impoundment was capped and closed in 2020 and is no longer in operation. The cap enclosure was designed adequately to protect the closed and capped impoundment by providing two design elements that were implemented during construction. First, large Class 2 riprap was placed on the 4:1 side slopes of the closed surface impoundment up to the 100-year flood elevation. Under the riprap, a separator fabric was placed over the 3 feet of soil cover. Second, below the final 3 feet of soil cover is a geomembrane composite and a 40-mil textured HDPE liner to prevent river water or stormwater from interacting with CCR material and causing erosion into the Mississippi River or the land surrounding the closed CCR impoundment. The specific details of the design can be found in the certification report dated October 29, 2021.

35 IAC § 845.540 - Annual inspection by a qualified professional engineer.

I, Alan Joseph Cork, certify under penalty of law that the information submitted in this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Illinois. The information submitted, is to the best of my knowledge and belief, true, accurate and complete. Based on the annual inspection, the design, construction, operation, and maintenance of the CCR Unit is consistent with recognized and generally accepted good engineering standards. Based on a review of the records for the CCR unit and a visual inspection of the unit to document no material changes to the unit, the hazard potential classification was conducted in accordance with the requirements of Section 845.440, the structural stability assessment was conducted in accordance with the requirements of Section 845.450, the safety factor assessment was conducted in accordance with the requirements of Section 845.460, and the inflow design flood control system plan assessment was conducted in accordance with the requirements of Section 845.510.



Alan Joseph Cork, PE
 Illinois PE No. 062-053938
 Expires: 11/30/2025
 Date: 01/30/25



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