Twin Oaks Power Station – Coal Combustion Residuals Landfill

2023 Annual Groundwater Monitoring and Corrective Action Report

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2023 Annual Groundwater Monitoring and Corrective Action Report

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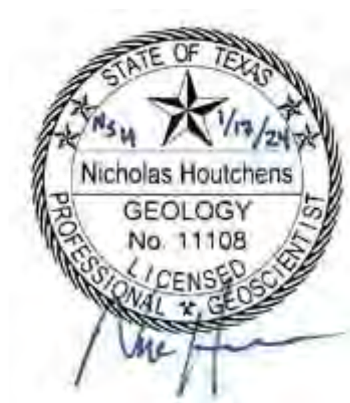

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ACRONYMS AND ABREVIATIONS

ASD	Alternate Source Demonstration
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
ERM	Environmental Resources Management Southwest, Inc.
GWPS	Groundwater Protection Standards
GWSAP	Groundwater Sampling and Analysis Plan
H1	First half of year
H2	Second half of year
Hydrex Environmental	Hydrex Environmental Consulting LLC
MCL	Maximum contaminant levels
SSI	Statistically Significant Increase
TAC	Texas Administrative Code
Twin Oaks	Twin Oaks Power Station
UTL	Upper tolerance limit

EXECUTIVE SUMMARY

On Behalf of Major Oak Power, LLC, Environmental Resources Management Southwest, Inc. (ERM) has prepared this 2023 Annual Groundwater Monitoring and Corrective Action Report summarizing groundwater monitoring activities at the Twin Oaks Power Station (Twin Oaks or Site) Coal Combustion Residuals (CCR) Landfill located in Robertson County, Texas. The CCR Landfill at the Site is subject to regulation under Title 40, Code of Federal Regulations (CFR), Part 257, Subpart D (40 CFR § 257 *et seq.*), also known as the Federal CCR Rule, and Title 30, Texas Administrative Code (TAC), Chapter 352 (30 TAC § 352 *et seq*.), also known as the Texas CCR Rule (collectively referred to as the CCR Rules). This report documents the status of the groundwater monitoring program for the CCR landfill, which includes the following as required by 40 CFR § 257.90(e) and 30 TAC § 352.901(a):

- A description of the current program status;
- A summary of key actions completed;
- A description of problems encountered, and actions taken to resolve the problems; and
- Identification of key activities for the coming year.

The CCR unit groundwater monitoring program began calendar year 2023 in "detection monitoring" program status, as defined by 40 CFR § 257.94 and 30 TAC § 352.941, and transitioned to "assessment monitoring" program status, as defined by 40 CFR § 257.95 and 30 TAC § 352.951. This transition occurred on 27 April 2023, due to statistically significant increases (SSIs) identified in the *2022 Annual Groundwater Monitoring and Corrective Action Report* (Hydrex Environmental, 2023) for which alternate source demonstrations (ASDs) were not able to be completed within the 90-day window. Notification of this transition is provided in Appendix A.

Groundwater monitoring in 2023 consisted of two semi-annual monitoring events completed in the spring (by Hydrex Environmental Consulting LLC [Hydrex Environmental]) and in the fall of 2023 (by ERM) conducted under assessment monitoring program status, which included groundwater level measurements and subsequent groundwater sampling. Groundwater level measurements were used to construct updated groundwater potentiometric surface maps for each of the geologic units monitored.

During the spring 2023 sampling event, groundwater samples were collected within 90 days of triggering an assessment monitoring program, for laboratory analysis of CCR Rule Appendix IV constituents, as required by 40 CFR § 257.95(b) and 30 TAC § 352.951(a). Appendix IV constituents detected include antimony, barium, cobalt, lithium, selenium, and radium 226/228 (combined).

During the fall 2023 sampling event, groundwater samples were collected within 90 days of obtaining the results from the results from the first assessment sampling event for laboratory analysis of CCR Rule Appendix III and detected Appendix IV constituents, as required by 40 CFR § 257.95(d)(1) and 30 TAC § 352.951(a).

Groundwater protection standards (GWPS) were established for detected Appendix IV constituents in accordance with 40 CFR § 257.95(h) and 30 TAC § 352.951(b). Because only two compliance monitoring samples have been collected from each downgradient well since the Site moved into assessment monitoring, there is currently insufficient compliance monitoring data available to calculate reliable confidence intervals for comparison to the GWPS, which is the selected statistical methodology for Appendix IV constituent analysis at the Site consistent with the Groundwater Sampling and Analysis Plan (GWSAP), 40 CFR § 257.93(f)(3) and 30 TAC § 352.931. Therefore, no SSIs were determined for downgradient wells for the calendar year 2023, and as a result the CCR Landfill remains in assessment monitoring at the conclusion of 2023. Accordingly, no remedial actions were selected, initiated, or performed in 2023.

1. INTRODUCTION

The Twin Oaks Power Station (Twin Oaks or Site) is located approximately one mile east of Hammond in the northwest section of Robertson County, Texas (Figure 1-1). Twin Oaks contains one regulated coal combustion residual (CCR) unit that is subject to regulation under Title 40, Code of Federal Regulations (CFR), Part 257, Subpart D (40 CFR 257.50 *et seq*.), also known as the Federal CCR Rule, and Title 30, Texas Administrative Code (TAC), Chapter 352 (30 TAC § 352 *et seq*.), also known as the Texas CCR Rule (collectively referred to as the CCR Rules). This unit is known as the CCR Landfill.

This report was produced by Environmental Resources Management Southwest, Inc. (ERM) on behalf of Major Oak Power, LLC and documents the status of the groundwater monitoring program for the CCR Landfill in accordance with the requirements of 40 CFR § 257.90(e) and 30 TAC § 352.901(a). Table 1-1 cross-references the reporting requirements under the CCR Rule with the contents of this report.

TABLE 1-1: REGULATORY REQUIREMENT CROSS-REFERENCE TABLE

Regulatory Citation in 40 CFR Part 257, Subpart D	Requirement (paraphrased)	Where Addressed in this Report
§ 257.90(e)(6)	Current status of the groundwater monitoring program.	Section 2
§ 257.90(e)	Summarize key actions completed.	Section 4
§ 257.90(e)	Describe any problems encountered and actions taken to resolve problems.	Section 4.3
§ 257.90(e)	Key activities for upcoming year.	Section 6
§ 257.90(e)(1)	Map, aerial image, or diagram of coal combustion residual (CCR) unit and all background and downgradient monitoring wells.	Figure 3-1
§ 257.90(e)(2)	Identification of new monitoring wells installed or abandoned during the preceding year and narrative description.	N/A
§ 257.90(e)(3)	Summary of groundwater data, wells sampled, date sampled, and whether sampling was required under detection or assessment monitoring.	Sections 3,4 and 5 and Appendix B
§ 257.90(e)(4)	Narrative discussion of any transition between monitoring programs (i.e., from detection to assessment monitoring).	Section 2
§ 257.93(c) (via § 257.90(e)(5))	Rate and direction of groundwater flow each time groundwater is sampled.	Section 5.1 and 5.2
§ 257.94(e)(2) (via § 257.90(e)(5))	Any alternate source demonstration reports and related certifications pertaining to a detection monitoring program.	N/A

Regulatory Citation in 40 CFR Part 257, Subpart D	Requirement (paraphrased)	Where Addressed in this Report
§ 257.95(g)(3) (via § 257.90(e)(5))	Any alternate source demonstration reports and related certifications pertaining to an assessment monitoring program.	N/A
§ 257.96(a) (via § 257.90(e)(5))	Any assessment of corrective measures to prevent further releases, remediate any releases, and restore affected area to original conditions, including the related certifications.	N/A
§ 257.97(a) (via § 257.90(e)(5))	Any semi-annual reports describing the progress in selecting and designing a remedy, including the related certifications.	N/A
§ 257.98(e) (via § 257.90(e)(5))	Any notification describing the completion of the selected remedy, including the related certifications.	N/A

Note: Texas CCR Rule regulatory requirements under 30 TAC § 352.901(a) adopt the Federal CCR regulatory requirements listed above.

Consistent with the notification requirements of the CCR Rules, this annual groundwater monitoring report will be posted to the Power Station operating record no later than 31 January 2024 (40 CFR § 257.105(h)(1) and 30 TAC § 352.1301(a)).

2. PROGRAM STATUS

The CCR unit groundwater monitoring program began calendar year 2023 under the detection monitoring program as defined by 40 CFR § 257.94 and 30 TAC § 352.941, and finished calendar year 2023 under the assessment monitoring program as defined by 40 CFR § 257.95 and 30 TAC § 352.951. The transition to assessment monitoring included the following events:

- The 2022 Annual Groundwater Monitoring and Corrective Action Report (Hydrex Environmental, 2023) identified statistically significant increases (SSIs) for boron, calcium, chloride, sulfate, and TDS at downgradient monitoring well MW-14. The SSIs were identified on 27 January 2023.
- The CCR unit transitioned to assessment monitoring on 27 April 2023, which was 90 days from the determination of SSIs above background, because an alternate source demonstration could not be completed for the SSIs from the December 2022 sampling event within the 90-day window.
- Notification of the transition to assessment monitoring was placed in the facility operating record on or before 27 April 2023 as required by 40 CFR § 257.94(e)(3) and 40 CFR § 257.105(h)(5).
- Notification of the transition to assessment monitoring was provided to the Texas Commission on Environmental Quality on 26 May 2023 as required by 40 CFR § 257.106(h)(4) and is provided in Appendix A.
- Notification of the transition to assessment monitoring was posted on the Twin Oaks CCR publicly accessible internet site on 26 May 2023 as required by 40 CFR § 257.107(h)(4).

GWPS were established for detected Appendix IV constituents in accordance with 40 CFR § 257.95(h) and 30 TAC § 352.951(b), and are set forth in Table 4-1 of Appendix C. Because only two compliance monitoring samples have been collected from each downgradient well since the Site transitioned into assessment monitoring, there is currently insufficient compliance monitoring data available to calculate reliable confidence intervals for comparison to the GWPS, which is the selected statistical methodology for Appendix IV constituent analysis at the Site consistent with the GWSAP, 40 C.F.R § 257.93(f)(3) and 30 TAC § 352.931. Therefore, no SSIs were determined for downgradient wells for the calendar year 2023, and as a result the CCR Landfill remains in assessment monitoring at the conclusion of 2023.

3. BACKGROUND

3.1 DESCRIPTION OF CCR UNIT

The Twin Oaks CCR Landfill is approximately 245 acres in size and is located approximately 0.5 miles northeast of the Plant (Figure 3-1). Approximately 130 acres is utilized for the landfilling of CCR material and is permitted by the Texas Commission on Environmental Quality as a Class 2 Landfill. The approved material to be disposed of in the CCR unit is boiler ash, bottom ash, fly ash, lime sludge, storm water, sandblasting material, and brine sludge associated with Site operations (Hydrex Environmental, 2022).

3.2 GEOLOGY AND HYDROGEOLOGY

The subsurface geology below the Twin Oaks CCR Landfill is subdivided into three units:

- Unit 1 – Upper confining unit (comprised of low permeability clays, silts, and clayey sands);
- Unit 2 – Uppermost groundwater-bearing unit (comprised of silty to well graded sands with lenses of clays and silts); and
- Unit 3 – Lower confining unit (comprised of clays and silts with minor sand content).

Further descriptions of these units and information on regional and site geology and hydrogeology can be found in the *Groundwater Sampling and Analysis Plan* (GWSAP) and *Geology Summary Report*, included within the *Registration Application for Coal Combustion Residual Waste Management* for the Twin Oaks Power Station CCR Landfill (Hydrex Environmental, 2022)

3.3 MONITORING WELL NETWORK

The CCR well network (Figure 3-1) currently consists of 4 upgradient (MW-07, MW-11, MW-12, and MW-16) and 4 downgradient (MW-13, MW-14, MW-15, and MW-17) monitoring wells located along the perimeter of the CCR unit. The upgradient wells are placed to accurately represent the quality of background groundwater that has not been affected by potential leakage from the CCR unit, while the downgradient wells in the network are positioned at the downgradient boundary of waste to detect potential release of CCR constituents from the CCR unit into groundwater in the uppermost aquifer. There are an additional five monitoring wells (MW-18, MW-19, MW-20, MW-21, and MW-22) that serve as observation points to provide supplemental information to the monitoring network (e.g., groundwater elevation data). These wells are not included as part of the certified CCR well network and are not regularly sampled.

4. MONITORING ACTIVITIES

4.1 MONITORING WELL INSTALLATION AND ABANDONMENT

No wells were installed or abandoned during 2023 activities at the site.

4.2 2023 SAMPLING SUMMARY

In accordance with the GWSAP (Hydrex Environmental, 2022), groundwater samples were collected by Hydrex Environmental in April 2023 for the first assessment monitoring event and then by ERM in August 2023 for the second assessment monitoring sampling event under 40 CFR § 257.95 and 30 TAC § 352.951. In accordance with 40 CFR § 257.95(b), groundwater samples collected during the April 2023 event were analyzed for all constituents listed in Appendix IV to 40 CFR Part 257, Subpart D. Groundwater samples collected during the August 2023 event were analyzed for all Appendix III constituents and those Appendix IV constituents detected during the April 2023 event, as required by 40 CFR § 257.95(d)(1).

Table 4-1 provides a summary of the 2023 sample dates, the well gradient designation (upgradient or downgradient) relative to the CCR unit, and the dates the data quality reviews were completed for each sampling event. Samples were collected using dedicated bladder pumps at each well. In addition, the samples were not filtered in the field or at the laboratory per the requirement of § 257.93(i) and were managed under chain-of-custody procedures from the field to the laboratory.

TABLE 4-1: 2023 SAMPLING DATES FOR CCR LANDFILL NETWORK

Monitoring Well	Location	Sampling Dates		Data Quality Review Dates	
		H1	H2	H1	H2
MW-7	Upgradient	24 April 2023	8 August 2023	6 July 2023	12 October 2023
MW-11	Upgradient	24 April 2023	8 August 2023	6 July 2023	12 October 2023
MW-12	Upgradient	24 April 2023	8 August 2023	6 July 2023	12 October 2023
MW-13	Downgradient	24 April 2023	9 August 2023	6 July 2023	12 October 2023
MW-14	Downgradient	24 April 2023	9 August 2023	6 July 2023	12 October 2023
MW-15	Downgradient	24 April 2023	9 August 2023	6 July 2023	12 October 2023
MW-16	Upgradient	24 April 2023	9 August 2023	6 July 2023	12 October 2023
MW-17	Downgradient	24 April 2023	9 August 2023	6 July 2023	12 October 2023

Note: H1 = Spring; H2 = Fall

4.3 DATA QUALITY REVIEW

ERM reviewed field and laboratory documentation to assess the validity, reliability, and usability of the analytical results (Appendix B). Samples collected in 2023 were analyzed by the Eurofins laboratory, located in Houston, Texas. Data quality information reviewed for these results included field sampling forms, chain-of-custody documentation, holding times, laboratory methods, cooler temperatures, laboratory method blanks, laboratory control sample recoveries, field duplicate samples, matrix spikes/matrix spike duplicates, and field blanks following data quality review guidance from the Environmental Protection Agency and the Texas Commission on Environmental Quality. Data qualifiers were appended to results in the project database, as appropriate, based on laboratory quality measurements (e.g., agreement between normal and field duplicate samples). Data quality reviews of the laboratory results from the Spring and Fall sampling events were completed on 6 July 2023 and 12 October 2023, respectively. ERM's data quality review found the laboratory analytical results to be valid, reliable, and usable for decision-making purposes with the listed qualifiers. No analytical results were rejected.

5. MONITORING RESULTS

5.1 GROUNDWATER POTENTIOMETRIC CONTOURS AND FLOW DIRECTION

Depth to groundwater measurements were collected in April and August 2023 at each monitoring well prior to each sampling event. Resulting groundwater elevations were calculated by subtracting the depth to groundwater from the surveyed reference elevation for each well. Groundwater elevation data for the April and August 2023 sampling events, as well as all previous gauging event data, is summarized in Table 5-1. Interpreted potentiometric surface maps, and interpreted groundwater flow directions for the April and August 2023 sampling events are presented on Figure 5-1 and Figure 5-2, respectively.

For both sampling events, the principal direction of groundwater flow in the uppermost groundwater-bearing unit is from the northwest to the southeast.

5.2 GROUNDWATER VELOCITY CALCULATION

Previous estimates of groundwater velocity were calculated using estimated hydraulic conductivity values from slug test data conducted by Hydrex Environmental in March 2016 (Hydrex Environmental, 2022). For both the April and August 2023 sampling events, horizontal hydraulic gradients were calculated along four flow paths across the CCR Landfill: MW-12 to MW-13, MW-11 to MW-14, MW-7 to MW-17, and MW-16 to MW-15. The velocity of groundwater for each flow path is estimated based on the measured horizontal hydraulic gradient, estimated hydraulic conductivity of 4.85×10^{-3} centimeters per second, and an estimated effective porosity value of 0.3 (Hydrex Environmental, 2022). Hydraulic gradients ranged from 0.0033 to 0.0039 feet/foot during the April sampling event, and from 0.0033 to 0.0042 feet/foot during the August sampling event. Estimated average groundwater velocities of 60 and 63 feet/year were calculated for the spring and fall sampling events, respectively. Groundwater velocity calculations for both the April and August 2023 sampling events are presented in Table 5-2a and Table 5-2b.

5.3 2023 SAMPLING EVENT RESULTS

A summary of all analytical results obtained from the CCR wells is presented in Table 5-3a through Table 5-3h. Laboratory analytical reports from both the spring and the fall sampling events, including data usability summaries, are provided in Appendix B.

5.4 DEVELOPMENT OF GROUNDWATER PROTECTION STANDARDS

In accordance with 40 CFR § 257.95(h) and 30 TAC § 352.951(b), groundwater protection standards (GWPS) were developed for Appendix IV constituents to 40 CFR Part 257, Subpart D. A detailed report documenting the derivation of GWPS is provided in Appendix C.

Background concentrations were calculated for each Appendix IV constituent using an upper tolerance limit (UTL) approach, per recommendations in the USEPA Unified Guidance (USEPA, 2009, p. 7-24). Resulting background values were compared against maximum contaminant levels (MCL) or concentrations established by federal regulations and final GWPS concentration limits were selected in accordance with 40 CFR § 257.95(h) and 30 TAC § 352.951(b). This statistical methodology meets regulatory requirements and it is consistent with the approach recommended by USEPA guidance.

Compliance testing will be performed by comparing the lower confidence limit from downgradient compliance monitoring samples against the appropriate GWPS to identify potential exceedances. This approach is consistent with USEPA Unified Guidance (USEPA, 2009, p. 7-25). USEPA Unified Guidance also states that "at least 4 distinct compliance point measurements should be used to define the mean confidence interval in the parametric case, and 3-7 values should be used with a non-parametric median test" (USEPA, 2009, p. 7-24). As discussed further in Appendix C, only two compliance monitoring samples have been collected from each downgradient well since the Site transitioned to assessment monitoring and there is currently insufficient compliance monitoring data available to calculate reliable confidence intervals for comparison to the GWPS. Appendix IV results from samples collected at downgradient wells in 2016 and 2017 are not appropriate for comparison to the GWPS because they were collected before the Site transitioned to assessment monitoring and they were used to derive the GWPS concentration limits.

Therefore, no exceedances of the Appendix IV constituent GWPS were identified in downgradient wells for the 2023 calendar year. Two additional rounds of sampling will be collected in 2024, which is anticipated to allow for the calculation of reliable confidence intervals for comparison to the GWPS following those events.

6. KEY FUTURE ACTIVITES

The following key future activities are planned for 2024:

Groundwater Sampling

- Two assessment monitoring groundwater sampling events will be performed in 2024. During the first monitoring event, groundwater samples will be analyzed for all Appendix III and Appendix IV constituents, in accordance with 40 CFR § 257.95(b). Groundwater samples collected during the second monitoring event will be analyzed for all Appendix III constituents and detected Appendix IV constituents, in accordance with 40 CFR § 257.95(d)(1).
- Once a sufficient number of independent samples have been collected from the compliance wells a confidence interval around the mean will be calculated to determine if there are statistically significant levels above the GWPS.
- Results from the statistical comparison will be reported as required by the CCR Rules.

7. REFERENCES

Hydrex Environmental. 2022. Registration Application for Coal Combustion Residuals Waste Management. Twin Oaks Power Stations, Coal Combustion Residuals (CCR) Landfill.

Hydrex Environmental. 2023. 2022 Annual Groundwater Monitoring and Corrective Action Report. Twin Oaks Power Stations, Coal Combustion Residuals (CCR) Landfill.

TABLES

Table 5-1
Summary of Groundwater Elevations
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Well	Measurement Date	Reference Elevation (feet amsl)	Depth to Water (feet btoc)	Groundwater Elevation
MW-07 (Background)	8/8/2023	411.60	25.32	386.28
	4/24/2023	411.60	25.45	386.15
	12/6/2022	411.60	25.81	385.79
	4/18/2022	411.60	25.15	386.45
	10/18/2021	411.60	24.98	386.62
	4/28/2021	411.60	24.99	386.61
	10/27/2020	411.60	24.91	386.69
	4/28/2020	411.60	24.39	387.21
	10/21/2019	411.60	24.50	387.10
	4/3/2019	411.60	25.71	385.89
	10/8/2018	411.60	27.13	384.47
	4/25/2018	411.60	25.90	385.70
	10/9/2017	411.60	25.50	386.10
	8/14/2017	411.60	25.44	386.16
	6/21/2017	411.60	25.25	386.35
	3/27/2017	411.60	25.40	386.20
	1/23/2017	411.60	25.50	386.10
	11/28/2016	411.60	25.40	386.20
	9/26/2016	411.60	25.50	386.10
	7/25/2016	411.60	25.65	385.95
	6/13/2016	411.60	25.69	385.91
MW-11 (Background)	8/8/2023	406.93	22.92	384.01
	4/24/2023	406.93	22.40	384.53
	12/6/2022	406.93	23.10	383.83
	4/18/2022	406.93	22.40	384.53
	10/18/2021	406.93	22.57	384.36
	4/28/2021	406.93	22.40	384.53
	10/27/2020	406.93	22.75	384.18
	4/28/2020	406.93	21.90	385.03
	10/21/2019	406.93	22.60	384.33
	4/3/2019	406.93	22.90	384.03
	10/8/2018	406.93	24.36	382.57
	4/25/2018	406.93	23.00	383.93
	10/9/2017	406.93	23.10	383.83
	8/14/2017	406.93	23.05	383.88
	6/21/2017	406.93	22.55	384.38
	3/27/2017	406.93	23.00	383.93
	1/23/2017	406.93	22.80	384.13
	11/28/2016	406.93	22.65	384.28
	9/26/2016	406.93	23.00	383.93
	7/25/2016	406.93	23.10	383.83
	6/13/2016	406.93	22.56	384.37
MW-12 (Background)	8/8/2023	387.27	6.85	380.42
	4/24/2023	387.27	5.97	381.30
	12/6/2022	387.27	6.57	380.70
	4/18/2022	387.27	5.52	381.75
	10/18/2021	387.27	6.10	381.17
	4/28/2021	387.27	5.35	381.92
	10/27/2020	387.27	6.07	381.20
	4/28/2020	387.27	5.19	382.08
	10/21/2019	387.27	5.97	381.30
	4/3/2019	387.27	6.70	380.57
	10/8/2018	387.27	7.58	379.69
	4/25/2018	387.27	6.60	380.67
	10/9/2017	387.27	6.60	380.67
	8/14/2017	387.27	6.50	380.77
	6/21/2017	387.27	5.85	381.42
	3/27/2017	387.27	6.40	380.87
	1/23/2017	387.27	4.35	382.92
	11/28/2016	387.27	5.80	381.47
	9/26/2016	387.27	6.30	380.97
	7/25/2016	387.27	6.00	381.27
	6/13/2016	387.27	5.26	382.01

Table 5-1
Summary of Groundwater Elevations
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Well	Measurement Date	Reference Elevation (feet amsl)	Depth to Water (feet btoc)	Groundwater Elevation
MW-13 (Downgradient)	8/8/2023	398.32	22.50	375.82
	4/24/2023	398.32	21.47	376.85
	12/6/2022	398.32	22.41	375.91
	4/18/2022	398.32	20.81	377.51
	10/18/2021	398.32	21.85	376.47
	4/28/2021	398.32	20.84	377.48
	10/27/2020	398.32	22.02	376.30
	4/28/2020	398.32	21.85	376.47
	10/21/2019	398.32	22.20	376.12
	4/3/2019	398.32	21.01	377.31
	10/8/2018	398.32	23.61	374.71
	4/25/2018	398.32	22.30	376.02
	10/9/2017	398.32	22.70	375.62
	8/14/2017	398.32	22.50	375.82
	6/21/2017	398.32	21.60	376.72
	3/27/2017	398.32	21.40	376.92
	1/23/2017	398.32	22.20	376.12
	11/28/2016	398.32	22.15	376.17
	9/26/2016	398.32	22.30	376.02
	7/25/2016	398.32	22.00	376.32
	6/13/2016	398.32	20.70	377.62
MW-14 (Downgradient)	8/8/2023	394.68	20.51	374.17
	4/24/2023	394.68	20.13	374.55
	12/6/2022	394.68	20.93	373.75
	4/18/2022	394.68	19.65	375.03
	10/18/2021	394.68	20.24	374.44
	4/28/2021	394.68	19.68	375.00
	10/27/2020	394.68	20.48	374.20
	4/28/2020	394.68	19.40	375.28
	10/21/2019	394.68	20.31	374.37
	4/3/2019	394.68	20.24	374.44
	10/8/2018	394.68	22.04	372.64
	4/25/2018	394.68	20.60	374.08
	10/9/2017	394.68	20.90	373.78
	8/14/2017	394.68	20.66	374.02
	6/21/2017	394.68	20.10	374.58
	3/27/2017	394.68	20.25	374.43
	1/23/2017	394.68	20.30	374.38
	11/28/2016	394.68	20.60	374.08
	9/26/2016	394.68	20.75	373.93
	7/25/2016	394.68	20.65	374.03
	6/13/2016	394.68	20.00	374.68
MW-15 (Downgradient)	8/8/2023	410.47	36.84	373.63
	4/24/2023	410.47	36.60	373.87
	12/6/2022	410.47	36.74	373.73
	4/18/2022	410.47	35.37	375.10
	10/18/2021	410.47	35.80	374.67
	4/28/2021	410.47	35.25	375.22
	10/27/2020	410.47	36.05	374.42
	4/28/2020	410.47	35.22	375.25
	10/21/2019	410.47	35.58	374.89
	4/3/2019	410.47	36.07	374.40
	10/8/2018	410.47	37.55	372.92
	4/25/2018	410.47	36.45	374.02
	10/9/2017	410.47	36.50	373.97
	8/14/2017	410.47	36.20	374.27
	6/21/2017	410.47	36.20	374.27
	3/27/2017	410.47	36.00	374.47
	1/23/2017	410.47	36.20	374.27
	11/28/2016	410.47	36.30	374.17
	9/26/2016	410.47	36.30	374.17
	7/25/2016	410.47	36.20	374.27
	6/13/2016	410.47	36.19	374.28

Table 5-1
Summary of Groundwater Elevations
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Well	Measurement Date	Reference Elevation (feet amsl)	Depth to Water (feet btoc)	Groundwater Elevation
MW-16 (Downgradient)	8/8/2023	422.54	41.78	380.76
	4/24/2023	422.54	42.15	380.39
	12/6/2022	422.54	41.90	380.64
	4/18/2022	422.54	41.09	381.45
	10/18/2021	422.54	40.87	381.67
	4/28/2021	422.54	40.84	381.70
	10/27/2020	422.54	41.03	381.51
	4/28/2020	422.54	40.82	381.72
	10/21/2019	422.54	40.52	382.02
	4/3/2019	422.54	41.68	380.86
	10/8/2018	422.54	42.47	380.07
	4/25/2018	422.54	42.00	380.54
	10/9/2017	422.54	41.45	381.09
	8/14/2017	422.54	41.25	381.29
	6/21/2017	422.54	41.30	381.24
	3/27/2017	422.54	41.40	381.14
	1/23/2017	422.54	41.60	380.94
	11/28/2016	422.54	41.40	381.14
	9/26/2016	422.54	41.60	380.94
	7/25/2016	422.54	41.75	380.79
	6/13/2016	422.54	42.09	380.45
MW-17 (Background)	8/8/2023	405.87	34.93	370.94
	4/24/2023	405.87	34.23	371.64
	12/6/2022	405.87	34.82	371.05
	4/18/2022	405.87	33.10	372.77
	10/18/2021	405.87	34.06	371.81
	4/28/2021	405.87	33.18	372.69
	10/27/2020	405.87	34.28	371.59
	4/28/2020	405.87	33.10	372.77
	10/21/2019	405.87	34.05	371.82
	4/3/2019	405.87	33.82	372.05
	10/8/2018	405.87	36.00	369.87
	4/25/2018	405.87	34.20	371.67
	10/9/2017	405.87	30.75	375.12
	8/14/2017	405.87	34.42	371.45
	6/21/2017	405.87	33.55	372.32
	3/27/2017	405.87	33.75	372.12
	1/23/2017	405.87	34.10	371.77
	11/28/2016	405.87	34.25	371.62
	9/26/2016	405.87	34.40	371.47
	7/25/2016	405.87	34.19	371.68
	6/13/2016	405.87	33.90	371.97
MW-18 (Observation)	8/8/2023	410.88	25.27	385.61
MW-19 (Observation)	8/8/2023	417.33	30.43	386.90
MW-20 (Observation)	8/8/2023	423.19	39.90	383.29
MW-21 (Observation)	8/8/2023	387.52	6.29	381.23
MW-22 (Observation)	8/8/2023	421.71	33.52	388.19

Notes:
btoc = below top of casing
amsl = above mean sea level

Table 5-2a
Groundwater Velocity Calculation - April 2023
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Flow Path	MW-12 to MW-13	MW-11 to MW-14	MW-7 to MW-17	MW-16 to MW-15
Δ**h** (ft)	4.45	9.98	14.51	6.52
Δ**d** (ft)	1,260	2,988	3,931	1,692
Hydraulic graident (**i**; ft/ft)	0.0035	0.0033	0.0037	0.0039
Hydraulic conductivity (**k**; cm/s)	0.00485	0.00485	0.00485	0.00485
effective porosity ($\mathbf{n_e}$)	0.30	0.30	0.30	0.30
Velocity (**v**; ft/year)	59.04	55.84	61.71	64.42
Average Velocity (v; ft/year)	**60**			

Groundwater Elevations (ft amsl)			
MW-12	*MW-11*	*MW-07*	*MW-16*
381.30	384.53	386.15	380.39
MW-13	*MW-14*	*MW-17*	*MW-15*
376.85	374.55	371.64	373.87

Groundwater elevation data collected on 24 April 2023.

Calculation for hydraulic gradient:

$$i = \frac{\Delta h}{\Delta d}$$

Calculation for groundwater velocity:

$$v = \frac{ki}{n_e}$$

Where:
Δh = Difference in hydraulic head between two wells.
Δd = Distance between wells (along similar flow path).
k and n_e = Values derived from slug test data performed by Hydrex in March 2016 (as documented in the 2022 *Registration Application for Coal Combustion Residuals Waste Management*).

Units:
amsl = above mean sea level
cm = centimeters
ft = feet
s = seconds

Table 5-2b
Groundwater Velocity Calculation - August 2023
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Flow Path	MW-12 to MW-13	MW-11 to MW-14	MW-7 to MW-17	MW-16 to MW-15
Δ**h** (ft)	4.60	9.84	15.34	7.13
Δ**d** (ft)	1,260	2,988	3,931	1,692
Hydraulic graident (**i**; ft/ft)	0.0037	0.0033	0.0039	0.0042
Hydraulic conductivity (**k**; cm/s)	0.00485	0.00485	0.00485	0.00485
effective porosity ($\mathbf{n_e}$)	0.30	0.30	0.30	0.30
Velocity (**v**; ft/year)	61.03	55.05	65.23	70.44
Average Velocity (v; ft/year)	**63**			

Calculation for hydraulic gradient:

$$i = \frac{\Delta h}{\Delta d}$$

Calculation for groundwater velocity:

$$v = \frac{ki}{n_e}$$

Groundwater Elevations (ft amsl)			
MW-12	*MW-11*	*MW-07*	*MW-16*
380.42	384.01	386.28	380.76
MW-13	*MW-14*	*MW-17*	*MW-15*
375.82	374.17	370.94	373.63

Groundwater elevation data collected on 8 August 2023.

Where:
Δh = Difference in hydraulic head between two wells.
Δd = Distance between wells (along similar flow path).
k and n_e = Values derived from slug test data performed by Hydrex in March 2016 (as documented in the 2022 *Registration Application for Coal Combustion Residuals Waste Management*).

Units:
amsl = above mean sea level
cm = centimeters
ft = feet
s = seconds

Table 5-3a
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-07 (Background)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	**Boron**	**Calcium**	**Chloride**	**Fluoride**	**pH, Lab**	**Sulfate**	**Dissolved Solids, Total**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Fluoride**	**Lead**	**Lithium**	**Mercury**	**Molybdenum**	**Selenium**	**Thallium**	**Radium-226/228**
Unit	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**SU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**pCi/L**
Sample Date																						
8/8/2023	0.208	273	259	< 0.500	6.6 HF	865	1,750	< 0.00400	NA	0.0144	NA	NA	NA	0.00102 J	< 0.500	NA	< 0.0400	NA	NA	< 0.00200	NA	0.521
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	< 0.00400	< 0.00400	0.0166	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0400	< 0.000200	< 0.00200	< 0.00200	< 0.00200	1.20
12/6/2022	0.271	303	260	< 0.500	6.5 HF	1,030	1,920	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.270	292	277	< 0.500	6.5 HF	1,010	1,940	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.286	284	257	< 0.500	6.7 HF	940	1,730	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.295 F1	258	259	< 0.500	6.5 HF	952	1,800	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.298	245 DX	262	< 0.500	6.06 K	930 D	1,670	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.322	268 D	274	< 0.500	6.42 K	1,550 D	1,780	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/21/2019	0.286	312 D	285	< 0.500	6.50 K	1,040 D	1,950	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.332	284	285	< 0.500	6.36 K	908	1,780	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.303	326 D	312	< 0.500	6.72 K	1,070	1,730	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.257	232	300 D	< 0.500	6.58 K	998 D	1,660	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.259	186	258	< 0.500	6.15 K	785	1,650	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.257	229	260	< 0.500	6.49 K	782	708	< 0.00200	0.0143	0.243	0.00339	< 0.00200	0.00998	0.0116	< 0.500	0.00877	< 0.0200	0.000230	< 0.00200	< 0.00200	< 0.00200	1.63
6/22/2017	0.257	218	219 D	< 0.500	6.81 K	671 D	1,800	< 0.00200	0.00839	0.166	0.00217	< 0.00200	0.00559	0.00637	< 0.500	0.00653	< 0.0200	0.000313	< 0.00200	< 0.00200	< 0.00200	0.888
3/28/2017	0.370	263	216 D	< 0.500	6.27 K	730 D	1,390	< 0.00200	0.00765	0.148	< 0.00200	< 0.00200	0.00536	0.00638	< 0.500	0.00498	< 0.0200	0.000243	< 0.00200	< 0.00200	< 0.00200	2.22
1/24/2017	0.264	199	206 D	< 0.500	6.07 K	703 D	1,530	< 0.00200	0.0123	0.204	0.00274	< 0.00200	0.00920	0.00976	< 0.500	0.00798	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	NA
11/29/2016	0.288	217	208	< 0.500	6.38 K	731	1,550	< 0.00200	0.00317	0.0581	< 0.00200	< 0.00200	< 0.00400	0.00307	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	3.08
9/27/2016	0.306	199	218 D	0.272	6.33 K	826 D	1,550	< 0.00200	0.0119	0.164	0.00291	< 0.00200	0.00696	0.00870	0.272	0.00699	< 0.0200	< 0.000200	< 0.00200	0.00340	< 0.00200	1.82
7/26/2016	0.566	208	257 D	0.459	6.37 K	880 D	1,590	< 0.00200	0.00918	0.140	0.00230	< 0.00200	0.00585	0.00685	0.459	0.00642	0.235	0.000219	< 0.00200	< 0.00200	< 0.00200	5.99
6/14/2016	0.313	179	186 D	< 0.200	6.37 K	702 D	1,460	< 0.00200	0.00687	0.109	< 0.00200	< 0.00200	< 0.00400	0.00422	< 0.200	0.00385	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	2.76

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3b
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-11 (Background)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Analyte	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
	Boron	Calcium	Chloride	Fluoride	pH, Lab	Sulfate	Dissolved Solids, Total	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226/228
Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
Sample Date																						
8/8/2023	0.144	120	118	0.325 J	6.6 HF	409	917	< 0.00400	NA	0.0166	NA	NA	NA	0.00180 J	0.325 J	NA	< 0.0400	NA	NA	< 0.00200	NA	0.276
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	< 0.00400	< 0.00400	0.0176	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0400	< 0.000200	< 0.00200	< 0.00200	< 0.00200	1.62
12/6/2022	0.169	129	138	< 0.500	6.5 HF	469	913	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.162	130	140	< 0.500	6.6 HF	485	988	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.175	134	157	< 0.500	7.0 HF	528	1,160	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.175	152	176	< 0.500	6.5 HF	612	1,130	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.147	142 D	184	< 0.500	6.07 K	621 D	1,120	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.140	137 D	185	< 0.500	6.42 K	606 D	1,170	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/21/2019	0.110	127 D	155	< 0.500	6.48 K	487 D	992	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.119	94.8	141	< 0.500	6.30 K	406	862	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.102	109 D	153	< 0.500	6.63 K	445	902	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.0805	64.4	124	< 0.500	6.55 K	365 D	785	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.0673	84.6	124	< 0.500	6.39 K	363	890	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.0675	55.6	109	< 0.500	2.12 K	337	2,890	< 0.00200	< 0.00200	0.0304	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	0.397
6/22/2017	0.0952	74.2	124	< 0.500	6.78 K	362 D	796	< 0.00200	0.00212	0.0725	< 0.00200	< 0.00200	0.00403	0.00302	< 0.500	0.00247	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	1.45
3/28/2017	0.149	88.8	138	< 0.500	6.18 K	424 D	908	< 0.00200	< 0.00200	0.0368	< 0.00200	< 0.00200	< 0.00400	0.00206	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	2.04
1/24/2017	0.0861	102	135	< 0.500	6.17 K	416 D	913	< 0.00200	< 0.00200	0.0479	< 0.00200	< 0.00200	< 0.00400	0.00258	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	5.69
11/29/2016	0.0863	95.9	138	< 0.500	6.26 K	418	952	< 0.00200	< 0.00200	0.0476	< 0.00200	< 0.00200	< 0.00400	0.00261	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	2.38
9/27/2016	0.0947	90.2	138 D	0.256	6.28 K	437 D	888	< 0.00200	< 0.00200	0.0426	< 0.00200	< 0.00200	< 0.00400	0.00231	0.256	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	2.23
7/26/2016	0.153	87.8	151 D	0.448	6.28 K	430 D	935	< 0.00200	< 0.00200	0.0802	< 0.00200	< 0.00200	< 0.00400	0.00293	0.448	< 0.00200	0.139	< 0.000200	< 0.00200	< 0.00200	< 0.00200	1.75
6/14/2016	0.0975	93.9	143 D	< 0.200	6.25 K	419 D	923	< 0.00200	0.00332	0.0893	< 0.00200	< 0.00200	0.00583	0.00368	< 0.200	0.00339	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	3.59

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3c
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-12 (Background)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	**Boron**	**Calcium**	**Chloride**	**Fluoride**	**pH, Lab**	**Sulfate**	**Dissolved Solids, Total**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Fluoride**	**Lead**	**Lithium**	**Mercury**	**Molybdenum**	**Selenium**	**Thallium**	**Radium-226/228**
Unit	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**SU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**pCi/L**
Sample Date																						
8/8/2023	0.0332 JH	22.3	78.3	*< 0.500*	6.4 HF	45.7	270	*< 0.00400*	*NA*	0.0884	*NA*	*NA*	*NA*	0.00296	*< 0.500*	*NA*	*< 0.0400*	*NA*	*NA*	*< 0.00200*	*NA*	1.99
4/24/2023	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*< 0.00400*	*< 0.00400*	0.0913	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00429	*< 0.500*	*< 0.00200*	*< 0.0400*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	2.00
12/6/2022	*< 0.0500*	20.2	80.2	*< 0.500*	6.3 HF	43.6	262	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
4/18/2022	0.0250	16.1	75.9	*< 0.500*	6.5 HF	41.0	266	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
10/18/2021	0.0332	20.9	77.6	*< 0.500*	6.8 HF	40.7 F2	390	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
4/28/2021	0.0373	15.4	74.6	*< 0.500*	6.5 HF	38.1	221	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
10/27/2020	0.0280	18.3	76.5	*< 0.500*	6.20 K	40.5	283	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
4/28/2020	0.0304	16.9	76.9	*< 0.500*	6.47 K	43.4	275	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
10/21/2019	0.0326	21.5	80.3	*< 0.500*	6.48 K	46.1	313	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
4/4/2019	0.0424	19.4	78.3	*< 0.500*	6.56 K	42.6	256	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
10/9/2018	0.0335	20.8	83.5	*< 0.500*	6.71 K	50.0	267	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
4/26/2018	0.0260	17.3	82.9	*< 0.500*	6.62 K	50.3	279	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
10/10/2017	0.0285	21.9	83.4	*< 0.500*	6.33 K	48.6	300	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*< 0.500*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
8/15/2017	0.0334	20.2	84.2	*< 0.500*	7.07 K	48.8	300	*< 0.00200*	*< 0.00200*	0.123	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00283	*< 0.500*	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	3.90
6/22/2017	0.0378	18.6	84.3	*< 0.500*	6.68 K	48.5	296	*< 0.00200*	*< 0.00200*	0.125	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00353	*< 0.500*	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	3.29
3/28/2017	0.0615	23.2	87.6	*< 0.500*	6.21 K	52.3	314	*< 0.00200*	*< 0.00200*	0.131	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00457	*< 0.500*	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	3.09
1/24/2017	0.0321	22.0	83.2	*< 0.500*	5.97 K	48.9	284	*< 0.00200*	*< 0.00200*	0.133	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00507	*< 0.500*	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	4.32
11/29/2016	0.0359	22.3	84.9	*< 0.500*	6.27 K	49.6	355	*< 0.00200*	*< 0.00200*	0.142	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00538	*< 0.500*	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	2.47
9/27/2016	0.0367	22.0	88.3	0.290	6.22 K	56.4	299	*< 0.00200*	*< 0.00200*	0.148	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00631	0.290	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	3.53
7/26/2016	0.0635	21.2	85.9	0.484	6.37 K	48.1	307	*< 0.00200*	*< 0.00200*	0.157	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00678	0.484	*< 0.00200*	0.0343	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	1.44
6/14/2016	0.0366	19.1	87.1	*< 0.200*	6.28 K	50.0	314	*< 0.00200*	*< 0.00200*	0.142	*< 0.00200*	*< 0.00200*	*< 0.00400*	0.00632	*< 0.200*	*< 0.00200*	*< 0.0200*	*< 0.000200*	*< 0.00200*	*< 0.00200*	*< 0.00200*	4.53

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3d
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-13 (Downgradient)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	Boron	Calcium	Chloride	Fluoride	pH, Lab	Sulfate	Dissolved Solids, Total	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226/228
Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
Sample Date																						
8/9/2023	0.0496	40.7	114	< 0.500	6.3 HF	125	507	< 0.00400	NA	0.0693	NA	NA	NA	0.00120 J	< 0.500	NA	< 0.0400	NA	NA	0.00273	NA	2.17
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	< 0.00400	< 0.00400	0.0832	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0400	< 0.000200	< 0.00200	< 0.00200	< 0.00200	3.32
12/6/2022	0.0536	35.1	117	< 0.500	6.2 HF	110	448	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
5/31/2022	NA	NA	NA	NA	NA	360	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.0483	51.3	101	< 0.500	6.3 HF	200	582	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.0567	33.8	104	< 0.500	6.7 HF	99.0	437	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.0587	26.1	105	< 0.500	6.4 HF	78.9	398	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.0604	28.8	104	< 0.500	6.13 K	71.3	381	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.0750	31.1	103	< 0.500	6.55 K	72.2	403	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/22/2019	0.0550	36.8	98.4	< 0.500	6.63 K	84.8	423	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.0529	23.7	92.4	< 0.500	6.38 K	56.2	343	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.0394	20.0	98.0	< 0.500	6.64 K	39.6	355	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.0400	17.9	98.0	< 0.500	6.59 K	39.7	338	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.0558	23.3	94.2	< 0.500	5.71 K	38.4	368	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.0529	22.6	97.4	< 0.500	6.61 K	44.4	371	< 0.00200	0.00455	0.136	< 0.00200	< 0.00200	0.00566	0.00335	< 0.500	0.00408	< 0.0200	< 0.000200	< 0.00200	0.00265	< 0.00200	1.07
6/22/2017	0.0786	37.1	99.1	< 0.500	6.66 K	93.5	448	< 0.00200	0.00364	0.136	< 0.00200	< 0.00200	< 0.00400	0.00276	< 0.500	0.00236	< 0.0200	< 0.000200	< 0.00200	0.0189	< 0.00200	4.77
3/28/2017	0.0756	22.4	97.3	< 0.500	6.21 K	36.2	336	< 0.00200	< 0.00200	0.133	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	0.0686	< 0.000200	< 0.00200	< 0.00200	< 0.00200	2.38
1/24/2017	0.0382	19.4	91.8	< 0.500	5.91 K	37.7	322	< 0.00200	0.00204	0.128	< 0.00200	< 0.00200	< 0.00400	0.00326	< 0.500	0.00211	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	2.69
11/29/2016	0.0470	37.7	102	< 0.500	6.16 K	108	495	< 0.00200	< 0.00200	0.156	< 0.00200	< 0.00200	< 0.00400	0.00207	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.0213	< 0.00200	4.46
9/27/2016	0.0531	30.6	101 D	0.410	6.32 K	62.9	449	< 0.00200	0.00253	0.197	< 0.00200	< 0.00200	0.00499	0.00236	0.410	0.00206	< 0.0200	< 0.000200	< 0.00200	0.0134	< 0.00200	5.67
7/26/2016	0.0498	20.7	91.1	0.584	6.35 K	< 0.200	414	< 0.00200	0.00286	0.164	< 0.00200	< 0.00200	< 0.00400	0.00234	0.584	0.00255	0.0271	< 0.000200	< 0.00200	< 0.00200	< 0.00200	4.31
6/14/2016	0.114	20.7	75.8	0.285	6.32 K	26.7	348	< 0.00200	< 0.00200	0.159	< 0.00200	< 0.00200	< 0.00400	< 0.00200	0.285	< 0.00200	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	4.12

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3e
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-14 (Downgradient)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	Boron	Calcium	Chloride	Fluoride	pH, Lab	Sulfate	Dissolved Solids, Total	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226/228
Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
Sample Date																						
8/9/2023	3.33	336	499	0.562	6.6 HF	1,150	2,940	< 0.00400	NA	0.0207	NA	NA	NA	0.00365	0.562	NA	0.0512	NA	NA	0.856	NA	1.83
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	< 0.00400	< 0.00400	0.0247	< 0.00200	< 0.00200	< 0.00400	0.00497	< 0.500	< 0.00200	0.0576	< 0.000200	< 0.00200	0.782	< 0.00200	2.04
12/6/2022	1.30	263	470	< 0.500	6.5 HF	1,080	2,450	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
7/14/2022	0.762	NA	NA	NA	NA	NA	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/28/2022	1.64	211	423	NA	NA	933	2,340	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5/31/2022	0.718	202	464	NA	NA	944	2,240	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.875	190	457	< 0.500	6.6 HF	899	2,290	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.347	118	403	< 0.500	7.0 HF	< 0.500	1,760	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
6/23/2021	NA	130	NA	NA	NA	545	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.391	117	381	0.510	6.7 HF	493	1,520	NA	NA	NA	NA	NA	NA	NA	0.510	NA	NA	NA	NA	NA	NA	NA
11/23/2020	NA	NA	NA	NA	NA	424 D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.497	112 D	364	< 0.500	6.35 K	493 D	1,480	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
7/9/2020	NA	NA	NA	NA	NA	448 D	1,490	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.322	106 D	370	< 0.500	6.80 K	467 D	1,680	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/22/2019	0.248	102 D	357	< 0.500	6.74 K	306 D	1,350	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.214	82.9	373	< 0.500	6.67 K	242	1,180	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.253	86.7 D	366	< 0.500	6.88 K	225	1,060	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.236	68.3	358	< 0.500	6.85 K	231	986	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.305	88.2	322	< 0.500	5.90 K	228	1,290	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.157	70.8	307	< 0.500	6.86 K	259	1,180	< 0.00200	< 0.00200	0.101	< 0.00200	< 0.00200	< 0.00400	0.00226	< 0.500	0.00306	0.0396	< 0.000200	< 0.00200	0.0205	< 0.00200	2.66
6/22/2017	0.0355	75.4	345 D	< 0.500	6.83 K	185	1,070	< 0.00200	0.00204	0.123	< 0.00200	< 0.00200	< 0.00400	0.00271	< 0.500	0.00254	< 0.0200	< 0.000200	< 0.00200	0.00397	< 0.00200	3.048
3/28/2017	0.0537	82.5	335 D	< 0.500	6.55 K	209 D	1,150	< 0.00200	< 0.00200	0.120	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00848	< 0.00200	2.17
1/24/2017	0.0338	69.1	337 D	< 0.500	6.39 K	175	1,170	< 0.00200	< 0.00200	0.130	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00209	< 0.00200	2.55
11/29/2016	0.0388	77.3	334	< 0.500	6.59 K	177	1,160	< 0.00200	< 0.00200	0.158	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	0.0313	< 0.000200	< 0.00200	0.00465	< 0.00200	3.63
9/27/2016	0.0362	84.9	355 D	0.533	6.67 K	225 D	1,180	< 0.00200	< 0.00200	0.195	< 0.00200	< 0.00200	< 0.00400	< 0.00200	0.533	< 0.00200	0.0413	< 0.000200	< 0.00200	0.00824	< 0.00200	2.81
7/26/2016	0.0425	71.2	351 D	0.682	6.63 K	151 D	1,130	< 0.00200	0.00475	0.289	< 0.00200	< 0.00200	0.00504	0.00387	0.682	0.00523	0.100	< 0.000200	< 0.00200	0.00535	< 0.00200	5.92
6/14/2016	0.419	68.1	337 D	0.280	6.51 K	127 D	1,040	< 0.00200	0.00259	0.293	< 0.00200	< 0.00200	0.00407	0.00293	0.280	0.00397	0.0464	< 0.000200	< 0.00200	0.00267	< 0.00200	5.13

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3f
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-15 (Downgradient)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	Boron	Calcium	Chloride	Fluoride	pH, Lab	Sulfate	Dissolved Solids, Total	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226/228
Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
Sample Date																						
8/9/2023	0.0704 J	34.1	136	< 0.500	6.5 HF	44.7	498	< 0.00400	NA	0.112	NA	NA	NA	< 0.00200	< 0.500	NA	< 0.0400	NA	NA	0.00374	NA	1.19 J
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	0.00585	< 0.00400	0.105	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0400	< 0.000200	< 0.00200	0.00398	< 0.00200	1.95
12/6/2022	< 0.0500	27.7	144	< 0.500	6.5 HF	39.0	424	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.0340	27.4	147	< 0.500	6.6 HF	44.2	462	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.0445	26.0	131	< 0.500	6.7 HF	39.8	434	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
6/23/2021	NA	30.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.0475	29.0	155	< 0.500	6.7 HF	34.5	404	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.0399	23.4	129	< 0.500	6.32 K	34.3	381	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.0427	21.8	119	< 0.500	6.61 K	38.1	338	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/22/2019	0.0443	23.6	113	< 0.500	6.71 K	34.7	380	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
6/11/2019	NA	23.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.0500	26.8	128	< 0.500	6.60 K	30.5	355	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
11/20/2018	NA	17.2	131	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.0461	26.2	138	< 0.500	6.71 K	33.1	365	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.0491	18.2	127	< 0.500	6.85 K	29.2	345	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.0477	22.1	109	< 0.500	5.63 K	24.9	373	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.0489	20.9	115	< 0.500	6.34 K	26.3	401	< 0.00200	< 0.00200	0.0872	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00231	< 0.00200	1.94
6/22/2017	0.0428	20.0	110	< 0.500	6.86 K	27.0	393	< 0.00200	< 0.00200	0.0836	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00246	< 0.00200	0.551
3/28/2017	0.0642	21.3	98.4	< 0.500	6.54 K	29.1	362	< 0.00200	< 0.00200	0.0754	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00278	< 0.00200	1.09
1/24/2017	0.0474	19.7	94.4	< 0.500	6.23 K	26.0	370	< 0.00200	< 0.00200	0.0844	< 0.00200	< 0.00200	0.00451	< 0.00200	< 0.500	0.00221	< 0.0200	< 0.000200	< 0.00200	0.00313	< 0.00200	1.28
11/29/2016	0.0521	19.5	98.9	< 0.500	6.51 K	24.3	407	< 0.00200	< 0.00200	0.0749	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00311	< 0.00200	2.53
9/27/2016	0.0512	19.7	96.5	0.298	6.59 K	28.6	356	< 0.00200	< 0.00200	0.0899	< 0.00200	< 0.00200	< 0.00400	< 0.00200	0.298	0.00236	< 0.0200	< 0.000200	< 0.00200	0.00334	< 0.00200	2.19
7/26/2016	0.0544	19.7	97.9	0.486	6.57 K	27.6	368	< 0.00200	0.00230	0.111	< 0.00200	< 0.00200	0.00442	0.00205	0.486	0.00291	0.0213	< 0.000200	< 0.00200	0.00277	< 0.00200	3.53
6/14/2016	0.0571	20.5	102 D	< 0.200	6.49 K	28.2	337	0.00222	< 0.00200	0.165	< 0.00200	< 0.00200	0.00871	0.00427	< 0.200	0.00859	< 0.0200	< 0.000200	< 0.00200	0.00284	< 0.00200	2.81

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3g
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-16 (Background)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	Boron	Calcium	Chloride	Fluoride	pH, Lab	Sulfate	Dissolved Solids, Total	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium-226/228
Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
Sample Date																						
8/9/2023	0.0437 JH	72.4	187	0.130 J	6.7 HF	101	792	< 0.00400	NA	0.0475	NA	NA	NA	< 0.00200	0.130 J	NA	< 0.0400	NA	NA	0.00168 J	NA	1.58
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	< 0.00400	< 0.00400	0.0524	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0400	< 0.000200	< 0.00200	< 0.00200	< 0.00200	1.50
12/6/2022	< 0.0500	68.0	176	< 0.500	6.6 HF	130	717	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.0220	69.0	273	< 0.500	6.6 HF	98.9	796	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.0338	64.3	234	< 0.500	7.1 HF	81.0	715	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.0271	43.2	189	< 0.500	6.9 HF	82.8	677	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.0243	45.7	198	< 0.500	6.33 K	87.5	598	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.0257	87.1 D	371	< 0.500	6.53 K	129	960	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/21/2019	0.0354	69.2	257	< 0.500	6.56 K	101	778	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.0314	62.0	267	< 0.500	6.57 K	123	849	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.0300	58.1	233	< 0.500	6.35 K	109	684	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
6/26/2018	NA	NA	NA	NA	NA	133	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.0372	73.3	254 D	< 0.500	6.40 K	142	662	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.0379	78.0	289	< 0.500	5.05 K	71.9	781	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.0376	73.2	270	< 0.500	6.51 K	68.1	670	< 0.00200	0.0206	0.199	0.00267	< 0.00200	0.0107	0.0105	< 0.500	0.0127	< 0.0200	< 0.000200	< 0.00200	0.00361	< 0.00200	5.98
6/22/2017	0.0367	67.0	268 D	< 0.500	6.48 K	63.1	675	< 0.00200	0.0104	0.180	< 0.00200	< 0.00200	0.00719	0.00660	< 0.500	0.00792	< 0.0200	< 0.000200	< 0.00200	0.00319	< 0.00200	4.81
3/28/2017	0.0548	63.0	255 D	< 0.500	6.11 K	57.2	671	< 0.00200	0.00294	0.148	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00231	< 0.00200	6.14
1/24/2017	0.0419	64.4	253 D	< 0.500	5.97 K	44.5	676	< 0.00200	0.0120	0.172	< 0.00200	< 0.00200	0.00625	0.00558	< 0.500	0.00606	< 0.0200	< 0.000200	< 0.00200	0.00250	< 0.00200	6.16
11/29/2016	0.0453	63.2	267	< 0.500	6.19 K	36.9	832	< 0.00200	0.00460	0.166	< 0.00200	< 0.00200	< 0.00400	0.00232	< 0.500	0.00229	< 0.0200	< 0.000200	< 0.00200	< 0.00200	< 0.00200	9.85
9/27/2016	0.0475	59.0	244 D	0.252	6.16 K	41.2	670	< 0.00200	0.0142	0.180	0.00259	< 0.00200	0.00673	0.00794	0.252	0.00856	< 0.0200	< 0.000200	< 0.00200	0.00384	< 0.00200	3.44
7/26/2016	0.179	59.3	238 D	0.441	6.21 K	38.0	744	< 0.00200	0.0137	0.207	0.00248	< 0.00200	0.00680	0.00841	0.441	0.00951	0.0415	< 0.000200	< 0.00200	0.00224	< 0.00200	4.72
6/14/2016	0.0566	57.2	230 D	< 0.200	6.11 K	37.5	648	< 0.00200	0.0232	0.217	0.00396	< 0.00200	0.0104	0.0116	< 0.200	0.0140	< 0.0200	< 0.000200	< 0.00200	0.00281	< 0.00200	4.34

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
NA = Not analyzed.
D = Sample diluted due to targets detected over highest point of the calibration curve or due to matrix interference.
E = Data exceeds upper calibration limit, therefore the value reported is estimated.
F1 = MS/MSD relative percent difference exceeds control limits.
F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

Table 5-3h
Summary of Groundwater Monitoring Analytical Results
Monitor Well MW-17 (Downgradient)
Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

	Detection Monitoring Constituents (Appendix III)							Assessment Monitoring Constituents (Appendix IV)														
Analyte	**Boron**	**Calcium**	**Chloride**	**Fluoride**	**pH, Lab**	**Sulfate**	**Dissolved Solids, Total**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Fluoride**	**Lead**	**Lithium**	**Mercury**	**Molybdenum**	**Selenium**	**Thallium**	**Radium-226/228**
Unit	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**SU**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**pCi/L**
Sample Date																						
8/9/2023	0.0933	156	619	0.223 J	5.9 HF	54.6	1,740	< 0.00400	NA	0.181	NA	NA	NA	0.00223	0.223 J	NA	< 0.0400	NA	NA	0.00607	NA	3.38
4/24/2023	NA	NA	NA	< 0.500	NA	NA	NA	< 0.00400	< 0.00400	0.129	< 0.00200	< 0.00200	< 0.00400	< 0.00200	< 0.500	< 0.00200	< 0.0400	< 0.000200	< 0.00200	0.00582	< 0.00200	4.38
12/6/2022	< 0.0500	73.1	410	< 0.500	5.8 HF	53.9	878	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/18/2022	0.0332	130	611	< 0.500	5.9 HF	132	1,350	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/18/2021	0.0317	220	1,060	< 0.500	6.2 HF	94.1	2,300	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2021	0.0314	156	798	< 0.500	5.8 HF	26.1	1,500	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/27/2020	0.0237	162 D	640 D	< 0.500	5.40 K	41.1	1,340	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/28/2020	0.0227	156 D	706 D	< 0.500	5.83 K	55.2	1,210	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/22/2019	0.0195	137 D	806 D	< 0.500	6.21 K	96.4	1,810	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/4/2019	0.0280	69.6	350	< 0.500	6.08 K	37.8	697	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/9/2018	0.0243	27.8	153	< 0.500	6.67 K	38.4	379	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
4/26/2018	0.0224	60.5 E	386 D	< 0.500	6.30 K	78.5	905	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
10/10/2017	0.0198	226	957	< 0.500	5.05 K	87.4	1,980	NA	NA	NA	NA	NA	NA	NA	< 0.500	NA	NA	NA	NA	NA	NA	NA
8/15/2017	0.0228	188	926	< 0.500	6.06 K	52.0	1,620	< 0.00200	0.00354	0.544	0.00201	0.00258	0.0107	0.00626	< 0.500	0.00758	0.0246	< 0.000200	< 0.00200	0.00935	< 0.00200	10.46
6/22/2017	0.0285	118	544 D	< 0.500	6.13 K	47.9	1,250	< 0.00200	0.00640	0.382	0.00292	< 0.00200	0.0168	0.0114	< 0.500	0.0140	< 0.0200	< 0.000200	< 0.00200	0.0112	< 0.00200	5.59
3/28/2017	0.0370	61.6	417 D	< 0.500	5.85 K	55.9	987	< 0.00200	< 0.00200	0.173	< 0.00200	< 0.00200	< 0.00400	0.00254	< 0.500	< 0.00200	< 0.0200	< 0.000200	< 0.00200	0.00690	< 0.00200	3.50
1/24/2017	0.0267	91.6	494 D	< 0.500	5.62 K	55.2	1,110	< 0.00200	0.00237	0.272	< 0.00200	< 0.00200	0.00813	0.00459	< 0.500	0.00473	< 0.0200	< 0.000200	< 0.00200	0.00694	< 0.00200	3.97
11/29/2016	0.0354	54.5	394	< 0.500	5.63 K	51.6	1,040	< 0.00200	< 0.00200	0.164	< 0.00200	< 0.00200	0.00403	0.00239	< 0.500	0.00257	< 0.0200	< 0.000200	< 0.00200	0.00919	< 0.00200	5.47
9/27/2016	0.0289	97.6	518 D	0.255	5.75 K	48.0	1,220	< 0.00200	< 0.00200	0.320	< 0.00200	< 0.00200	< 0.00400	0.00407	0.255	< 0.00200	0.0219	< 0.000200	< 0.00200	0.00879	< 0.00200	3.68
7/26/2016	0.362	80.1	432 D	0.441	5.79 K	< 0.200	1,010	< 0.00200	0.00308	0.359	< 0.00200	< 0.00200	0.0102	0.00794	0.441	0.00637	0.0501	< 0.000200	< 0.00200	0.00528	< 0.00200	6.05
6/14/2016	0.740	38.0	263 D	< 0.200	5.84 K	28.2	714	< 0.00200	0.00344	0.234	< 0.00200	< 0.00200	0.0121	0.00796	< 0.200	0.00764	< 0.0200	< 0.000200	< 0.00200	0.00695	< 0.00200	3.46

Notes:
mg/L = milligrams per liter.
pCi/L = picocuries per liter.
SU = Standard units.
< = Compound not detected. Reportable detection limit shown.
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F2 or X = MS and/or MSD recovery exceeds control limits.
HF or K = Sample analyzed outside of recommended hold time.
J = Estimated value.
JH = Estimated value with high bias.

FIGURES

APRX Path | Layout Name: M:\US\Projects\A-C\CPS_Energy\Twin Oaks - CCR Landfill\Twin Oaks - CCR Landfill.aprx | Figure 1-1

Map Author: HECTOR.SAENZ

Legend

- Registration Boundary
- CCR Landfill
- Stormwater Detention Ponds
- Twin Oaks Power Station CCR Landfill

Figure 1-1

Site Map

CCR Landfill

Twin Oaks Power Station

13065 Plant Road, Bremond, Texas

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APRX Path | Layout Name: M:\US\Projects\A-C\CPS_Energy\Twin Oaks - CCR Landfill\Twin Oaks - CCR Landfill.aprx | Figure 3-1

Map Author: HECTOR SAENZ

Legend

- Registration Boundary
- CCR Landfill
- Stormwater Detention Ponds
- Upgradient Wells
- Downgradient Wells
- Observation Wells (Not included in Monitoring Well Network)

Figure 3-1

CCR Well Network Location Map

CCR Landfill

Twin Oaks Power Station

13065 Plant Road, Bremond, Texas

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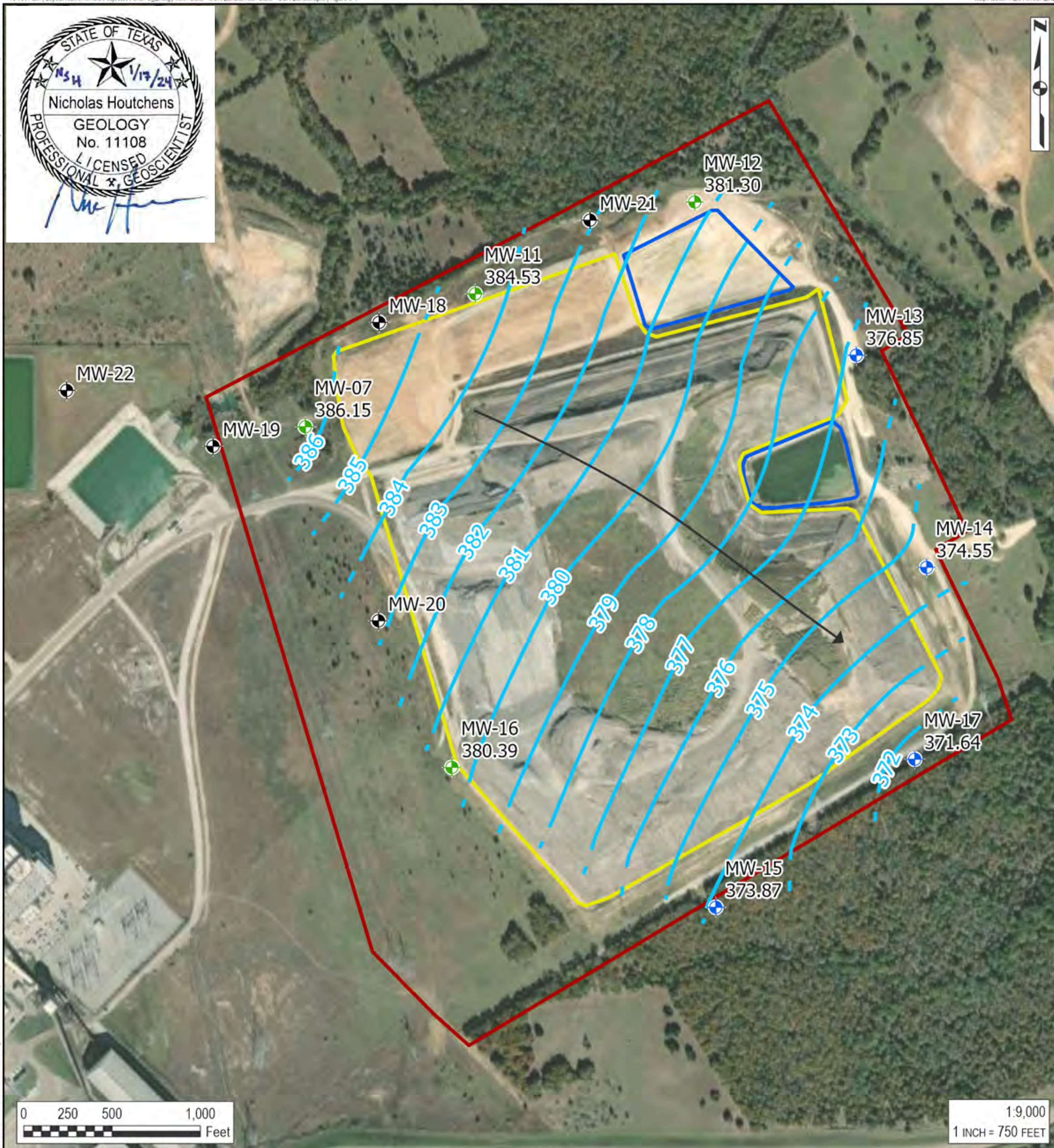

Legend

- Registration Boundary
- CCR Landfill
- Stormwater Detention Ponds
- Upgradient Wells
- Downgradient Wells
- Observation Wells (Not included in Monitoring Well Network)
- 376 Potentiometric Surface Contour (Feet, Mean Sea Level) - Dashed Where Inferred
- Groundwater Flow Direction
- 376.85 Potentiometric Surface Elevation (Feet, Mean Sea Level)

Figure 5-1

April 2023 Potentiometric Surface Map

CCR Landfill
Twin Oaks Power Station
13065 Plant Road, Bremond, Texas

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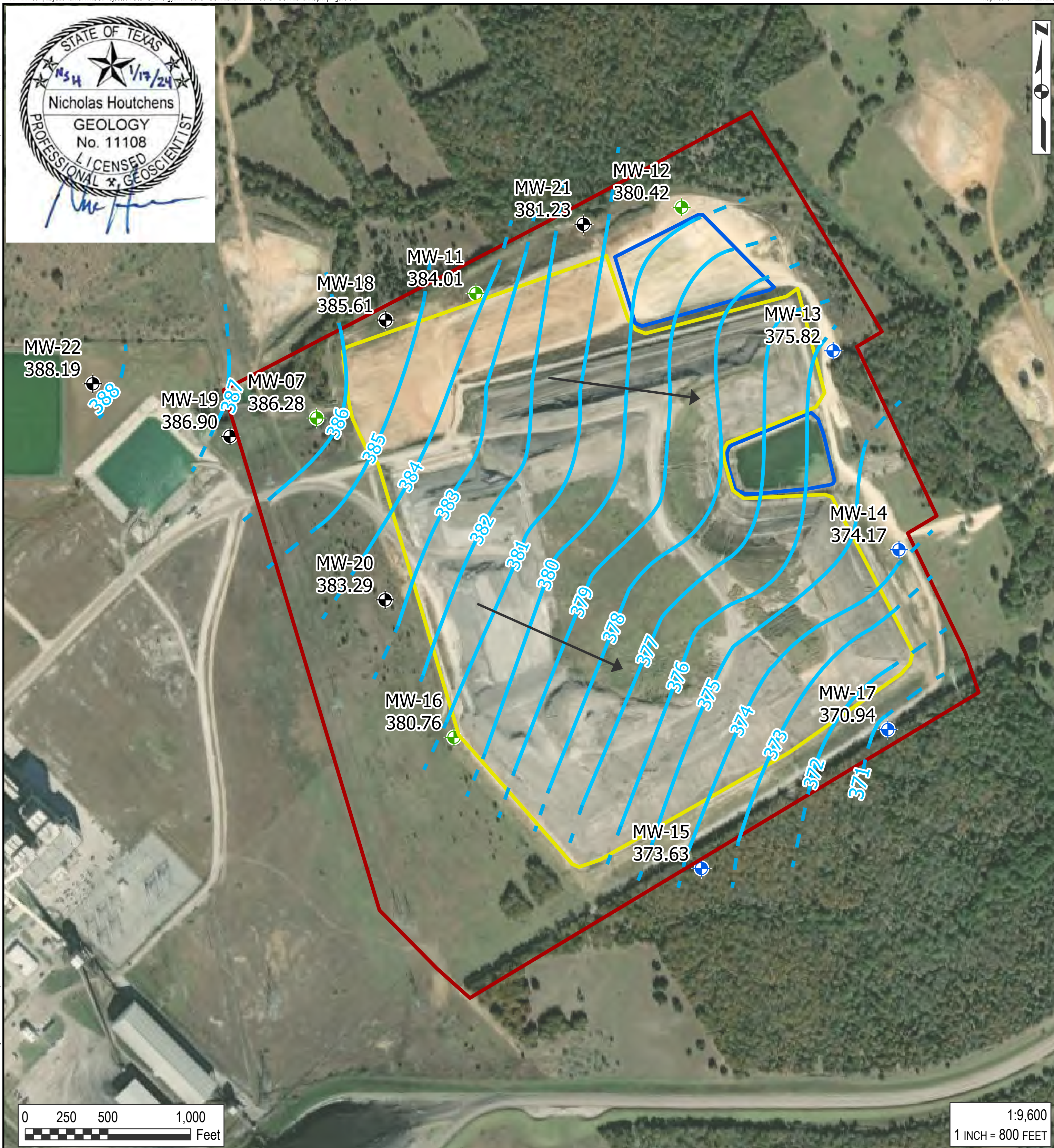
APRX Path | Layout Name: M:\US\Projects\A-C\CPS_Energy\Twin Oaks - CCR Landfill\Twin Oaks - CCR Landfill.aprx | Figure 5-2

Map Author: KATY.ALBANO

Revised: 12/15/2023 | Scale: 1:35,157,624 when printed at 8.5"x11"



Legend

- Registration Boundary
- CCR Landfill
- Stormwater Detention Ponds
- Upgradient Wells
- Downgradient Wells
- Observation Wells (Not included in Monitoring Well Network)
- 376 Potentiometric Surface Contour (Feet, Mean Sea Level) - Dashed Where Inferred
- Groundwater Flow Direction
- 376.85 Potentiometric Surface Elevation (Feet, Mean Sea Level)

Figure 5-2

August 2023 Potentiometric Surface Map

CCR Landfill

Twin Oaks Power Station

13065 Plant Road, Bremond, Texas

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APPENDIX A NOTICE OF ESTABLISHMENT OF AN ASSESSMENT MONITORING PROGRAM

Mesquite Generation

Eddy Young
Environmental Manager

P.O. Box 37
13065 Plant Rd.
Bremond, TX 76629
Tel: (254)342-3664
Eddy.young@mesquitegen.com

May 26, 2023

MC-130
Industrial and Hazardous Waste Permits Section
Waste Permits Division
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

RE: Notification of Initiation of Assessment Monitoring Program
Twin Oaks Power Station Coal Combustion Residuals Landfill
Major Oak Power, LLC
Bremond (Robertson County), Texas
CCR Registration No. CCR112
TCEQ SWR No. 37677; EPA ID No. TXD987997988
RN100226570/CN604670034

To Whom It May Concern:

The following information is provided on behalf of Twin Oaks Power Station Coal Combustion Residuals ("CCR") Landfill ("the facility") and is prepared in accordance with the requirements of the facility's Groundwater Sampling and Analysis Plan ("GWSAP"), the state CCR Rules, 30 TAC Chapter 352, and the federal CCR Rule, 40 CFR Part 257, Subpart D.

In accordance with applicable regulations and the GWSAP, Twin Oaks has established an assessment monitoring program that will be initiated at the next regularly scheduled monitoring event. Assessment monitoring will include the Landfill's CCR unit monitoring well network and each monitoring well will be analyzed for Appendix IV constituents in accordance with 30 TAC §352.951 and 40 CFR §257.95.

This notification has been placed in the facility's operating record and uploaded to the internet site pursuant to the CCR rule 40 CFR 257.107(f)(4). The internet site is publicly accessible at www.twinoaksccr.com.

Should you have any questions, please feel free to contact me at (254) 342-3664 or via email at Eddy.Young@mesquitegen.com.

Sincerely,

Eddy Young

Eddy Young
Environmental Manager

Distribution:

(E-Copy)	MC-130 Industrial and Hazardous Waste Permits Waste Permits Division Texas Commission on Environmental Quality P. O. Box 13087 Austin, Texas 78711-3087
(1 + E-Copy)	Mr. Eddy Young Environmental Manager Twin Oaks P.O. Box 37 Bremond, Texas 76629
(E-Copy)	Mr. John J. Tayntor, P.E. Auckland Consulting, LLC P.O. Box 8155 Jacksonville, Texas 75766
(E-Copy)	Hydrex Environmental

APPENDIX B LABORATORY AND DATA USABILITY SUMMARY REPORTS

eurofins | Environment Testing

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

ANALYTICAL REPORT

PREPARED FOR

Attn: Michelle Transier
Hydrex Environmental
312 Old Tyler Rd
Nacogdoches, Texas 75961

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JOB DESCRIPTION

Twin Oaks PP

JOB NUMBER

860-47755-1

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477

See page two for job notes and contact information.

myEOL

Job Notes

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Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization

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Definitions/Glossary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method 6010D Detection Limit Validation

Laboratory Eurofins Houston

Preparation Method: 3010A MDLV

Limit Group MT - 6010B_C_D - Water - RL_MDL

Analysis Dates: 2/17/2023 to 2/17/2023 **Equipment:** A261

Analyte

Li

Current	
MDL	RL
0.03650	0.04

Calculations							
Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.03650	0.04	mg/L	1.1	0.0392	NA	1	N

MDLV used - 90624-19 All values recovere
MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-F MDL'	02/17/2023	90624	19	Mavani, Jaykumar D	6010D	3010A	A261	0.0392	mg/L	Pass

Detected? Pass = result was detected ; Fail = result < = 0 . If MDLV is < MDL , verify Detection or S/N ratio
MDLV: Pass = meets Spike/MDL ratio , Spike High =Spike/MDL > ratio , Spike Low = Spike < MDL
Spike/MDL ratio = 3.00

Method 6020A Detection Limit Validation

Laboratory Eurofins Houston

Preparation Method: 3010A MDLV

Limit Group MT - 6020_A-B - Water - ALL

Analysis Dates: 2/17/2023 to 5/24/2023 **Equipment:** A311

Analyte

Ag

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000156	0.002	0.000156	0.002	mg/L	12.8	0.00185	0.0001258	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001942	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001764	mg/L	Pass

Al

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.005492	0.02	0.005492	0.02	mg/L	3.6	0.01803	0.0003280	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.017798	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.018262	mg/L	Pass

As

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000690	0.004	0.000690	0.004	mg/L	5.8	0.00350	8.6267027	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.003446	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.003568	mg/L	Pass

B

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.004007	0.010	0.004007	0.01	mg/L	2.5	0.01127	0.0018752	2	N

MDLV used - 90828-20 All values recovere
MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.012602	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.00995	mg/L	Pass

Ba

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.001342	0.004	0.001342	0.004	mg/L	3	0.00331	0.0001965	2	N

MDLV used - 90828-20 All values recovere
MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.00318	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.003458	mg/L	Pass

Be

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000271	0.002	0.000271	0.002	mg/L	7.4	0.00183	9.3338095	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001902	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.00177	mg/L	Pass

Ca

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.030053	0.1	0.030053	0.1	mg/L	3.3	0.07855	0.0090269	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Analyte

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.084936	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.07217	mg/L	Pass

Cd

Current MDL	Current RL
0.000240	0.002

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000240	0.002	mg/L	8.3	0.00179	7.6367532	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.00174	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001848	mg/L	Pass

Co

Current MDL	Current RL
0.000355	0.002

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000355	0.002	mg/L	5.6	0.00178	5.6568542	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001792	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001784	mg/L	Pass

Cr

Current MDL	Current RL
0.000560	0.004

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000560	0.004	mg/L	7.1	0.00350	4.9497474	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.003468	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.003538	mg/L	Pass

Cu

Current MDL	Current RL
0.00388	0.004

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.00388	0.004	mg/L	1	0.00354	4.6669047	2	N

MDLV used - 90828-20 All values recovere
MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.003574	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.003508	mg/L	Pass

Fe

Current MDL	Current RL
0.02828	0.1

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.02828	0.02	mg/L	.7	0.01732	0.0003351	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike Low

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.017084	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.017558	mg/L	Pass

K

Current MDL	Current RL
0.022004	0.1

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.022004	0.1	mg/L	4.5	0.09124	0.0036302	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.088682	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.093816	mg/L	Pass

Mg

Current MDL	Current RL
0.01638	0.1

Calculations

Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.01638	0.1	mg/L	6.1	0.08739	0.0016206	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.086246	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.088538	mg/L	Pass

Analyte

Mn

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000759	0.002	0.000759	0.002	mg/L	2.6	0.00174	5.3740115	2	N

MDLV used - 90828-20 All values recovere
MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001784	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001708	mg/L	Pass

Mo

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000255	0.002	0.000255	0.002	mg/L	7.8	0.00208	0.0003959	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.00236	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.0018	mg/L	Pass

Na

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.056449	0.1	0.056449	0.1	mg/L	1.8	0.08117	0.0054022	2	N

MDLV used - 90828-20 All values recovere
MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.084994	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.077354	mg/L	Pass

Ni

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000528	0.002	0.000528	0.002	mg/L	3.8	0.00163	4.2426406	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001604	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001664	mg/L	Pass

Pb

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000367	0.002	0.000367	0.002	mg/L	5.4	0.00174	9.8994949	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.00175	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001736	mg/L	Pass

Sb

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.002200	0.004	0.002200	0.002	mg/L	.9	0.00406	0.0026290	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike Low

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.005924	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.002206	mg/L	Pass

Se

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.000266	0.002	0.000266	0.002	mg/L	7.5	0.00192	0.0002757	2	N

MDLV used - 90828-20 All values recovere
MDLV: Spike High

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001732	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.002122	mg/L	Pass

Analyte

Sn

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Spike High
0.000335	0.002	0.000335	0.002	mg/L	6	0.00178	0.0003309	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.002018	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.00155	mg/L	Pass

Sr

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Spike High
0.000738	0.010	0.000738	0.01	mg/L	13.6	0.00880	9.1923881	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.008742	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.008872	mg/L	Pass

Ti

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Spike High
0.000643	0.004	0.000643	0.004	mg/L	6.2	0.00349	0.0002390	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.00333	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.003668	mg/L	Pass

Tl

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Spike High
0.000185	0.002	0.000185	0.002	mg/L	10.8	0.00180	1.4142135	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.001796	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001816	mg/L	Pass

U

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Spike High
0.0002109	.001	0.000210	0.001	mg/L	4.7	0.00084	1.8384776	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.000836	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.000862	mg/L	Pass

V

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Spike High
0.000172	0.002	0.000172	0.002	mg/L	11.6	0.00174	1.5556349	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.00176	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.001738	mg/L	Pass

Zn

Current		Calculations								*MDLV used - 90828-20* All values recovere
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	MDLV: Pass
0.002741	0.004	0.002741	0.004	mg/L	1.5	0.00362	0.0001103	2	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-E MDL	02/17/2023	90828	20	Pandey, Deepak	6020A	3010A	A311	0.003544	mg/L	Pass
860-46395-A-1-E MDL	05/24/2023	104619	23	Pandey, Deepak	6020A	3010A	A311	0.0037	mg/L	Pass

Detected? Pass = result was detected ; Fail = result < = 0 . If MDLV is < MDL , verify Detection or S/N ratio
MDLV: Pass = meets Spike/MDL ratio , Spike High =Spike/MDL > ratio , Spike Low = Spike < MDL
Spike/MDL ratio = 3.00

Method 7470A Detection Limit Validation

Laboratory Eurofins Houston

Preparation Method: 7470A_Prep MDLV

Limit Group MT - 7470A - Water - ALL

Analysis Dates: 1/12/2023 to 1/12/2023 **Equipment:** A352

Analyte

Hg

Current		Calculations								MDLV:
MDL	RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?	
0.00003169	0.00020		0	mg/L		NaN	NA	0	N	

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-40393-A-1-A MDL	01/12/2023	85617	25	Hernandez, Salvador	7470A	7470A_Prep	A352	0.000088	mg/L	

Detected? Pass = result was detected ; Fail = result < = 0 . If MDLV is < MDL , verify Detection or S/N ratio
MDLV: Pass = meets Spike/MDL ratio , Spike High =Spike/MDL > ratio , Spike Low = Spike < MDL
Spike/MDL ratio = 3.00

Method 300 ORGFM 28 Detection Limit Validation

Laboratory Eurofins Houston

MDLV

Limit Group WC - 300_9056A 28D - Water - RL_MDL

Analysis Dates: 4/26/2023 to 4/29/2023

Analyte

Fluoride

Current MDL	Current RL	Ver MDL	Spike amount	Units	Spike / MDL	Mean	Std Dev	Reps	Edit Limts?
0.1	0.5000	0.1	0.25	mg/L	2.5	0.24090	0.0326016	9	N

MDLV used - 100503-53 All values recover

MDLV: Pass

Lab ID	Anal Date	Batch	Samp	Analyst	Method	Prep Method	Equipment	Result	Units	Detected?
860-38014-A-8 MDLV	04/26/2023	100503	53	Prommek, Warangkhar	300_ORGFM_2	No Prep	A166	0.27590569	mg/L	Pass
860-38014-A-8 MDLV	04/26/2023	100506	64	Prommek, Warangkhar	300_ORGFM_2	No Prep	A317	0.20721978	mg/L	Pass
860-38014-A-8 MDLV	04/27/2023	100741	18	Prommek, Warangkhar	300_ORGFM_2	No Prep	A166	0.29161339	mg/L	Pass
860-38014-A-8 MDLV	04/27/2023	100745	18	Prommek, Warangkhar	300_ORGFM_2	No Prep	A317	0.19597051	mg/L	Pass
860-38014-A-8 MDLV	04/27/2023	100750	16	Prommek, Warangkhar	300_ORGFM_2	No Prep	A263	0.24156312	mg/L	Pass
860-38014-A-8 MDLV	04/28/2023	100966	12	Prommek, Warangkhar	300_ORGFM_2	No Prep	A263	0.24920372	mg/L	Pass
860-38014-A-8 MDLV	04/28/2023	100953	29	Prommek, Warangkhar	300_ORGFM_2	No Prep	A317	0.20871002	mg/L	Pass
860-38014-A-8 MDLV	04/29/2023	101063	22	Prommek, Warangkhar	300_ORGFM_2	No Prep	A166	0.26155995	mg/L	Pass
860-38014-A-8 MDLV	04/29/2023	101059	12	Prommek, Warangkhar	300_ORGFM_2	No Prep	A263	0.23640180	mg/L	Pass

Detected? Pass = result was detected ; Fail = result < = 0 . If MDLV is < MDL , verify Detection or S/N ratio
MDLV: Pass = meets Spike/MDL ratio , Spike High =Spike/MDL > ratio , Spike Low = Spike < MDL
Spike/MDL ratio = 3.00

Appendix A
Laboratory Data Package Cover Page - Page 1 of 4

This data package is for Job No. 860-47755-1 and consists of:

This signature page, the laboratory review checklist, and the following reportable data:

☑ R1- Field chain-of-custody documentation;

☑ R2 - Sample identification cross-reference;

☑ R3 - Test reports (analytical data sheets) for each environmental sample that includes:
- a. Items consistent with NELAC Chapter 5,
- b. dilution factors,
- c. preparation methods,
- d. cleanup methods, and
- e. if required for the project, tentatively identified coumpounds (TICs).

☐ R4 - Surrogate recovery data including:
- a. Calculated recovery (%R), and
- b. The laboratory's surrogate QC limits.

☑ R5 - Test reports/summary forms for blank samples;

☑ R6 - Test reports/summary forms for laboratory control samples (LCSs) including:
- a. LCS spiking amounts,
- b. Calculated %R for each analyte, and
- c. The laboratory's LCS QC limits.

☑ R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
- a. Samples associated with the MS/MSD clearly identified,
- b. MS/MSD spiking amounts,
- c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d. Calculated %Rs and relative percent differences (RPDs), and
- e. The laboratory's MS/MSD QC limits

☐ R8 - Laboratory analytical duplicate (if applicable) recovery and precision:
- a. The amount of analyte measured in the duplicate,
- b. The calculated RPD, and
- c. The laboratory's QC limits for analytical duplicates.

☑ R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix;

☑ R10 - Other problems or anomalies.

☐ Exception Report for every "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: ☐ This laboratory meets an exception under 30 TAC §25.6 and was last inspected by ☐ TCEQ or ☐ ______ on __/__/__. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date
Anita Patel	Anita Patel	Project Manager	06/02/2023

Laboratory Data Package Cover Page - Page 2 of 4

Laboratory Name: Eurofins Houston	LRC Date: 06/02/2023
Project Name: Twin Oaks PP	Laboratory Job Number: 860-47755-1
Reviewer Name: Anita Patel	

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	**Chain-of-custody (C-O-C)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
		Were all departures from standard conditions described in an exception report?	✓				
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?	✓				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	✓				
		Were calculations checked by a peer or supervisor?	✓				
		Were all analyte identifications checked by a peer or supervisor?	✓				
		Were sample detection limits reported for all analytes not detected?	✓				
		Were all results for soil and sediment samples reported on a dry weight basis?			✓		
		Were % moisture (or solids) reported for all soil and sediment samples?			✓		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			✓		
		If required for the project, are TICs reported?			✓		
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			✓		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	✓				
		Were blanks analyzed at the appropriate frequency?	✓				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
		Were blank concentrations < MQL?	✓				
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	✓				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
		Were LCSs analyzed at the required frequency?	✓				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	✓				
		Was the LCSD RPD within QC limits?	✓				
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	✓				
		Were MS/MSD analyzed at the appropriate frequency?		✓			1
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	✓				
		Were MS/MSD RPDs within laboratory QC limits?	✓				
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?			✓		
		Were analytical duplicates analyzed at the appropriate frequency?			✓		
		Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	✓				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	✓				
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	✓				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	✓				

Laboratory Data Package Cover Page - Page 3 of 4

Laboratory Name: Eurofins Houston	LRC Date: 06/02/2023
Project Name: Twin Oaks PP	Laboratory Job Number: 860-47755-1
Reviewer Name: Anita Patel	

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	✓				
		Were percent RSDs or correlation coefficient criteria met?	✓				
		Was the number of standards recommended in the method used for all analytes?	✓				
		Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
		Are ICAL data available for all instruments used?	✓				
		Has the initial calibration curve been verified using an appropriate second source standard?	✓				
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):**					
		Was the CCV analyzed at the method-required frequency?	✓				
		Were percent differences for each analyte within the method-required QC limits?	✓				
		Was the ICAL curve verified for each analyte?	✓				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	✓				
S3	O	**Mass spectral tuning**					
		Was the appropriate compound for the method used for tuning?			✓		
		Were ion abundance data within the method-required QC limits?			✓		
S4	O	**Internal standards (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			✓		
S5	OI	**Raw data (NELAC Section 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
		Were data associated with manual integrations flagged on the raw data?	✓				
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?			✓		
S7	O	**Tentatively identified compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
S8	I	**Interference Check Sample (ICS) results**					
		Were percent recoveries within method QC limits?	✓				
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?	✓				
		Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
S11	OI	**Proficiency test reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?	✓				
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	✓				
		Is documentation of the analyst's competency up-to-date and on file?	✓				
S15	OI	**Verification/validation documentation for methods (NELAC Chapter 5)**					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
S16	OI	**Laboratory standard operating procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	✓				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Data Package Cover Page - Page 4 of 4

Laboratory Name: Eurofins Houston	LRC Date: 06/02/2023
Project Name: Twin Oaks PP	Laboratory Job Number: 860-47755-1
Reviewer Name: Anita Patel	

ER#[1]	Description
1	Method 903.0: Radium-226 Prep 160-610885Insufficient sample volume was available to perform a sample duplicate for the following samples: DUP (860-47755-1), MW-7 (860-47755-2), MW-11 (860-47755-3), MW-12 (860-47755-4), MW-13 (860-47755-5), MW-14 (860-47755-6), MW-15 (860-47755-7), MW-16 (860-47755-8) and MW-17 (860-47755-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision. Method 904.0: Radium-228 Prep Batch 160-610896Insufficient sample volume was available to perform a sample duplicate for the following samples: DUP (860-47755-1), MW-7 (860-47755-2), MW-11 (860-47755-3), MW-12 (860-47755-4), MW-13 (860-47755-5), MW-14 (860-47755-6), MW-15 (860-47755-7), MW-16 (860-47755-8) and MW-17 (860-47755-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.
Misc.	Method 904.0: Radium-228 prep batch 160-610896:The Ra-228 laboratory control sample and/or laboratory control sample duplicate (LCS/LCSD) associated with the following samples recovered at <spike recovery>: (LCS 160-610896/2-A). The limits in our LIMS system at (75-125%) reflect the requirements of a regulatory agency that represents a large amount of our work. However the samples associated with this LCS are not from this agency and are therefore held to our in-house statistical limits of (63-154%) per method requirements. The LCS is within criteria and no further action is required.

1. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

Case Narrative

Client: Hydrex Environmental Job ID: 860-47755-1
Project/Site: Twin Oaks PP

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Job ID: 860-47755-1

Laboratory: Eurofins Houston

Narrative

Job Narrative
860-47755-1

Receipt
The samples were received on 4/26/2023 9:09 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 2.3º C.

RAD
Methods 903.0, 9315: Radium-226 batch 610885
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
DUP (860-47755-1), MW-7 (860-47755-2), MW-11 (860-47755-3), MW-12 (860-47755-4), MW-13 (860-47755-5), MW-14 (860-47755-6), MW-15 (860-47755-7), MW-16 (860-47755-8), MW-17 (860-47755-9), (LCS 160-610885/2-A), (LCSD 160-610885/3-A) and (MB 160-610885/1-A)

Methods 904.0, 9320: Radium-228 prep batch 160-610896:

The Ra-228 laboratory control sample and/or laboratory control sample duplicate (LCS/LCSD) associated with the following samples recovered at <spike recovery>: (LCS 160-610896/2-A). The limits in our LIMS system at (75-125%) reflect the requirements of a regulatory agency that represents a large amount of our work. However the samples associated with this LCS are not from this agency and are therefore held to our in-house statistical limits of (63-154%) per method requirements. The LCS within criteria and no further action is required.

Methods 904.0, 9320: Radium-228 prep batch 160-610896:

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.DUP (860-47755-1), MW-7 (860-47755-2), MW-11 (860-47755-3), MW-12 (860-47755-4), MW-13 (860-47755-5), MW-14 (860-47755-6), MW-15 (860-47755-7), MW-16 (860-47755-8), MW-17 (860-4775 (LCS 160-610896/2-A), (LCSD 160-610896/3-A) and (MB 160-610896/1-A)

Method PrecSep_0: Radium-228 Prep Batch 160-610896

Insufficient sample volume was available to perform a sample duplicate for the following samples: DUP (860-47755-1), MW-7 (860-47755-2), MW-11 (860-47755-3), MW-12 (860-47755-4), MW-13 (860-47755-5), MW-14 (860-47755-6), MW-15 (860-4775 MW-16 (860-47755-8) and MW-17 (860-47755-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep-21: Radium-226 Prep 160-610885

Insufficient sample volume was available to perform a sample duplicate for the following samples: DUP (860-47755-1), MW-7 (860-47755-2), MW-11 (860-47755-3), MW-12 (860-47755-4), MW-13 (860-47755-5), MW-14 (860-47755-6), MW-15 (860-4775 MW-16 (860-47755-8) and MW-17 (860-47755-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

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

Metals

Job ID: 860-47755-1 (Continued)

Laboratory: Eurofins Houston (Continued)

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

General Chemistry

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

Detection Summary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: DUP
Lab Sample ID: 860-47755-1

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.0177		0.00400		mg/L	1		6020A	Total/NA
Cobalt	0.00209		0.00200		mg/L	1		6020A	Total/NA

Client Sample ID: MW-7
Lab Sample ID: 860-47755-2

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.0166		0.00400		mg/L	1		6020A	Total/NA

Client Sample ID: MW-11
Lab Sample ID: 860-47755-3

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.0176		0.00400		mg/L	1		6020A	Total/NA

Client Sample ID: MW-12
Lab Sample ID: 860-47755-4

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.0913		0.00400		mg/L	1		6020A	Total/NA
Cobalt	0.00429		0.00200		mg/L	1		6020A	Total/NA

Client Sample ID: MW-13
Lab Sample ID: 860-47755-5

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.0832		0.00400		mg/L	1		6020A	Total/NA

Client Sample ID: MW-14
Lab Sample ID: 860-47755-6

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lithium	0.0576		0.0400		mg/L	1		6010C	Total/NA
Barium	0.0247		0.00400		mg/L	1		6020A	Total/NA
Cobalt	0.00497		0.00200		mg/L	1		6020A	Total/NA
Selenium	0.782		0.00200		mg/L	1		6020A	Total/NA

Client Sample ID: MW-15
Lab Sample ID: 860-47755-7

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Antimony	0.00585		0.00400		mg/L	1		6020A	Total/NA
Barium	0.105		0.00400		mg/L	1		6020A	Total/NA
Selenium	0.00398		0.00200		mg/L	1		6020A	Total/NA

Client Sample ID: MW-16
Lab Sample ID: 860-47755-8

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.0524		0.00400		mg/L	1		6020A	Total/NA

Client Sample ID: MW-17
Lab Sample ID: 860-47755-9

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Barium	0.129		0.00400		mg/L	1		6020A	Total/NA
Selenium	0.00582		0.00200		mg/L	1		6020A	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Houston

Client Sample Results

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: DUP

Date Collected: 04/24/23 12:28
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-1
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 03:56	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:04	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:45	1
Arsenic	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:45	1
Barium	**0.0177**		0.00400		mg/L		05/02/23 10:30	05/02/23 17:45	1
Beryllium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1
Cadmium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1
Chromium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:45	1
Cobalt	**0.00209**		0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1
Lead	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1
Selenium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1
Thallium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:45	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:02	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.238**		0.161	0.163	1.00	0.226	pCi/L	05/10/23 12:57	06/01/23 08:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.9*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:11*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.30**		0.474	0.489	1.00	0.585	pCi/L	05/10/23 14:05	05/30/23 12:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.9*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:35*	*1*
Y Carrier	*82.0*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:35*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.53**		0.501	0.515	5.00	0.585	pCi/L		06/01/23 15:44	1

Eurofins Houston

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-7
Date Collected: 04/24/23 11:42
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-2
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 06:23	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:07	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:55	1
Arsenic	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:55	1
Barium	**0.0166**		0.00400		mg/L		05/02/23 10:30	05/02/23 17:55	1
Beryllium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1
Cadmium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1
Chromium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:55	1
Cobalt	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1
Lead	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1
Selenium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1
Thallium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:55	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:03	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.110	U	0.139	0.139	1.00	0.230	pCi/L	05/10/23 12:57	06/01/23 09:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.5*		*30 - 110*	*05/10/23 12:57*	*06/01/23 09:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.09**		0.455	0.465	1.00	0.582	pCi/L	05/10/23 14:05	05/30/23 12:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.5*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*
Y Carrier	*82.3*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.20**		0.476	0.485	5.00	0.582	pCi/L		06/01/23 15:44	1

Client Sample Results

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-11

Lab Sample ID: 860-47755-3

Date Collected: 04/24/23 12:28
Matrix: Water
Date Received: 04/26/23 09:09

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 04:26	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:11	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:57	1
Arsenic	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:57	1
Barium	**0.0176**		0.00400		mg/L		05/02/23 10:30	05/02/23 17:57	1
Beryllium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1
Cadmium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1
Chromium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 17:57	1
Cobalt	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1
Lead	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1
Selenium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1
Thallium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 17:57	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:04	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.242**		0.164	0.165	1.00	0.230	pCi/L	05/10/23 12:57	06/01/23 08:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.4*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:12*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.37**		0.496	0.512	1.00	0.621	pCi/L	05/10/23 14:05	05/30/23 12:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.4*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*
Y Carrier	*80.9*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.62**		0.522	0.538	5.00	0.621	pCi/L		06/01/23 15:44	1

Eurofins Houston

Client Sample ID: MW-12

Date Collected: 04/24/23 13:40
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-4

Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 04:35	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:14	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 18:00	1
Arsenic	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 18:00	1
Barium	**0.0913**		0.00400		mg/L		05/02/23 10:30	05/02/23 18:00	1
Beryllium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1
Cadmium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1
Chromium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 18:00	1
Cobalt	**0.00429**		0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1
Lead	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1
Selenium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1
Thallium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:00	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:06	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.799**		0.224	0.236	1.00	0.201	pCi/L	05/10/23 12:57	06/01/23 08:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.3*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:12*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.20**		0.477	0.490	1.00	0.634	pCi/L	05/10/23 14:05	05/30/23 12:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.3*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*
Y Carrier	*82.6*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**2.00**		0.527	0.544	5.00	0.634	pCi/L		06/01/23 15:44	1

Client Sample Results

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-13
Date Collected: 04/24/23 15:26
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-5
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 04:45	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:18	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 18:02	1
Arsenic	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 18:02	1
Barium	**0.0832**		0.00400		mg/L		05/02/23 10:30	05/02/23 18:02	1
Beryllium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1
Cadmium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1
Chromium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 18:02	1
Cobalt	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1
Lead	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1
Selenium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1
Thallium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 18:02	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:07	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.621**		0.214	0.221	1.00	0.212	pCi/L	05/10/23 12:57	06/01/23 08:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.6*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:12*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**2.70**		0.574	0.626	1.00	0.524	pCi/L	05/10/23 14:05	05/30/23 12:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.6*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*
Y Carrier	*84.0*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**3.32**		0.613	0.664	5.00	0.524	pCi/L		06/01/23 15:44	1

Eurofins Houston

Client Sample ID: MW-14

Lab Sample ID: 860-47755-6

Date Collected: 04/24/23 17:35
Matrix: Water
Date Received: 04/26/23 09:09

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 07:02	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.0576**		0.0400		mg/L		05/04/23 09:30	05/04/23 18:21	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 15:59	1
Arsenic	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 15:59	1
Barium	**0.0247**		0.00400		mg/L		05/03/23 09:00	05/03/23 15:59	1
Beryllium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1
Cadmium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1
Chromium	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 15:59	1
Cobalt	**0.00497**		0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1
Lead	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1
Selenium	**0.782**		0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1
Thallium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:59	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:08	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.280**		0.191	0.193	1.00	0.276	pCi/L	05/10/23 12:57	06/01/23 08:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.5*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:12*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.76**		0.527	0.551	1.00	0.599	pCi/L	05/10/23 14:05	05/30/23 12:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.5*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*
Y Carrier	*83.7*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**2.04**		0.561	0.584	5.00	0.599	pCi/L		06/01/23 15:44	1

Client Sample Results

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-15

Date Collected: 04/24/23 16:11
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-7

Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 05:14	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:39	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	**0.00585**		0.00400		mg/L		05/03/23 09:00	05/03/23 15:38	1
Arsenic	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 15:38	1
Barium	**0.105**		0.00400		mg/L		05/03/23 09:00	05/03/23 15:38	1
Beryllium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1
Cadmium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1
Chromium	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 15:38	1
Cobalt	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1
Lead	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1
Selenium	**0.00398**		0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1
Thallium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 15:38	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:11	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.577**		0.212	0.218	1.00	0.219	pCi/L	05/10/23 12:57	06/01/23 08:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:12*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.37**		0.494	0.510	1.00	0.605	pCi/L	05/10/23 14:05	05/30/23 12:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*
Y Carrier	*78.1*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:37*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.95**		0.538	0.555	5.00	0.605	pCi/L		06/01/23 15:44	1

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Client Sample ID: MW-16

Date Collected: 04/24/23 14:41
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-8
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 05:24	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:43	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 16:02	1
Arsenic	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 16:02	1
Barium	**0.0524**		0.00400		mg/L		05/03/23 09:00	05/03/23 16:02	1
Beryllium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1
Cadmium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1
Chromium	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 16:02	1
Cobalt	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1
Lead	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1
Selenium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1
Thallium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:02	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:13	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.821**		0.246	0.257	1.00	0.230	pCi/L	05/10/23 12:57	06/01/23 08:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:12*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.680**		0.413	0.418	1.00	0.602	pCi/L	05/10/23 14:05	05/30/23 12:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:38*	*1*
Y Carrier	*80.1*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:38*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.50**		0.481	0.491	5.00	0.602	pCi/L		06/01/23 15:44	1

Client Sample ID: MW-17

Lab Sample ID: 860-47755-9
Date Collected: 04/24/23 16:56
Matrix: Water
Date Received: 04/26/23 09:09

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500		mg/L			05/09/23 05:34	1

Method: SW846 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 18:46	1

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 16:04	1
Arsenic	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 16:04	1
Barium	**0.129**		0.00400		mg/L		05/03/23 09:00	05/03/23 16:04	1
Beryllium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1
Cadmium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1
Chromium	<0.00400	U	0.00400		mg/L		05/03/23 09:00	05/03/23 16:04	1
Cobalt	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1
Lead	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1
Selenium	**0.00582**		0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1
Thallium	<0.00200	U	0.00200		mg/L		05/03/23 09:00	05/03/23 16:04	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200		mg/L		04/27/23 10:48	04/27/23 20:14	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.699**		0.232	0.241	1.00	0.226	pCi/L	05/10/23 12:57	06/01/23 10:02	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.8*		*30 - 110*	*05/10/23 12:57*	*06/01/23 10:02*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**3.68**		0.752	0.825	1.00	0.730	pCi/L	05/10/23 14:05	05/30/23 12:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.8*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:38*	*1*
Y Carrier	*74.7*		*30 - 110*	*05/10/23 14:05*	*05/30/23 12:38*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**4.38**		0.787	0.859	5.00	0.730	pCi/L		06/01/23 15:44	1

Tracer/Carrier Summary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(30-110)
860-47755-1	DUP	83.9
860-47755-2	MW-7	80.5
860-47755-3	MW-11	84.4
860-47755-4	MW-12	90.3
860-47755-5	MW-13	86.6
860-47755-6	MW-14	81.5
860-47755-7	MW-15	85.6
860-47755-8	MW-16	85.6
860-47755-9	MW-17	80.8
LCS 160-610885/2-A	Lab Control Sample	84.2
LCSD 160-610885/3-A	Lab Control Sample Dup	89.3
MB 160-610885/1-A	Method Blank	87.1

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(30-110)	(30-110)
860-47755-1	DUP	83.9	82.0
860-47755-2	MW-7	80.5	82.3
860-47755-3	MW-11	84.4	80.9
860-47755-4	MW-12	90.3	82.6
860-47755-5	MW-13	86.6	84.0
860-47755-6	MW-14	81.5	83.7
860-47755-7	MW-15	85.6	78.1
860-47755-8	MW-16	85.6	80.1
860-47755-9	MW-17	80.8	74.7
LCS 160-610896/2-A	Lab Control Sample	84.2	81.2
LCSD 160-610896/3-A	Lab Control Sample Dup	89.3	81.7
MB 160-610896/1-A	Method Blank	87.1	82.9

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 860-102240/25
Matrix: Water
Analysis Batch: 102240

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500	mg/L			05/08/23 21:26	1

Lab Sample ID: MB 860-102240/60
Matrix: Water
Analysis Batch: 102240

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.500	U	0.500	mg/L			05/09/23 03:08	1

Lab Sample ID: LCS 860-102240/61
Matrix: Water
Analysis Batch: 102240

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Fluoride	10.0	10.62		mg/L		106	90 - 110

Lab Sample ID: LCSD 860-102240/62
Matrix: Water
Analysis Batch: 102240

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Fluoride	10.0	10.59		mg/L		106	90 - 110	0	20

Lab Sample ID: LLCS 860-102240/17
Matrix: Water
Analysis Batch: 102240

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Fluoride	0.500	0.5252		mg/L		105	50 - 150

Lab Sample ID: 860-47755-1 MS
Matrix: Water
Analysis Batch: 102240

Client Sample ID: DUP
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Fluoride	<0.500	U	10.0	9.357		mg/L		92	90 - 110

Lab Sample ID: 860-47755-1 MSD
Matrix: Water
Analysis Batch: 102240

Client Sample ID: DUP
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Fluoride	<0.500	U	10.0	9.392		mg/L		92	90 - 110	0	15

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 860-101711/1-A
Matrix: Water
Analysis Batch: 101898

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 101711

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0400	U	0.0400		mg/L		05/04/23 09:30	05/04/23 16:31	1

Lab Sample ID: LCS 860-101711/2-A
Matrix: Water
Analysis Batch: 101898

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 101711

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Lithium	1.00	0.9790		mg/L		98	80 - 120

Lab Sample ID: LCSD 860-101711/3-A
Matrix: Water
Analysis Batch: 101898

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 101711

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lithium	1.00	0.9780		mg/L		98	80 - 120	0	20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 860-101374/1-A
Matrix: Water
Analysis Batch: 101487

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 101374

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 16:53	1
Arsenic	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 16:53	1
Barium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 16:53	1
Beryllium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1
Cadmium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1
Chromium	<0.00400	U	0.00400		mg/L		05/02/23 10:30	05/02/23 16:53	1
Cobalt	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1
Lead	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1
Molybdenum	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1
Selenium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1
Thallium	<0.00200	U	0.00200		mg/L		05/02/23 10:30	05/02/23 16:53	1

Lab Sample ID: LCS 860-101374/2-A
Matrix: Water
Analysis Batch: 101487

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 101374

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.09152		mg/L		92	80 - 120
Arsenic	0.100	0.09936		mg/L		99	80 - 120
Barium	0.100	0.09552		mg/L		96	80 - 120
Beryllium	0.100	0.09696		mg/L		97	80 - 120
Cadmium	0.100	0.1014		mg/L		101	80 - 120
Chromium	0.100	0.1010		mg/L		101	80 - 120
Cobalt	0.100	0.1019		mg/L		102	80 - 120
Lead	0.100	0.1007		mg/L		101	80 - 120
Molybdenum	0.100	0.09631		mg/L		96	80 - 120
Selenium	0.100	0.09995		mg/L		100	80 - 120

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

Lab Sample ID: LCS 860-101374/2-A
Matrix: Water
Analysis Batch: 101487

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 101374

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Thallium	0.100	0.1013		mg/L		101	80 - 120

Lab Sample ID: LCSD 860-101374/3-A
Matrix: Water
Analysis Batch: 101487

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 101374

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony	0.100	0.09400		mg/L		94	80 - 120	3	20
Arsenic	0.100	0.09755		mg/L		98	80 - 120	2	20
Barium	0.100	0.09565		mg/L		96	80 - 120	0	20
Beryllium	0.100	0.09617		mg/L		96	80 - 120	1	20
Cadmium	0.100	0.1015		mg/L		102	80 - 120	0	20
Chromium	0.100	0.1007		mg/L		101	80 - 120	0	20
Cobalt	0.100	0.1016		mg/L		102	80 - 120	0	20
Lead	0.100	0.1010		mg/L		101	80 - 120	0	20
Molybdenum	0.100	0.09609		mg/L		96	80 - 120	0	20
Selenium	0.100	0.09815		mg/L		98	80 - 120	2	20
Thallium	0.100	0.1016		mg/L		102	80 - 120	0	20

Lab Sample ID: MB 860-101562/1-A
Matrix: Water
Analysis Batch: 101638

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 101562

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00400	U	0.00400	mg/L		05/03/23 09:00	05/03/23 15:31	1
Arsenic	<0.00400	U	0.00400	mg/L		05/03/23 09:00	05/03/23 15:31	1
Barium	<0.00400	U	0.00400	mg/L		05/03/23 09:00	05/03/23 15:31	1
Beryllium	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1
Cadmium	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1
Chromium	<0.00400	U	0.00400	mg/L		05/03/23 09:00	05/03/23 15:31	1
Cobalt	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1
Lead	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1
Molybdenum	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1
Selenium	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1
Thallium	<0.00200	U	0.00200	mg/L		05/03/23 09:00	05/03/23 15:31	1

Lab Sample ID: LCS 860-101562/2-A
Matrix: Water
Analysis Batch: 101638

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 101562

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.08867		mg/L		89	80 - 120
Arsenic	0.100	0.09819		mg/L		98	80 - 120
Barium	0.100	0.09480		mg/L		95	80 - 120
Beryllium	0.100	0.09718		mg/L		97	80 - 120
Cadmium	0.100	0.1018		mg/L		102	80 - 120
Chromium	0.100	0.09857		mg/L		99	80 - 120
Cobalt	0.100	0.1000		mg/L		100	80 - 120
Lead	0.100	0.09984		mg/L		100	80 - 120

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

Lab Sample ID: LCS 860-101562/2-A
Matrix: Water
Analysis Batch: 101638

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 101562

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Molybdenum			0.100	0.09487		mg/L		95	80 - 120		
Selenium			0.100	0.1009		mg/L		101	80 - 120		
Thallium			0.100	0.1007		mg/L		101	80 - 120		

Lab Sample ID: LCSD 860-101562/3-A
Matrix: Water
Analysis Batch: 101638

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 101562

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony			0.100	0.09303		mg/L		93	80 - 120	5	20
Arsenic			0.100	0.09815		mg/L		98	80 - 120	0	20
Barium			0.100	0.09277		mg/L		93	80 - 120	2	20
Beryllium			0.100	0.09786		mg/L		98	80 - 120	1	20
Cadmium			0.100	0.1026		mg/L		103	80 - 120	1	20
Chromium			0.100	0.1000		mg/L		100	80 - 120	1	20
Cobalt			0.100	0.1009		mg/L		101	80 - 120	1	20
Lead			0.100	0.09960		mg/L		100	80 - 120	0	20
Molybdenum			0.100	0.09740		mg/L		97	80 - 120	3	20
Selenium			0.100	0.09809		mg/L		98	80 - 120	3	20
Thallium			0.100	0.1002		mg/L		100	80 - 120	1	20

Lab Sample ID: 860-47755-7 MS
Matrix: Water
Analysis Batch: 101638

Client Sample ID: MW-15
Prep Type: Total/NA
Prep Batch: 101562

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Antimony	0.00585		0.100	0.1134		mg/L		108	75 - 125		
Arsenic	<0.00400	U	0.100	0.09610		mg/L		96	75 - 125		
Barium	0.105		0.100	0.1927		mg/L		87	75 - 125		
Beryllium	<0.00200	U	0.100	0.09654		mg/L		97	75 - 125		
Cadmium	<0.00200	U	0.100	0.1005		mg/L		100	75 - 125		
Chromium	<0.00400	U	0.100	0.09975		mg/L		100	75 - 125		
Cobalt	<0.00200	U	0.100	0.1001		mg/L		100	75 - 125		
Lead	<0.00200	U	0.100	0.09396		mg/L		94	75 - 125		
Molybdenum	<0.00200	U	0.100	0.1077		mg/L		107	75 - 125		
Selenium	0.00398		0.100	0.09892		mg/L		95	75 - 125		
Thallium	<0.00200	U	0.100	0.09299		mg/L		93	75 - 125		

Lab Sample ID: 860-47755-7 MSD
Matrix: Water
Analysis Batch: 101638

Client Sample ID: MW-15
Prep Type: Total/NA
Prep Batch: 101562

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony	0.00585		0.100	0.1122		mg/L		106	75 - 125	1	20
Arsenic	<0.00400	U	0.100	0.09620		mg/L		96	75 - 125	0	20
Barium	0.105		0.100	0.1940		mg/L		89	75 - 125	1	20
Beryllium	<0.00200	U	0.100	0.09674		mg/L		97	75 - 125	0	20
Cadmium	<0.00200	U	0.100	0.09973		mg/L		99	75 - 125	1	20
Chromium	<0.00400	U	0.100	0.09876		mg/L		99	75 - 125	1	20

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

Lab Sample ID: 860-47755-7 MSD
Matrix: Water
Analysis Batch: 101638

Client Sample ID: MW-15
Prep Type: Total/NA
Prep Batch: 101562

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Cobalt	<0.00200	U	0.100	0.09996		mg/L		100	75 - 125	0	20
Lead	<0.00200	U	0.100	0.09433		mg/L		94	75 - 125	0	20
Molybdenum	<0.00200	U	0.100	0.1065		mg/L		106	75 - 125	1	20
Selenium	0.00398		0.100	0.09923		mg/L		95	75 - 125	0	20
Thallium	<0.00200	U	0.100	0.09454		mg/L		95	75 - 125	2	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: LB 860-100560/1-B
Matrix: Water
Analysis Batch: 100831

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 100706

Analyte	LB Result	LB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200	mg/L		04/27/23 10:19	04/27/23 19:45	1

Lab Sample ID: MB 860-100706/1-A
Matrix: Water
Analysis Batch: 100831

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 100706

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200	U	0.000200	mg/L		04/27/23 10:19	04/27/23 19:38	1

Lab Sample ID: LCS 860-100706/2-A
Matrix: Water
Analysis Batch: 100831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 100706

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00200	0.002013		mg/L		101	80 - 120

Lab Sample ID: LCSD 860-100706/3-A
Matrix: Water
Analysis Batch: 100831

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 100706

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	0.00200	0.001995		mg/L		100	80 - 120	1	20

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-610885/1-A
Matrix: Water
Analysis Batch: 614158

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 610885

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.08440	U	0.159	0.160	1.00	0.280	pCi/L	05/10/23 12:57	06/01/23 08:08	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.1*		*30 - 110*	*05/10/23 12:57*	*06/01/23 08:08*	*1*

Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample ID: LCS 160-610885/2-A
Matrix: Water
Analysis Batch: 614160

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 610885

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-226	11.3	10.80		1.25	1.00	0.237	pCi/L	95	75 - 113

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*84.2*		*30 - 110*

Lab Sample ID: LCSD 160-610885/3-A
Matrix: Water
Analysis Batch: 614160

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 610885

Analyte	Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-226	11.3	10.03		1.17	1.00	0.232	pCi/L	89	75 - 113	0.31	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*89.3*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-610896/1-A
Matrix: Water
Analysis Batch: 613642

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 610896

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3544	U	0.559	0.560	1.00	0.949	pCi/L	05/10/23 14:05	05/30/23 16:39	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.1*		*30 - 110*	*05/10/23 14:05*	*05/30/23 16:39*	*1*
Y Carrier	*82.9*		*30 - 110*	*05/10/23 14:05*	*05/30/23 16:39*	*1*

Lab Sample ID: LCS 160-610896/2-A
Matrix: Water
Analysis Batch: 613641

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 610896

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-228	8.16	11.47		1.52	1.00	0.497	pCi/L	141	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*84.2*		*30 - 110*
Y Carrier	*81.2*		*30 - 110*

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCSD 160-610896/3-A
Matrix: Water
Analysis Batch: 613641

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 610896

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-228			8.16	10.21		1.37	1.00	0.473	pCi/L	125	75 - 125	0.44	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*89.3*		*30 - 110*
Y Carrier	*81.7*		*30 - 110*

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QC Association Summary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

HPLC/IC

Analysis Batch: 102240

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	300.0	
860-47755-2	MW-7	Total/NA	Water	300.0	
860-47755-3	MW-11	Total/NA	Water	300.0	
860-47755-4	MW-12	Total/NA	Water	300.0	
860-47755-5	MW-13	Total/NA	Water	300.0	
860-47755-6	MW-14	Total/NA	Water	300.0	
860-47755-7	MW-15	Total/NA	Water	300.0	
860-47755-8	MW-16	Total/NA	Water	300.0	
860-47755-9	MW-17	Total/NA	Water	300.0	
MB 860-102240/25	Method Blank	Total/NA	Water	300.0	
MB 860-102240/60	Method Blank	Total/NA	Water	300.0	
LCS 860-102240/61	Lab Control Sample	Total/NA	Water	300.0	
LCSD 860-102240/62	Lab Control Sample Dup	Total/NA	Water	300.0	
LLCS 860-102240/17	Lab Control Sample	Total/NA	Water	300.0	
860-47755-1 MS	DUP	Total/NA	Water	300.0	
860-47755-1 MSD	DUP	Total/NA	Water	300.0	

Metals

Leach Batch: 100560

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 860-100560/1-B	Method Blank	Total/NA	Water	1311	

Prep Batch: 100706

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	7470A	
860-47755-2	MW-7	Total/NA	Water	7470A	
860-47755-3	MW-11	Total/NA	Water	7470A	
860-47755-4	MW-12	Total/NA	Water	7470A	
860-47755-5	MW-13	Total/NA	Water	7470A	
860-47755-6	MW-14	Total/NA	Water	7470A	
860-47755-7	MW-15	Total/NA	Water	7470A	
860-47755-8	MW-16	Total/NA	Water	7470A	
860-47755-9	MW-17	Total/NA	Water	7470A	
LB 860-100560/1-B	Method Blank	Total/NA	Water	7470A	100560
MB 860-100706/1-A	Method Blank	Total/NA	Water	7470A	
LCS 860-100706/2-A	Lab Control Sample	Total/NA	Water	7470A	
LCSD 860-100706/3-A	Lab Control Sample Dup	Total/NA	Water	7470A	

Analysis Batch: 100831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	7470A	100706
860-47755-2	MW-7	Total/NA	Water	7470A	100706
860-47755-3	MW-11	Total/NA	Water	7470A	100706
860-47755-4	MW-12	Total/NA	Water	7470A	100706
860-47755-5	MW-13	Total/NA	Water	7470A	100706
860-47755-6	MW-14	Total/NA	Water	7470A	100706
860-47755-7	MW-15	Total/NA	Water	7470A	100706
860-47755-8	MW-16	Total/NA	Water	7470A	100706
860-47755-9	MW-17	Total/NA	Water	7470A	100706
LB 860-100560/1-B	Method Blank	Total/NA	Water	7470A	100706

Metals (Continued)

Analysis Batch: 100831 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 860-100706/1-A	Method Blank	Total/NA	Water	7470A	100706
LCS 860-100706/2-A	Lab Control Sample	Total/NA	Water	7470A	100706
LCSD 860-100706/3-A	Lab Control Sample Dup	Total/NA	Water	7470A	100706

Prep Batch: 101374

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	3010A	
860-47755-2	MW-7	Total/NA	Water	3010A	
860-47755-3	MW-11	Total/NA	Water	3010A	
860-47755-4	MW-12	Total/NA	Water	3010A	
860-47755-5	MW-13	Total/NA	Water	3010A	
MB 860-101374/1-A	Method Blank	Total/NA	Water	3010A	
LCS 860-101374/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 860-101374/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	

Analysis Batch: 101487

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	6020A	101374
860-47755-2	MW-7	Total/NA	Water	6020A	101374
860-47755-3	MW-11	Total/NA	Water	6020A	101374
860-47755-4	MW-12	Total/NA	Water	6020A	101374
860-47755-5	MW-13	Total/NA	Water	6020A	101374
MB 860-101374/1-A	Method Blank	Total/NA	Water	6020A	101374
LCS 860-101374/2-A	Lab Control Sample	Total/NA	Water	6020A	101374
LCSD 860-101374/3-A	Lab Control Sample Dup	Total/NA	Water	6020A	101374

Prep Batch: 101562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-6	MW-14	Total/NA	Water	3010A	
860-47755-7	MW-15	Total/NA	Water	3010A	
860-47755-8	MW-16	Total/NA	Water	3010A	
860-47755-9	MW-17	Total/NA	Water	3010A	
MB 860-101562/1-A	Method Blank	Total/NA	Water	3010A	
LCS 860-101562/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 860-101562/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	
860-47755-7 MS	MW-15	Total/NA	Water	3010A	
860-47755-7 MSD	MW-15	Total/NA	Water	3010A	

Analysis Batch: 101638

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-6	MW-14	Total/NA	Water	6020A	101562
860-47755-7	MW-15	Total/NA	Water	6020A	101562
860-47755-8	MW-16	Total/NA	Water	6020A	101562
860-47755-9	MW-17	Total/NA	Water	6020A	101562
MB 860-101562/1-A	Method Blank	Total/NA	Water	6020A	101562
LCS 860-101562/2-A	Lab Control Sample	Total/NA	Water	6020A	101562
LCSD 860-101562/3-A	Lab Control Sample Dup	Total/NA	Water	6020A	101562
860-47755-7 MS	MW-15	Total/NA	Water	6020A	101562
860-47755-7 MSD	MW-15	Total/NA	Water	6020A	101562

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

QC Association Summary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Metals

Prep Batch: 101711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	3010A	
860-47755-2	MW-7	Total/NA	Water	3010A	
860-47755-3	MW-11	Total/NA	Water	3010A	
860-47755-4	MW-12	Total/NA	Water	3010A	
860-47755-5	MW-13	Total/NA	Water	3010A	
860-47755-6	MW-14	Total/NA	Water	3010A	
860-47755-7	MW-15	Total/NA	Water	3010A	
860-47755-8	MW-16	Total/NA	Water	3010A	
860-47755-9	MW-17	Total/NA	Water	3010A	
MB 860-101711/1-A	Method Blank	Total/NA	Water	3010A	
LCS 860-101711/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 860-101711/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	

Analysis Batch: 101898

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	6010C	101711
860-47755-2	MW-7	Total/NA	Water	6010C	101711
860-47755-3	MW-11	Total/NA	Water	6010C	101711
860-47755-4	MW-12	Total/NA	Water	6010C	101711
860-47755-5	MW-13	Total/NA	Water	6010C	101711
860-47755-6	MW-14	Total/NA	Water	6010C	101711
860-47755-7	MW-15	Total/NA	Water	6010C	101711
860-47755-8	MW-16	Total/NA	Water	6010C	101711
860-47755-9	MW-17	Total/NA	Water	6010C	101711
MB 860-101711/1-A	Method Blank	Total/NA	Water	6010C	101711
LCS 860-101711/2-A	Lab Control Sample	Total/NA	Water	6010C	101711
LCSD 860-101711/3-A	Lab Control Sample Dup	Total/NA	Water	6010C	101711

Rad

Prep Batch: 610885

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	PrecSep-21	
860-47755-2	MW-7	Total/NA	Water	PrecSep-21	
860-47755-3	MW-11	Total/NA	Water	PrecSep-21	
860-47755-4	MW-12	Total/NA	Water	PrecSep-21	
860-47755-5	MW-13	Total/NA	Water	PrecSep-21	
860-47755-6	MW-14	Total/NA	Water	PrecSep-21	
860-47755-7	MW-15	Total/NA	Water	PrecSep-21	
860-47755-8	MW-16	Total/NA	Water	PrecSep-21	
860-47755-9	MW-17	Total/NA	Water	PrecSep-21	
MB 160-610885/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-610885/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-610885/3-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

Prep Batch: 610896

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-1	DUP	Total/NA	Water	PrecSep_0	
860-47755-2	MW-7	Total/NA	Water	PrecSep_0	
860-47755-3	MW-11	Total/NA	Water	PrecSep_0	
860-47755-4	MW-12	Total/NA	Water	PrecSep_0	

Rad (Continued)

Prep Batch: 610896 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-47755-5	MW-13	Total/NA	Water	PrecSep_0	
860-47755-6	MW-14	Total/NA	Water	PrecSep_0	
860-47755-7	MW-15	Total/NA	Water	PrecSep_0	
860-47755-8	MW-16	Total/NA	Water	PrecSep_0	
860-47755-9	MW-17	Total/NA	Water	PrecSep_0	
MB 160-610896/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-610896/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-610896/3-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: DUP

Lab Sample ID: 860-47755-1

Date Collected: 04/24/23 12:28
Date Received: 04/26/23 09:09

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 03:56	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:04	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101374	05/02/23 10:30	MD	EET HOU
Total/NA	Analysis	6020A		1			101487	05/02/23 17:45	SHZ	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:02	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			997.52 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:11	FLC	EET SL
Total/NA	Prep	PrecSep_0			997.52 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:35	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-7

Lab Sample ID: 860-47755-2

Date Collected: 04/24/23 11:42
Date Received: 04/26/23 09:09

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 06:23	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:07	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101374	05/02/23 10:30	MD	EET HOU
Total/NA	Analysis	6020A		1			101487	05/02/23 17:55	SHZ	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:03	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			995.05 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 09:58	FLC	EET SL
Total/NA	Prep	PrecSep_0			995.05 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:37	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-11

Lab Sample ID: 860-47755-3

Date Collected: 04/24/23 12:28
Date Received: 04/26/23 09:09

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 04:26	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:11	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101374	05/02/23 10:30	MD	EET HOU
Total/NA	Analysis	6020A		1			101487	05/02/23 17:57	SHZ	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:04	SHZ	EET HOU

Lab Chronicle

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-11
Date Collected: 04/24/23 12:28
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			998.59 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:12	FLC	EET SL
Total/NA	Prep	PrecSep_0			998.59 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:37	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-12
Date Collected: 04/24/23 13:40
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 04:35	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:14	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101374	05/02/23 10:30	MD	EET HOU
Total/NA	Analysis	6020A		1			101487	05/02/23 18:00	SHZ	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:06	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			997.61 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:12	FLC	EET SL
Total/NA	Prep	PrecSep_0			997.61 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:37	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-13
Date Collected: 04/24/23 15:26
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 04:45	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:18	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101374	05/02/23 10:30	MD	EET HOU
Total/NA	Analysis	6020A		1			101487	05/02/23 18:02	SHZ	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:07	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			995.24 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:12	FLC	EET SL
Total/NA	Prep	PrecSep_0			995.24 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:37	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Lab Chronicle

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-14
Date Collected: 04/24/23 17:35
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 07:02	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:21	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101562	05/03/23 09:00	MD	EET HOU
Total/NA	Analysis	6020A		1			101638	05/03/23 15:59	DP	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:08	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			994.02 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:12	FLC	EET SL
Total/NA	Prep	PrecSep_0			994.02 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:37	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-15
Date Collected: 04/24/23 16:11
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 05:14	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:39	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101562	05/03/23 09:00	MD	EET HOU
Total/NA	Analysis	6020A		1			101638	05/03/23 15:38	DP	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:11	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			995.37 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:12	FLC	EET SL
Total/NA	Prep	PrecSep_0			995.37 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:37	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-16
Date Collected: 04/24/23 14:41
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 05:24	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:43	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101562	05/03/23 09:00	MD	EET HOU
Total/NA	Analysis	6020A		1			101638	05/03/23 16:02	DP	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:13	SHZ	EET HOU

Lab Chronicle

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Client Sample ID: MW-16

Date Collected: 04/24/23 14:41
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			994.63 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614160	06/01/23 08:12	FLC	EET SL
Total/NA	Prep	PrecSep_0			994.63 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:38	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Client Sample ID: MW-17

Date Collected: 04/24/23 16:56
Date Received: 04/26/23 09:09

Lab Sample ID: 860-47755-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			102240	05/09/23 05:34	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101711	05/04/23 09:30	MD	EET HOU
Total/NA	Analysis	6010C		1			101898	05/04/23 18:46	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	101562	05/03/23 09:00	MD	EET HOU
Total/NA	Analysis	6020A		1			101638	05/03/23 16:04	DP	EET HOU
Total/NA	Prep	7470A			50 mL	50 mL	100706	04/27/23 10:48	PB	EET HOU
Total/NA	Analysis	7470A		1			100831	04/27/23 20:14	SHZ	EET HOU
Total/NA	Prep	PrecSep-21			997.10 mL	1.0 g	610885	05/10/23 12:57	KAC	EET SL
Total/NA	Analysis	903.0		1			614158	06/01/23 10:02	FLC	EET SL
Total/NA	Prep	PrecSep_0			997.10 mL	1.0 g	610896	05/10/23 14:05	KAC	EET SL
Total/NA	Analysis	904.0		1			613641	05/30/23 12:38	SCB	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			614190	06/01/23 15:44	SCB	EET SL

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200
EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Laboratory: Eurofins Houston

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704215-23-50	06-30-23

Laboratory: Eurofins St. Louis

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

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704193	07-31-23

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

Analysis Method	Prep Method	Matrix	Analyte
Ra226_Ra228 Pos		Water	Radium 226 and 228

Method Summary

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	EPA	EET HOU
6010C	Metals (ICP)	SW846	EET HOU
6020A	Metals (ICP/MS)	SW846	EET HOU
7470A	Mercury (CVAA)	SW846	EET HOU
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228 Pos	Combined Radium-226 and Radium-228	TAL-STL	EET SL
3010A	Preparation, Total Metals	SW846	EET HOU
7470A	Preparation, Mercury	SW846	EET HOU
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Hydrex Environmental
Project/Site: Twin Oaks PP

Job ID: 860-47755-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
860-47755-1	DUP	Water	04/24/23 12:28	04/26/23 09:09
860-47755-2	MW-7	Water	04/24/23 11:42	04/26/23 09:09
860-47755-3	MW-11	Water	04/24/23 12:28	04/26/23 09:09
860-47755-4	MW-12	Water	04/24/23 13:40	04/26/23 09:09
860-47755-5	MW-13	Water	04/24/23 15:26	04/26/23 09:09
860-47755-6	MW-14	Water	04/24/23 17:35	04/26/23 09:09
860-47755-7	MW-15	Water	04/24/23 16:11	04/26/23 09:09
860-47755-8	MW-16	Water	04/24/23 14:41	04/26/23 09:09
860-47755-9	MW-17	Water	04/24/23 16:56	04/26/23 09:09

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477
Phone (281) 240-4200

Chain of Custody Record

eurofins | Environment Testing

Client Information	Sampler: Colton Dillsthwall	Lab PM: Patel, Anita	Carrier Tracking No(s):	COC No: 860-18040-6133.1
Client Contact: Michelle Transier	Phone:	E-Mail: Anita.Patel@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: Hydrex Environmental	PWSID:			Job #:
Address: 312 Old Tyler Rd	Due Date Requested:			
City: Nacogdoches	TAT Requested (days):			
State, Zip: TX, 75961	Compliance Project: Δ Yes Δ No			
Phone: 936-568-9451(Tel)	PO #: I-14-1007			
Email: mtransier@hydrex-inc.com	WO #: I-14-1007			
Project Name: Twin Oaks PP Semi-Annual Assessment	Project #: 86000207			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Fluroide-Anions 300	Appendix IV Metals Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li, Mo, Se, Tl, Hg	Radium 226 (903.0 To St. Louis)	Radium 228 (904.0 To St. Louis)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	D		
Dup	4/24/23	1228	G	W			X	X	X	X	4	
MW-7	4/24/23	1147	G	W			X	X	X	X	4	
MW-11	4/24/23	1228	G	W			X	X	X	X	4	
MW-12	4/24/23	1340	G	W			X	X	X	X	4	
MW-13	4/24/23	1526	G	W			X	X	X	X	4	
MW-14	4/24/23	1735	G	W			X	X	X	X	4	
MW-15	4/24/23	1611	G	W			X	X	X	X	4	
MW-16	4/24/23	1441	G	W			X	X	X	X	4	
MW-17	4/24/23	1656	G	W			X	X	X	X	4	

860-47755 Chain of Custody

Preservation Codes:
A HCL
B NaOH
C Zn Acetate
D Nitric Acid
E NaHSO4
F MeOH
G Amchlor
H Ascorbic Acid
I Ice
J DI Water
K EDTA
L EDA
M Hexane
N None
O AsNaO2
P Na2O4S
Q Na2SO3
R Na2S2O3
S H2SO4
T TSP Dodecahydrate
U Acetone
V MCAA
W pH 4-5
Y Trizma
Z other (specify)
Other:

Temp: 2.5 IR ID:HOU-344
C/F.-0.2
Corrected Temp: 2.3

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I II III IV Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Colton Dillsthwall					
Colton Dillsthwall	4/25/23 / 1415	Hydrex	FedEx	4/25/23 / 1415	FedEx
FedEx			[illegible]	4.26.23 904	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins Houston
4145 Greenbriar Dr
Stafford, TX 77477
Phone: 281-240-4200

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Patel, Anita	Carrier Tracking No(s):	COC No: 860-24458.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Anita.Patel@et.eurofinsus.com	State of Origin: Texas	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Texas		Job #: 860-47755-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 5/4/2023			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Twin Oaks PP	Project #: 86000207			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Y - Trizma
Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	904.0/PrecSep_0 Radium-228	903.0/PrecSep_21 Radium-226	Ra226_228AS_P	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
DUP (860-47755-1)	4/24/23	12:28 Central		Water			X	X	X	2	
MW-7 (860-47755-2)	4/24/23	11:42 Central		Water			X	X	X	2	
MW-11 (860-47755-3)	4/24/23	12:28 Central		Water			X	X	X	2	
MW-12 (860-47755-4)	4/24/23	13:40 Central		Water			X	X	X	2	
MW-13 (860-47755-5)	4/24/23	15:26 Central		Water			X	X	X	2	
MW-14 (860-47755-6)	4/24/23	17:35 Central		Water			X	X	X	2	
MW-15 (860-47755-7)	4/24/23	16:11 Central		Water			X	X	X	2	
MW-16 (860-47755-8)	4/24/23	14:41 Central		Water			X	X	X	2	
MW-17 (860-47755-9)	4/24/23	16:56 Central		Water			X	X	X	2 18	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing South Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing South Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing South Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing South Central, LLC.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 4.28.23	Company: 17:00	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: Carol Gosell	Date/Time: 0845 MAY 0 1 2023	Company: ETA STL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: Hydrex Environmental

Job Number: 860-47755-1

Login Number: 47755
List Number: 1
Creator: Canadilla, Surelis

List Source: Eurofins Houston

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	

Login Sample Receipt Checklist

Client: Hydrex Environmental | Job Number: 860-47755-1

Login Number: 47755
List Number: 2
Creator: Farrell, Conor P

List Source: Eurofins St. Louis
List Creation: 05/01/23 01:39 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Data Usability Summary for Laboratory Package 860-47755-1

April 2023 Groundwater Sampling – Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

ERM reviewed one data package (Work Order Number 860-47755-1) from Eurofins of Houston, Texas for the analysis of nine (9) groundwater samples, including one blind field duplicate sample, collected on April 24, 2023 at Twin Oaks Power Station, Robertson County, Texas. Data were reviewed for general conformance to the requirements of the following documents:

1) Twin Oaks Power Station, *Groundwater Sampling and Analysis Plan (October 2017)*;
2) Environmental Protection Agency's (EPA's) National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA-540-R-2017-001, January 2017);
3) Texas Commission on Environmental Quality's (TCEQ's) *Review and Reporting of COC Concentration Data Under TRRP* (RG-366/TRRP-13, May 2010); and
4) *CCR Landfill Draft Technical Guideline No. 32* (May 2020).

Eurofins is NELAC-accredited under the Texas Laboratory Accreditation Program for the matrices, analytes, and methods of analysis requested on the chain-of-custody documentation. Eurofins National Environmental Laboratory Accreditation Program (NELAP) certificate applicable to the period during which the laboratory generated the data in these reports is referenced in the laboratory reports.

Intended Use of Data: To provide concentration data on Appendix IV Coal Combustion Residuals (CCR) Rule parameters) in the ground water at the facility.

Analyses requested included:

- SW846 6010C – Metals (ICP)
- SW846 6020A – Metals (ICP/MS)
- SW846 7470A – Mercury (CVAA)
- EPA 300.0 – Anions, Ion Chromatography
- EPA 903.0 – Radium-226 (GFPC)
- EPA 904.0 – Radium-228 (GFPC)

Data were reviewed and validated as described in the TRRP-13 Guidance Document and the results of the review/validation are discussed in this Data Usability Summary (DUS). The following laboratory submittals were reviewed by ERM:

- Analytical data report;
- Laboratory review checklist (LRC);
- Exception reports (ERs); and
- Case narrative.

The results of supporting quality control (QC) analyses are summarized on the LRCs, ERs, and in the case narrative, which were included in this review.

The LRC, ERs, case narrative, and analytical data report are attached to this report.

INTRODUCTION

Eight (8) groundwater samples and one (1) blind field duplicate were submitted to the laboratory for analysis of select metals and anions. Table 1 lists the sample identifications cross-referenced to laboratory identifications.

Project Data Quality Objectives

The QC sample recoveries and relative percent differences (RPD) were evaluated based on the following Project Data Quality Objectives (DQO):

Organic Compounds
Recovery 60-140%
RPD ≤40%

Inorganic Compounds
Recovery 70-130%
RPD ≤30%

Data were qualified in accordance with the TCEQ's TRRP-13 guidance document, including data qualifier codes and data qualifier code definitions.

DATA REVIEW / VALIDATION RESULTS

Analytical Results

Groundwater analytical results are reported in milligrams per liter (mg/L). *Not Detected* results are reported as less than the value of the reporting limit (RL).

Preservation and Holding Times

The samples were evaluated for agreement with the chain-of-custody (COC). The samples were received in the appropriate containers and in good condition. The corrected sample receipt temperature (2.3°C) was within the acceptance criteria of 4 ± 2°C. The samples were preserved in the field as specified by the method. The samples were prepared and analyzed within holding times.

Calibrations

According to the LRC, initial calibrations, continuing calibrations, and calibration verifications data met method requirements for metals and anions, as applicable.

Blanks

Metals, anions and radium were not detected in the method blanks.

Internal Standards and Surrogate Recoveries

According to the LRC, internal standard area counts and retention times were not applicable for the analyses requested. Surrogate recoveries were also not applicable for the analyses requested and therefore were not evaluated. Carrier percent yields for radioactive analyses were within acceptable limits.

Laboratory Control Samples and Precision

Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) precision and accuracy analysis (i.e., percent recovery and relative percentage difference [RPDs], and relative error ratio [RER]) results for all analyses were within DQO limits, with the following exception.

The LCS recovery in analysis batch 613642 for radium-228 was higher than DQO limits (141%); however, the corresponding LCSD recovery was within DQO limits (125%). As such, no qualifiers were required.

Matrix Spike/Matrix Spike Duplicates

Matrix spike and matrix spike duplicate (MS/MSD) recoveries and associated RPDs were run on project-related sample MW-15 for metals and project-related sample DUP for fluoride (anions) and were within DQO limits.

Post Digestion Spike

According to the LRC, post digestion spike (PDS) recoveries were within method acceptance limits.

Serial Dilution

According to the LRC, serial dilution (SD) percent differences (%D) were within method acceptance limits.

Field Precision

One pair of field precision samples were collected during the April 2023 event (MW-11 / DUP). RPD calculations for detected analytes for each field precision pair are shown in Table 2. All RPD were within DQO limits; as such, no qualifiers were required.

Field Procedures

The samples were collected by Hydrex Environmental using procedures documented in the Groundwater Sampling and Analysis Plan for the site.

SUMMARY

No data were rejected or qualified during this review. Groundwater analytical data are useable for the purpose of provide concentration data on Appendix IV Coal Combustion Residuals (CCR) Rule parameters in ground water at the Twin Oaks Power Plant.

TABLE 1

Cross-Reference Field Sample Identifications and Laboratory Identifications
Laboratory ID 860-47755-1

Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Laboratory Identification	Field Identification	Description
860-47755-1	DUP	Duplicate Sample
860-47755-2	MW-7	Field Sample
860-47755-3	MW-11	Field Sample
860-47755-4	MW-12	Field Sample
860-47755-5	MW-13	Field Sample
860-47755-6	MW-14	Field Sample
860-47755-7	MW-15	Field Sample
860-47755-8	MW-16	Field Sample
860-47755-9	MW-17	Field Sample

TABLE 2

Field Precision
Laboratory ID 860-47755-1

Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Field Identification	Analyte	Sample Result (SR)		Duplicate Result (DR)	Relative Percent Difference (RPD)	Qualified
MW-11 / DUP	Barium	0.0176		0.0177	0.57	A
	Cobalt	0.00200	U	0.00209	4.40	A
	Radium-226	0.242		0.238	1.67	A
	Radium-228	1.37		1.30	5.24	A
	Radium-226 and 228	1.62		1.53	5.71	A

NOTES:
Only detected analytes are listed in table.
Units in milligrams per liter (mg/L).
RPD = ((SR-DR)*200)/(SR+DR)
A = Acceptable data based on project data quality objectives (DQO).

eurofins | Environment Testing

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ANALYTICAL REPORT

PREPARED FOR

Attn: Nick Houtchens
ERM-Southwest Inc.
111 Congress Ave.
Suite 500
Austin, Texas 78701

Generated 10/11/2023 10:13:20 AM Revision 1

JOB DESCRIPTION

Twin Oaks Power Plant

JOB NUMBER

860-55139-1

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477

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See page two for job notes and contact information.

my EOL

Eurofins Houston

Job Notes

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

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization

Generated
10/11/2023 10:13:20 AM
Revision 1

Authorized for release by
Anita Patel, Project Manager
Anita.Patel@et.eurofinsus.com
(832)776-2275

Table of Contents

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the MQL but greater than or equal to the SDL and the concentration is an estimated value.
N1	MS, MSD: Spike recovery exceeds upper or lower control limits.
U	Analyte was not detected at or above the SDL.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the MQL but greater than or equal to the SDL and the concentration is an estimated value.
U	Analyte was not detected at or above the SDL.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.
U	Analyte was not detected at or above the SDL.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client: ERM-Southwest Inc. Job ID: 860-55139-1
Project/Site: Twin Oaks Power Plant

Method: 6020B - Metals (ICP/MS)

Matrix: Water **Prep Type: Total/NA**
Prep Method: 3010A-Preparation, Total Metals
Instrument: A311 **Detector: MSD/0**

Analyte	Spike Added	Result	Qualifier	Unit	RL	MDL	Analysis Date	Analysis Batch
Antimony	0.00200	<0.00800	U	mg/L	0.00800	0.00440	05/24/2023	860-104619
Boron	0.0100	0.00995	J	mg/L	0.0200	0.00801	05/24/2023	860-104619
Selenium	0.00200	0.00212	J	mg/L	0.00400	0.000532	05/24/2023	860-104619
Calcium	0.100	0.0722	J	mg/L	0.200	0.0601	05/24/2023	860-104619
Barium	0.00400	0.00346	J	mg/L	0.00800	0.00268	05/24/2023	860-104619
Cobalt	0.00200	0.00178	J	mg/L	0.00400	0.000276	05/24/2023	860-104619

Appendix A

Laboratory Data Package Cover Page - Page 1 of 4

This data package is for Job No. 860-55139-1 and consists of:

This signature page, the laboratory review checklist, and the following reportable data:

☑ R1- Field chain-of-custody documentation;

☑ R2 - Sample identification cross-reference;

☑ R3 - Test reports (analytical data sheets) for each environmental sample that includes:
  a. Items consistent with NELAC Chapter 5,
  b. dilution factors,
  c. preparation methods,
  d. cleanup methods, and
  e. if required for the project, tentatively identified coumpounds (TICs).

☐ R4 - Surrogate recovery data including:
  a. Calculated recovery (%R), and
  b. The laboratory's surrogate QC limits.

☑ R5 - Test reports/summary forms for blank samples;

☑ R6 - Test reports/summary forms for laboratory control samples (LCSs) including:
  a. LCS spiking amounts,
  b. Calculated %R for each analyte, and
  c. The laboratory's LCS QC limits.

☑ R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
  a. Samples associated with the MS/MSD clearly identified,
  b. MS/MSD spiking amounts,
  c. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
  d. Calculated %Rs and relative percent differences (RPDs), and
  e. The laboratory's MS/MSD QC limits

☑ R8 - Laboratory analytical duplicate (if applicable) recovery and precision:
  a. The amount of analyte measured in the duplicate,
  b. The calculated RPD, and
  c. The laboratory's QC limits for analytical duplicates.

☑ R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix;

☑ R10 - Other problems or anomalies.

☐ Exception Report for every "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: ☐ This laboratory meets an exception under 30 TAC §25.6 and was last inspected by ☐ TCEQ or ☐ ______ on __/__/__. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date
Anita Patel	Anita Patel	Project Manager	10/11/2023

Laboratory Data Package Cover Page - Page 2 of 4

Laboratory Name: Eurofins Houston	LRC Date: 10/11/2023
Project Name: Twin Oaks Power Plant	Laboratory Job Number: 860-55139-1
Reviewer Name: Anita Patel	

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	**Chain-of-custody (C-O-C)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
		Were all departures from standard conditions described in an exception report?	✓				
R2	OI	**Sample and quality control (QC) identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
R3	OI	**Test reports**					
		Were all samples prepared and analyzed within holding times?	✓				
		Other than those results < MQL, were all other raw values bracketed by calibration standards?	✓				
		Were calculations checked by a peer or supervisor?	✓				
		Were all analyte identifications checked by a peer or supervisor?	✓				
		Were sample detection limits reported for all analytes not detected?	✓				
		Were all results for soil and sediment samples reported on a dry weight basis?			✓		
		Were % moisture (or solids) reported for all soil and sediment samples?			✓		
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			✓		
		If required for the project, are TICs reported?			✓		
R4	O	**Surrogate recovery data**					
		Were surrogates added prior to extraction?			✓		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
R5	OI	**Test reports/summary forms for blank samples**					
		Were appropriate type(s) of blanks analyzed?	✓				
		Were blanks analyzed at the appropriate frequency?	✓				
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
		Were blank concentrations < MQL?	✓				
R6	OI	**Laboratory control samples (LCS):**					
		Were all COCs included in the LCS?	✓				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
		Were LCSs analyzed at the required frequency?	✓				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	✓				
		Was the LCSD RPD within QC limits?	✓				
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	✓				
		Were MS/MSD analyzed at the appropriate frequency?	✓				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		✓			1
		Were MS/MSD RPDs within laboratory QC limits?	✓				
R8	OI	**Analytical duplicate data**					
		Were appropriate analytical duplicates analyzed for each matrix?	✓				
		Were analytical duplicates analyzed at the appropriate frequency?	✓				
		Were RPDs or relative standard deviations within the laboratory QC limits?	✓				
R9	OI	**Method quantitation limits (MQLs):**					
		Are the MQLs for each method analyte included in the laboratory data package?	✓				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	✓				
R10	OI	**Other problems/anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?		✓			2
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	✓				

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Laboratory Data Package Cover Page - Page 3 of 4

Laboratory Name: Eurofins Houston	LRC Date: 10/11/2023
Project Name: Twin Oaks Power Plant	Laboratory Job Number: 860-55139-1
Reviewer Name: Anita Patel	

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	✓				
		Were percent RSDs or correlation coefficient criteria met?	✓				
		Was the number of standards recommended in the method used for all analytes?	✓				
		Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
		Are ICAL data available for all instruments used?	✓				
		Has the initial calibration curve been verified using an appropriate second source standard?	✓				
S2	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):**					
		Was the CCV analyzed at the method-required frequency?	✓				
		Were percent differences for each analyte within the method-required QC limits?	✓				
		Was the ICAL curve verified for each analyte?	✓				
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	✓				
S3	O	**Mass spectral tuning**					
		Was the appropriate compound for the method used for tuning?			✓		
		Were ion abundance data within the method-required QC limits?			✓		
S4	O	**Internal standards (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			✓		
S5	OI	**Raw data (NELAC Section 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
		Were data associated with manual integrations flagged on the raw data?	✓				
S6	O	**Dual column confirmation**					
		Did dual column confirmation results meet the method-required QC?			✓		
S7	O	**Tentatively identified compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
S8	I	**Interference Check Sample (ICS) results**					
		Were percent recoveries within method QC limits?	✓				
S9	I	**Serial dilutions, post digestion spikes, and method of standard additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
S10	OI	**Method detection limit (MDL) studies**					
		Was a MDL study performed for each reported analyte?	✓				
		Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
S11	OI	**Proficiency test reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				
S12	OI	**Standards documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
S13	OI	**Compound/analyte identification procedures**					
		Are the procedures for compound/analyte identification documented?	✓				
S14	OI	**Demonstration of analyst competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	✓				
		Is documentation of the analyst's competency up-to-date and on file?	✓				
S15	OI	**Verification/validation documentation for methods (NELAC Chapter 5)**					
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
S16	OI	**Laboratory standard operating procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	✓				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Laboratory Data Package Cover Page - Page 4 of 4

Laboratory Name: Eurofins Houston	LRC Date: 10/11/2023
Project Name: Twin Oaks Power Plant	Laboratory Job Number: 860-55139-1
Reviewer Name: Anita Patel	

ER#[1]	Description
1	Method 6020B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 860-116935 and analytical batch 860-116994 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits. Method 300.0: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 860-117043 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recovery was within acceptance limits. Method 300.0: Due to the high concentration of Sulfate, the matrix spike / matrix spike duplicate (MS/MSD) for analytical batch 860-117043 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria. Method 300.0: Due to the high concentration of Chloride, the matrix spike / matrix spike duplicate (MS/MSD) for analytical batch 860-117282 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria. Method 300.0: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 860-117282 were outside control limits for one or more analytes. See QC Sample Results for detail. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recovery is within acceptance limits.
2	Method 300.0: The following sample was diluted to bring the concentration of target analytes within the calibration range: MW-14-20230809-01 (860-55139-5). Elevated reporting limits (RLs) are provided.

1. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

Case Narrative

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Job ID: 860-55139-1

Laboratory: Eurofins Houston

Narrative

Job Narrative
860-55139-1

REVISION

The report being provided is a revision of the original report sent on 9/14/2023. The report (revision 1) is being revised due to TRRP LRC checklist to be included.

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 8/11/2023 12:46 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 9.9°C and 10.7°C

HPLC/IC
Method 300_ORGFM_28D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 860-117043 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recovery was within acceptance limits.

Method 300_ORGFM_28D: The following sample was diluted to bring the concentration of target analytes within the calibration range: MW-14-20230809-01 (860-55139-5). Elevated reporting limits (RLs) are provided.

Method 300_ORGFM_28D: The instrument blank/CCB for analytical batch 860-117043 contained Chloride greater than the method detection limit (MDL), and were not reanalyzed because associated sample(s) results were greater than 10X the value found in the instrument blank/CCB. The data have been reported.

Method 300_ORGFM_28D: Due to the high concentration of Sulfate, the matrix spike / matrix spike duplicate (MS/MSD) for analytical batch 860-117043 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria.

Method 300_ORGFM_28D: The instrument blank/CCB for analytical batch 860-117043 contained Sulfate greater than the method detection limit (MDL), and were not reanalyzed because associated sample(s) results were greater than 10X the value found in the instrument blank/CCB. The data have been reported.

Method 300_ORGFM_28D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 860-117282 were outside control limits for one or more analytes. See QC Sample Results for detail. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recovery is within acceptance limits.

Method 300_ORGFM_28D: The following sample was diluted to bring the concentration of target analytes within the calibration range: (860-55300-A-1). Elevated reporting limits (RLs) are provided.

Method 300_ORGFM_28D: Due to the high concentration of Chloride, the matrix spike / matrix spike duplicate (MS/MSD) for analytical

Job ID: 860-55139-1 (Continued)

Laboratory: Eurofins Houston (Continued)

batch 860-117282 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria.

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

Metals
Method 6020B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 860-116935 and analytical batch 860-116994 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

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

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

Gas Flow Proportional Counter
Method 903.0: Radium-226 prep batch 160-624480:

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date. MW-7-20230808-01 (860-55139-1), MW-11-20230808-01 (860-55139-2), MW-12-20230808-01 (860-55139-3), MW-13-20230809-01 (860-55139-4), MW-14-20230809-01 (860-55139-5), MW-17-20230809-01 (860-55139-6), MW-15-20230809-01 (860-55139-7), MW-16-20230809-01 (860-55139-8), DUP-01-20230809-01 (860-55139-9), FB-01-20230809-01 (860-55139-10), (LCS 160-624480/2-A), (MB 160-624480/1-A), (810-73402-A-1-A) and (810-73402-B-1-A DU)

Method 904.0: Radium-228 batch 624482
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
MW-7-20230808-01 (860-55139-1), MW-11-20230808-01 (860-55139-2), MW-12-20230808-01 (860-55139-3), MW-13-20230809-01 (860-55139-4), MW-14-20230809-01 (860-55139-5), MW-17-20230809-01 (860-55139-6), MW-15-20230809-01 (860-55139-7), MW-16-20230809-01 (860-55139-8), DUP-01-20230809-01 (860-55139-9), FB-01-20230809-01 (860-55139-10), (LCS 160-624482/2-A), (MB 160-624482/1-A), (810-73402-A-1-B) and (810-73402-B-1-B DU)

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

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

Detection Summary

Client: ERM-Southwest Inc. Job ID: 860-55139-1
Project/Site: Twin Oaks Power Plant

Client Sample ID: MW-7-20230808-01 Lab Sample ID: 860-55139-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	259		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	865		5.00	2.00	mg/L	10		300.0	Total/NA
Boron	0.208		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	273		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.0144		0.00400	0.00134	mg/L	1		6020B	Total/NA
Cobalt	0.00102	J	0.00200	0.000355	mg/L	1		6020B	Total/NA
Total Dissolved Solids	1750		20.0	20.0	mg/L	1		SM 2540C	Total/NA
pH	6.6	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-11-20230808-01 Lab Sample ID: 860-55139-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	118		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	409		0.500	0.200	mg/L	1		300.0	Total/NA
Fluoride	0.325	J	0.500	0.100	mg/L	1		300.0	Total/NA
Boron	0.144		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	120		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.0166		0.00400	0.00134	mg/L	1		6020B	Total/NA
Cobalt	0.00180	J	0.00200	0.000355	mg/L	1		6020B	Total/NA
Total Dissolved Solids	917		10.0	10.0	mg/L	1		SM 2540C	Total/NA
pH	6.6	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-12-20230808-01 Lab Sample ID: 860-55139-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	78.3		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	45.7		0.500	0.200	mg/L	1		300.0	Total/NA
Boron	0.0332		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	22.3		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.0884		0.00400	0.00134	mg/L	1		6020B	Total/NA
Cobalt	0.00296		0.00200	0.000355	mg/L	1		6020B	Total/NA
Total Dissolved Solids	270		5.00	5.00	mg/L	1		SM 2540C	Total/NA
pH	6.4	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-13-20230809-01 Lab Sample ID: 860-55139-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	114		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	125		0.500	0.200	mg/L	1		300.0	Total/NA
Boron	0.0496		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	40.7		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.0693		0.00400	0.00134	mg/L	1		6020B	Total/NA
Cobalt	0.00120	J	0.00200	0.000355	mg/L	1		6020B	Total/NA
Selenium	0.00273		0.00200	0.000266	mg/L	1		6020B	Total/NA
Total Dissolved Solids	507		10.0	10.0	mg/L	1		SM 2540C	Total/NA
pH	6.3	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-14-20230809-01 Lab Sample ID: 860-55139-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	499		0.500	0.250	mg/L	1		300.0	Total/NA
Fluoride	0.562		0.500	0.100	mg/L	1		300.0	Total/NA
Sulfate - DL	1150		5.00	2.00	mg/L	10		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Houston

Client Sample ID: MW-14-20230809-01 (Continued)

Lab Sample ID: 860-55139-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.0512		0.0400	0.0365	mg/L	1		6010D	Total/NA
Boron	3.33		0.100	0.0401	mg/L	10		6020B	Total/NA
Calcium	336		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.0207		0.00400	0.00134	mg/L	1		6020B	Total/NA
Cobalt	0.00365		0.00200	0.000355	mg/L	1		6020B	Total/NA
Selenium	0.856		0.0200	0.00266	mg/L	10		6020B	Total/NA
Total Dissolved Solids	2940		40.0	40.0	mg/L	1		SM 2540C	Total/NA
pH	6.6	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-17-20230809-01

Lab Sample ID: 860-55139-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	619		5.00	2.50	mg/L	10		300.0	Total/NA
Sulfate	54.6		0.500	0.200	mg/L	1		300.0	Total/NA
Fluoride	0.223	J	0.500	0.100	mg/L	1		300.0	Total/NA
Boron	0.0933		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	156		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.181		0.00400	0.00134	mg/L	1		6020B	Total/NA
Cobalt	0.00223		0.00200	0.000355	mg/L	1		6020B	Total/NA
Selenium	0.00607		0.00200	0.000266	mg/L	1		6020B	Total/NA
Total Dissolved Solids	1740		20.0	20.0	mg/L	1		SM 2540C	Total/NA
pH	5.9	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-15-20230809-01

Lab Sample ID: 860-55139-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	136		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	44.7		0.500	0.200	mg/L	1		300.0	Total/NA
Boron	0.0704		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	34.1		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.112		0.00400	0.00134	mg/L	1		6020B	Total/NA
Selenium	0.00374		0.00200	0.000266	mg/L	1		6020B	Total/NA
Total Dissolved Solids	498		10.0	10.0	mg/L	1		SM 2540C	Total/NA
pH	6.5	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-16-20230809-01

Lab Sample ID: 860-55139-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	187		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	101		0.500	0.200	mg/L	1		300.0	Total/NA
Fluoride	0.130	J	0.500	0.100	mg/L	1		300.0	Total/NA
Boron	0.0437		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	72.4		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.0475		0.00400	0.00134	mg/L	1		6020B	Total/NA
Selenium	0.00168	J	0.00200	0.000266	mg/L	1		6020B	Total/NA
Total Dissolved Solids	792		10.0	10.0	mg/L	1		SM 2540C	Total/NA
pH	6.7	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: DUP-01-20230809-01

Lab Sample ID: 860-55139-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	136		0.500	0.250	mg/L	1		300.0	Total/NA
Sulfate	42.6		0.500	0.200	mg/L	1		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: DUP-01-20230809-01 (Continued) Lab Sample ID: 860-55139-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.133	J	0.500	0.100	mg/L	1		300.0	Total/NA
Boron	0.0513		0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	33.6		5.00	1.50	mg/L	50		6020B	Total/NA
Barium	0.105		0.00400	0.00134	mg/L	1		6020B	Total/NA
Selenium	0.00278		0.00200	0.000266	mg/L	1		6020B	Total/NA
Total Dissolved Solids	444		10.0	10.0	mg/L	1		SM 2540C	Total/NA
pH	6.6	HF			SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: FB-01-20230809-01 Lab Sample ID: 860-55139-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.00953	J	0.0100	0.00401	mg/L	1		6020B	Total/NA
Calcium	0.0445	J	0.100	0.0301	mg/L	1		6020B	Total/NA
pH	6.0	HF			SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Client Sample ID: MW-7-20230808-01

Lab Sample ID: 860-55139-1

Date Collected: 08/08/23 15:05

Matrix: Water

Date Received: 08/11/23 12:46

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**259**		0.500	0.250	mg/L			08/14/23 19:05	1
Sulfate	**865**		5.00	2.00	mg/L			08/15/23 16:06	10
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 19:05	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:02	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 17:44	1
Boron	**0.208**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 17:44	1
Calcium	**273**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 17:51	50
Barium	**0.0144**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 17:44	1
Cobalt	**0.00102**	**J**	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 17:44	1
Selenium	<0.000266	U	0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 17:44	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1750**		20.0	20.0	mg/L			08/14/23 10:04	1
pH (SM 4500 H+ B)	**6.6**	**HF**			SU			08/15/23 17:10	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.186**		0.0958	0.0973	1.00	0.119	pCi/L	08/17/23 10:24	09/08/23 09:31	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.5*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:31*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.335	U	0.326	0.327	1.00	0.521	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.5*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*82.2*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**0.521**		0.340	0.341	5.00	0.521	pCi/L		09/14/23 08:49	1

Client Sample ID: MW-11-20230808-01

Lab Sample ID: 860-55139-2

Date Collected: 08/08/23 16:15

Matrix: Water

Date Received: 08/11/23 12:46

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**118**		0.500	0.250	mg/L			08/14/23 19:28	1
Sulfate	**409**		0.500	0.200	mg/L			08/14/23 19:28	1
Fluoride	**0.325**	**J**	0.500	0.100	mg/L			08/14/23 19:28	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:26	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 17:46	1
Boron	**0.144**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 17:46	1
Calcium	**120**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 17:53	50
Barium	**0.0166**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 17:46	1
Cobalt	**0.00180**	**J**	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 17:46	1
Selenium	<0.000266	U	0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 17:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**917**		10.0	10.0	mg/L			08/14/23 10:04	1
pH (SM 4500 H+ B)	**6.6**	**HF**			SU			08/15/23 17:13	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0800	U	0.0680	0.0684	1.00	0.0992	pCi/L	08/17/23 10:24	09/08/23 09:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.7*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.196	U	0.370	0.371	1.00	0.636	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.7*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*83.0*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	0.276	U	0.376	0.377	5.00	0.636	pCi/L		09/14/23 08:49	1

Client Sample Results

Client: ERM-Southwest Inc. Job ID: 860-55139-1
Project/Site: Twin Oaks Power Plant

Client Sample ID: MW-12-20230808-01 Lab Sample ID: 860-55139-3
Date Collected: 08/08/23 17:25 **Matrix: Water**
Date Received: 08/11/23 12:46

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**78.3**		0.500	0.250	mg/L			08/14/23 19:38	1
Sulfate	**45.7**		0.500	0.200	mg/L			08/14/23 19:38	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 19:38	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:28	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 17:48	1
Boron	**0.0332**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 17:48	1
Calcium	**22.3**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 17:55	50
Barium	**0.0884**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 17:48	1
Cobalt	**0.00296**		0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 17:48	1
Selenium	<0.000266	U	0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 17:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**270**		5.00	5.00	mg/L			08/14/23 10:04	1
pH (SM 4500 H+ B)	**6.4**	**HF**			SU			08/15/23 17:14	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.750**		0.160	0.173	1.00	0.0971	pCi/L	08/17/23 10:24	09/08/23 09:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.2*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.24**		0.435	0.449	1.00	0.531	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.2*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*82.6*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.99**		0.463	0.481	5.00	0.531	pCi/L		09/14/23 08:49	1

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Client Sample ID: MW-13-20230809-01

Lab Sample ID: 860-55139-4
Date Collected: 08/09/23 08:40
Matrix: Water
Date Received: 08/11/23 12:46

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**114**		0.500	0.250	mg/L			08/14/23 19:48	1
Sulfate	**125**		0.500	0.200	mg/L			08/14/23 19:48	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 19:48	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:31	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:02	1
Boron	**0.0496**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 18:02	1
Calcium	**40.7**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 18:14	50
Barium	**0.0693**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:02	1
Cobalt	**0.00120**	**J**	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:02	1
Selenium	**0.00273**		0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 18:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**507**		10.0	10.0	mg/L			08/14/23 10:04	1
pH (SM 4500 H+ B)	**6.3**	**HF**			SU			08/15/23 17:16	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.716**		0.158	0.171	1.00	0.0970	pCi/L	08/17/23 10:24	09/08/23 09:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.2*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.45**		0.430	0.450	1.00	0.465	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.2*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*84.1*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**2.17**		0.458	0.481	5.00	0.465	pCi/L		09/14/23 08:49	1

Client Sample Results

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Client Sample ID: MW-14-20230809-01

Lab Sample ID: 860-55139-5
Date Collected: 08/09/23 09:40
Matrix: Water
Date Received: 08/11/23 12:46

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	499		0.500	0.250	mg/L			08/14/23 20:36	1
Fluoride	0.562		0.500	0.100	mg/L			08/14/23 20:36	1

Method: EPA 300.0 - Anions, Ion Chromatography - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	1150		5.00	2.00	mg/L			08/14/23 20:46	10

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	0.0512		0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:33	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:05	1
Boron	3.33		0.100	0.0401	mg/L		08/13/23 10:30	08/13/23 18:39	10
Calcium	336		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 18:16	50
Barium	0.0207		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:05	1
Cobalt	0.00365		0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:05	1
Selenium	0.856		0.0200	0.00266	mg/L		08/13/23 10:30	08/13/23 18:39	10

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	2940		40.0	40.0	mg/L			08/14/23 10:04	1
pH (SM 4500 H+ B)	6.6	HF			SU			08/15/23 17:17	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.383		0.123	0.127	1.00	0.108	pCi/L	08/17/23 10:24	09/08/23 09:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.45		0.455	0.474	1.00	0.533	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*86.4*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	1.83		0.471	0.491	5.00	0.533	pCi/L		09/14/23 08:49	1

Client Sample ID: MW-17-20230809-01

Lab Sample ID: 860-55139-6

Date Collected: 08/09/23 10:45

Matrix: Water

Date Received: 08/11/23 12:46

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	619		5.00	2.50	mg/L			08/15/23 16:13	10
Sulfate	54.6		0.500	0.200	mg/L			08/14/23 19:57	1
Fluoride	0.223	J	0.500	0.100	mg/L			08/14/23 19:57	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:36	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:07	1
Boron	0.0933		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 18:07	1
Calcium	156		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 18:19	50
Barium	0.181		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:07	1
Cobalt	0.00223		0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:07	1
Selenium	0.00607		0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 18:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	1740		20.0	20.0	mg/L			08/14/23 10:04	1
pH (SM 4500 H+ B)	5.9	HF			SU			08/15/23 17:19	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.03		0.190	0.212	1.00	0.112	pCi/L	08/17/23 10:24	09/08/23 09:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.35		0.525	0.568	1.00	0.491	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*82.2*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	3.38		0.558	0.606	5.00	0.491	pCi/L		09/14/23 08:49	1

Client Sample Results

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Client Sample ID: MW-15-20230809-01
Date Collected: 08/09/23 12:05
Date Received: 08/11/23 12:46

Lab Sample ID: 860-55139-7
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**136**		0.500	0.250	mg/L			08/14/23 20:26	1
Sulfate	**44.7**		0.500	0.200	mg/L			08/14/23 20:26	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 20:26	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:39	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:09	1
Boron	**0.0704**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 18:09	1
Calcium	**34.1**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 18:21	50
Barium	**0.112**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:09	1
Cobalt	<0.000355	U	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:09	1
Selenium	**0.00374**		0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 18:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**498**		10.0	10.0	mg/L			08/14/23 10:08	1
pH (SM 4500 H+ B)	**6.5**	**HF**			SU			08/15/23 17:21	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.468**		0.136	0.142	1.00	0.116	pCi/L	08/17/23 10:24	09/08/23 09:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.2*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:32*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.723**		0.364	0.370	1.00	0.502	pCi/L	08/17/23 10:32	09/01/23 11:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.2*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*
Y Carrier	*86.4*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:26*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.19**		0.389	0.396	5.00	0.502	pCi/L		09/14/23 08:49	1

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Client Sample Results

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Client Sample ID: MW-16-20230809-01
Date Collected: 08/09/23 13:55
Date Received: 08/11/23 12:46

Lab Sample ID: 860-55139-8
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**187**		0.500	0.250	mg/L			08/14/23 19:24	1
Sulfate	**101**		0.500	0.200	mg/L			08/14/23 19:24	1
Fluoride	**0.130**	**J**	0.500	0.100	mg/L			08/14/23 19:24	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:41	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:12	1
Boron	**0.0437**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 18:12	1
Calcium	**72.4**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 18:23	50
Barium	**0.0475**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:12	1
Cobalt	<0.000355	U	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:12	1
Selenium	**0.00168**	**J**	0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 18:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**792**		10.0	10.0	mg/L			08/14/23 10:08	1
pH (SM 4500 H+ B)	**6.7**	**HF**			SU			08/15/23 17:23	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.960**		0.185	0.204	1.00	0.102	pCi/L	08/17/23 10:24	09/08/23 09:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.5*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:33*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.618**		0.401	0.405	1.00	0.596	pCi/L	08/17/23 10:32	09/01/23 11:31	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.5*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:31*	*1*
Y Carrier	*81.1*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:31*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.58**		0.442	0.453	5.00	0.596	pCi/L		09/14/23 08:49	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Client Sample ID: DUP-01-20230809-01

Lab Sample ID: 860-55139-9

Date Collected: 08/09/23 06:00
Date Received: 08/11/23 12:46

Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**136**		0.500	0.250	mg/L			08/14/23 19:53	1
Sulfate	**42.6**		0.500	0.200	mg/L			08/14/23 19:53	1
Fluoride	**0.133**	**J**	0.500	0.100	mg/L			08/14/23 19:53	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:44	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:32	1
Boron	**0.0513**		0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 18:32	1
Calcium	**33.6**		5.00	1.50	mg/L		08/13/23 10:30	08/13/23 18:37	50
Barium	**0.105**		0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:32	1
Cobalt	<0.000355	U	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:32	1
Selenium	**0.00278**		0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 18:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**444**		10.0	10.0	mg/L			08/14/23 10:08	1
pH (SM 4500 H+ B)	**6.6**	**HF**			SU			08/15/23 17:25	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.555**		0.143	0.151	1.00	0.0977	pCi/L	08/17/23 10:24	09/08/23 09:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:34*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.21**		0.419	0.433	1.00	0.501	pCi/L	08/17/23 10:32	09/01/23 11:31	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:31*	*1*
Y Carrier	*87.1*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:31*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	**1.77**		0.443	0.459	5.00	0.501	pCi/L		09/14/23 08:49	1

Client Sample ID: FB-01-20230809-01

Date Collected: 08/09/23 00:00
Date Received: 08/11/23 12:46

Lab Sample ID: 860-55139-10
Matrix: Water

Method: EPA 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.250	U	0.500	0.250	mg/L			08/14/23 20:03	1
Sulfate	<0.200	U	0.500	0.200	mg/L			08/14/23 20:03	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 20:03	1

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 13:57	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 18:35	1
Boron	**0.00953**	**J**	0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 18:35	1
Calcium	**0.0445**	**J**	0.100	0.0301	mg/L		08/13/23 10:30	08/13/23 18:35	1
Barium	<0.00134	U	0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 18:35	1
Cobalt	<0.000355	U	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 18:35	1
Selenium	<0.000266	U	0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 18:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	<5.00	U	5.00	5.00	mg/L			08/14/23 10:08	1
pH (SM 4500 H+ B)	**6.0**	**HF**			SU			08/15/23 17:27	1

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0571	U	0.0592	0.0595	1.00	0.0915	pCi/L	08/17/23 10:24	09/08/23 09:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*30 - 110*	*08/17/23 10:24*	*09/08/23 09:34*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0997	U	0.247	0.247	1.00	0.499	pCi/L	08/17/23 10:32	09/01/23 11:31	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:31*	*1*
Y Carrier	*86.4*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:31*	*1*

Method: TAL-STL Ra226_Ra228 Pos - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and 228	0.0571	U	0.254	0.254	5.00	0.499	pCi/L		09/14/23 08:49	1

Tracer/Carrier Summary

Client: ERM-Southwest Inc. Job ID: 860-55139-1
Project/Site: Twin Oaks Power Plant

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba (30-110)
810-73402-B-1-A DU	Duplicate	88.7
860-55139-1	MW-7-20230808-01	93.5
860-55139-2	MW-11-20230808-01	90.7
860-55139-3	MW-12-20230808-01	91.2
860-55139-4	MW-13-20230809-01	92.2
860-55139-5	MW-14-20230809-01	90.0
860-55139-6	MW-17-20230809-01	91.0
860-55139-7	MW-15-20230809-01	90.2
860-55139-8	MW-16-20230809-01	87.5
860-55139-9	DUP-01-20230809-01	90.5
860-55139-10	FB-01-20230809-01	91.0
LCS 160-624480/2-A	Lab Control Sample	97.0
MB 160-624480/1-A	Method Blank	87.5

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba (30-110)	Y (30-110)
810-73402-B-1-B DU	Duplicate	88.7	83.7
860-55139-1	MW-7-20230808-01	93.5	82.2
860-55139-2	MW-11-20230808-01	90.7	83.0
860-55139-3	MW-12-20230808-01	91.2	82.6
860-55139-4	MW-13-20230809-01	92.2	84.1
860-55139-5	MW-14-20230809-01	90.0	86.4
860-55139-6	MW-17-20230809-01	91.0	82.2
860-55139-7	MW-15-20230809-01	90.2	86.4
860-55139-8	MW-16-20230809-01	87.5	81.1
860-55139-9	DUP-01-20230809-01	90.5	87.1
860-55139-10	FB-01-20230809-01	91.0	86.4
LCS 160-624482/2-A	Lab Control Sample	97.0	78.5
MB 160-624482/1-A	Method Blank	87.5	84.1

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

QC Sample Results

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 860-117043/3
Matrix: Water
Analysis Batch: 117043

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.250	U	0.500	0.250	mg/L			08/14/23 12:05	1
Sulfate	<0.200	U	0.500	0.200	mg/L			08/14/23 12:05	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 12:05	1

Lab Sample ID: LCS 860-117043/4
Matrix: Water
Analysis Batch: 117043

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.608		mg/L		96	90 - 110
Sulfate	10.0	10.90		mg/L		109	90 - 110
Fluoride	10.0	9.795		mg/L		98	90 - 110

Lab Sample ID: LCSD 860-117043/5
Matrix: Water
Analysis Batch: 117043

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	10.0	9.622		mg/L		96	90 - 110	0	20
Sulfate	10.0	10.86		mg/L		109	90 - 110	0	20
Fluoride	10.0	9.916		mg/L		99	90 - 110	1	20

Lab Sample ID: LLCS 860-117043/7
Matrix: Water
Analysis Batch: 117043

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	0.500	0.4659	J	mg/L		93	50 - 150
Sulfate	0.500	0.4847	J	mg/L		97	50 - 150
Fluoride	0.500	0.3318	J	mg/L		66	50 - 150

Lab Sample ID: 860-55139-1 MS
Matrix: Water
Analysis Batch: 117043

Client Sample ID: MW-7-20230808-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	259		10.0	266.0	4	mg/L		71	90 - 110
Fluoride	<0.100	U	10.0	8.642	N1	mg/L		86	90 - 110

Lab Sample ID: 860-55139-1 MSD
Matrix: Water
Analysis Batch: 117043

Client Sample ID: MW-7-20230808-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	259		10.0	266.5	4	mg/L		75	90 - 110	0	15
Fluoride	<0.100	U	10.0	8.602	N1	mg/L		86	90 - 110	0	15

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: MB 860-117046/3
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117046

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.250	U	0.500	0.250	mg/L			08/14/23 14:47	1
Sulfate	<0.200	U	0.500	0.200	mg/L			08/14/23 14:47	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/14/23 14:47	1

Lab Sample ID: LCS 860-117046/4
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117046

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	10.08		mg/L		101	90 - 110
Sulfate	10.0	10.08		mg/L		101	90 - 110
Fluoride	10.0	10.58		mg/L		106	90 - 110

Lab Sample ID: LCSD 860-117046/5
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117046

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	10.0	10.05		mg/L		101	90 - 110	0	20
Sulfate	10.0	10.13		mg/L		101	90 - 110	1	20
Fluoride	10.0	10.59		mg/L		106	90 - 110	0	20

Lab Sample ID: LLCS 860-117046/7
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117046

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	0.500	0.5210		mg/L		104	50 - 150
Sulfate	0.500	0.5189		mg/L		104	50 - 150
Fluoride	0.500	0.5750		mg/L		115	50 - 150

Lab Sample ID: 860-55139-8 MS
Client Sample ID: MW-16-20230809-01
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117046

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	187		10.0	197.4	4	mg/L		100	90 - 110
Sulfate	101		10.0	110.6	4	mg/L		96	90 - 110
Fluoride	0.130	J	10.0	9.820		mg/L		97	90 - 110

Lab Sample ID: 860-55139-8 MSD
Client Sample ID: MW-16-20230809-01
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117046

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	187		10.0	196.5	4	mg/L		91	90 - 110	0	15
Sulfate	101		10.0	110.4	4	mg/L		95	90 - 110	0	15
Fluoride	0.130	J	10.0	9.967		mg/L		98	90 - 110	1	15

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: MB 860-117282/3
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.250	U	0.500	0.250	mg/L			08/15/23 14:32	1
Sulfate	<0.200	U	0.500	0.200	mg/L			08/15/23 14:32	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/15/23 14:32	1

Lab Sample ID: MB 860-117282/58
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.250	U	0.500	0.250	mg/L			08/15/23 22:46	1
Sulfate	<0.200	U	0.500	0.200	mg/L			08/15/23 22:46	1
Fluoride	<0.100	U	0.500	0.100	mg/L			08/15/23 22:46	1

Lab Sample ID: LCS 860-117282/4
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.645		mg/L		96	90 - 110
Sulfate	10.0	10.55		mg/L		106	90 - 110
Fluoride	10.0	10.05		mg/L		100	90 - 110

Lab Sample ID: LCS 860-117282/59
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.814		mg/L		98	90 - 110
Sulfate	10.0	10.91		mg/L		109	90 - 110
Fluoride	10.0	10.35		mg/L		104	90 - 110

Lab Sample ID: LCSD 860-117282/5
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	10.0	9.667		mg/L		97	90 - 110	0	20
Sulfate	10.0	10.66		mg/L		107	90 - 110	1	20
Fluoride	10.0	10.09		mg/L		101	90 - 110	0	20

Lab Sample ID: LCSD 860-117282/60
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	10.0	9.788		mg/L		98	90 - 110	0	20
Sulfate	10.0	10.88		mg/L		109	90 - 110	0	20
Fluoride	10.0	10.27		mg/L		103	90 - 110	1	20

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LLCS 860-117282/7
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	0.500	0.4799	J	mg/L		96	50 - 150
Sulfate	0.500	0.5004		mg/L		100	50 - 150
Fluoride	0.500	0.3446	J	mg/L		69	50 - 150

Lab Sample ID: 860-55300-A-1 MS
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Sulfate	56.8		100	132.5	N1	mg/L		76	90 - 110
Fluoride	1.12	J	100	93.18		mg/L		92	90 - 110

Lab Sample ID: 860-55300-A-1 MSD
Matrix: Water
Analysis Batch: 117282

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Sulfate	56.8		100	132.7	N1	mg/L		76	90 - 110	0	15
Fluoride	1.12	J	100	92.86		mg/L		92	90 - 110	0	15

Method: 6010D - Metals (ICP)

Lab Sample ID: MB 860-116933/1-A
Matrix: Water
Analysis Batch: 117096

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 116933

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.0365	U	0.0400	0.0365	mg/L		08/13/23 10:00	08/14/23 12:54	1

Lab Sample ID: LCS 860-116933/2-A
Matrix: Water
Analysis Batch: 117096

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 116933

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Lithium	1.00	0.9840		mg/L		98	80 - 120

Lab Sample ID: LCSD 860-116933/3-A
Matrix: Water
Analysis Batch: 117096

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 116933

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lithium	1.00	0.9840		mg/L		98	80 - 120	0	20

Lab Sample ID: 860-55139-1 MS
Matrix: Water
Analysis Batch: 117096

Client Sample ID: MW-7-20230808-01
Prep Type: Total/NA
Prep Batch: 116933

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Lithium	<0.0365	U	1.00	1.030		mg/L		103	

Method: 6010D - Metals (ICP) (Continued)

Lab Sample ID: 860-55139-1 MSD
Client Sample ID: MW-7-20230808-01
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 117096
Prep Batch: 116933

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lithium	<0.0365	U	1.00	1.020		mg/L		102		1	

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 860-116935/1-A
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 116994
Prep Batch: 116935

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00220	U	0.00400	0.00220	mg/L		08/13/23 10:30	08/13/23 17:14	1
Boron	<0.00401	U	0.0100	0.00401	mg/L		08/13/23 10:30	08/13/23 17:14	1
Calcium	<0.0301	U	0.100	0.0301	mg/L		08/13/23 10:30	08/13/23 17:14	1
Barium	<0.00134	U	0.00400	0.00134	mg/L		08/13/23 10:30	08/13/23 17:14	1
Cobalt	<0.000355	U	0.00200	0.000355	mg/L		08/13/23 10:30	08/13/23 17:14	1
Selenium	<0.000266	U	0.00200	0.000266	mg/L		08/13/23 10:30	08/13/23 17:14	1

Lab Sample ID: LCS 860-116935/2-A
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 116994
Prep Batch: 116935

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.100	0.09643		mg/L		96	80 - 120
Boron	0.100	0.09473		mg/L		95	80 - 120
Arsenic	0.100	0.09893		mg/L		99	80 - 120
Calcium	2.50	2.694		mg/L		108	80 - 120
Barium	0.100	0.09771		mg/L		98	80 - 120
Beryllium	0.100	0.09530		mg/L		95	80 - 120
Cadmium	0.100	0.1003		mg/L		100	80 - 120
Chromium	0.100	0.1012		mg/L		101	80 - 120
Cobalt	0.100	0.09903		mg/L		99	80 - 120
Lead	0.100	0.09849		mg/L		98	80 - 120
Molybdenum	0.100	0.09997		mg/L		100	80 - 120
Selenium	0.100	0.09804		mg/L		98	80 - 120
Thallium	0.100	0.09863		mg/L		99	80 - 120

Lab Sample ID: LCSD 860-116935/3-A
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 116994
Prep Batch: 116935

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony	0.100	0.09778		mg/L		98	80 - 120	1	20
Boron	0.100	0.09780		mg/L		98	80 - 120	3	20
Arsenic	0.100	0.09888		mg/L		99	80 - 120	0	20
Calcium	2.50	2.716		mg/L		109	80 - 120	1	20
Barium	0.100	0.09670		mg/L		97	80 - 120	1	20
Beryllium	0.100	0.09468		mg/L		95	80 - 120	1	20
Cadmium	0.100	0.09891		mg/L		99	80 - 120	1	20
Chromium	0.100	0.1001		mg/L		100	80 - 120	1	20
Cobalt	0.100	0.09850		mg/L		98	80 - 120	1	20

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 860-116935/3-A
Matrix: Water
Analysis Batch: 116994

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 116935

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			0.100	0.09890		mg/L		99	80 - 120	0	20
Molybdenum			0.100	0.1001		mg/L		100	80 - 120	0	20
Selenium			0.100	0.09540		mg/L		95	80 - 120	3	20
Thallium			0.100	0.09939		mg/L		99	80 - 120	1	20

Lab Sample ID: 860-55109-C-1-A MS
Matrix: Water
Analysis Batch: 116994

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 116935

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.00402		0.100	0.08923		mg/L		85	75 - 125
Boron	0.0498		0.100	0.1345		mg/L		85	75 - 125
Arsenic	0.00101	J	0.100	0.09158		mg/L		91	75 - 125
Calcium	50.6		2.50	50.97	4	mg/L		16	75 - 125
Barium	0.256		0.100	0.3385		mg/L		83	75 - 125
Beryllium	0.000559	J	0.100	0.08323		mg/L		83	75 - 125
Cadmium	<0.000240	U	0.100	0.09164		mg/L		92	75 - 125
Chromium	0.00706		0.100	0.09851		mg/L		91	75 - 125
Cobalt	0.00225		0.100	0.09341		mg/L		91	75 - 125
Lead	0.00354		0.100	0.09620		mg/L		93	75 - 125
Molybdenum	0.000278	J	0.100	0.09387		mg/L		94	75 - 125
Selenium	0.000749	J	0.100	0.08874		mg/L		88	75 - 125
Thallium	0.000207	J	0.100	0.09275		mg/L		93	75 - 125

Lab Sample ID: 860-55109-C-1-B MSD
Matrix: Water
Analysis Batch: 116994

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 116935

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Antimony	0.00402		0.100	0.09633		mg/L		92	75 - 125	8	20
Boron	0.0498		0.100	0.1466		mg/L		97	75 - 125	9	20
Arsenic	0.00101	J	0.100	0.09696		mg/L		96	75 - 125	6	20
Calcium	50.6		2.50	55.40	4	mg/L		192	75 - 125	8	20
Barium	0.256		0.100	0.3614		mg/L		105	75 - 125	7	20
Beryllium	0.000559	J	0.100	0.08996		mg/L		89	75 - 125	8	20
Cadmium	<0.000240	U	0.100	0.09726		mg/L		97	75 - 125	6	20
Chromium	0.00706		0.100	0.1057		mg/L		99	75 - 125	7	20
Cobalt	0.00225		0.100	0.09828		mg/L		96	75 - 125	5	20
Lead	0.00354		0.100	0.1036		mg/L		100	75 - 125	7	20
Molybdenum	0.000278	J	0.100	0.09989		mg/L		100	75 - 125	6	20
Selenium	0.000749	J	0.100	0.09241		mg/L		92	75 - 125	4	20
Thallium	0.000207	J	0.100	0.09986		mg/L		100	75 - 125	7	20

QC Sample Results

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 860-117006/1
Matrix: Water
Analysis Batch: 117006

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<5.00	U	5.00	5.00	mg/L			08/14/23 10:04	1

Lab Sample ID: LCS 860-117006/2
Matrix: Water
Analysis Batch: 117006

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	1010		mg/L		101	80 - 120

Lab Sample ID: LCSD 860-117006/3
Matrix: Water
Analysis Batch: 117006

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Total Dissolved Solids	1000	1008		mg/L		101	80 - 120	0	10

Lab Sample ID: LLCS 860-117006/4
Matrix: Water
Analysis Batch: 117006

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	5.00	5.000		mg/L		100	50 - 150

Lab Sample ID: 820-9645-A-1 DU
Matrix: Water
Analysis Batch: 117006

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	579		578.0		mg/L		0.2	10

Lab Sample ID: MB 860-117013/1
Matrix: Water
Analysis Batch: 117013

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<5.00	U	5.00	5.00	mg/L			08/14/23 10:08	1

Lab Sample ID: LCS 860-117013/2
Matrix: Water
Analysis Batch: 117013

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	1010		mg/L		101	80 - 120

Lab Sample ID: LCSD 860-117013/3
Matrix: Water
Analysis Batch: 117013

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Total Dissolved Solids	1000	1008		mg/L		101	80 - 120	0	10

QC Sample Results

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: LLCS 860-117013/4
Matrix: Water
Analysis Batch: 117013

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	5.00	<5.00	U	mg/L		60	50 - 150

Lab Sample ID: 860-55139-7 DU
Matrix: Water
Analysis Batch: 117013

Client Sample ID: MW-15-20230809-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	498		495.0		mg/L		0.6	10

Lab Sample ID: 860-55139-8 DU
Matrix: Water
Analysis Batch: 117013

Client Sample ID: MW-16-20230809-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	792		793.0		mg/L		0.1	10

Method: SM 4500 H+ B - pH

Lab Sample ID: 860-55139-1 DU
Matrix: Water
Analysis Batch: 117321

Client Sample ID: MW-7-20230808-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	6.6	HF	6.6		SU		0.9	20

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-624480/1-A
Matrix: Water
Analysis Batch: 627241

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 624480

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.03306	U	0.0610	0.0610	1.00	0.139	pCi/L	08/17/23 10:24	09/08/23 07:21	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.5*		*30 - 110*	*08/17/23 10:24*	*09/08/23 07:21*	*1*

Lab Sample ID: LCS 160-624480/2-A
Matrix: Water
Analysis Batch: 627241

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 624480

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-226	11.3	10.90		1.14	1.00	0.117	pCi/L	96	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*97.0*		*30 - 110*

Eurofins Houston

Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample ID: 810-73402-B-1-A DU **Client Sample ID: Duplicate**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 627236 **Prep Batch: 624480**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-226	0.223		0.1206	U	0.101	1.00	0.153	pCi/L	0.51	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*88.7*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-624482/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 626385 **Prep Batch: 624482**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.1021	U	0.289	0.289	1.00	0.516	pCi/L	08/17/23 10:32	09/01/23 11:25	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.5*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:25*	*1*
Y Carrier	*84.1*		*30 - 110*	*08/17/23 10:32*	*09/01/23 11:25*	*1*

Lab Sample ID: LCS 160-624482/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 626385 **Prep Batch: 624482**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-228	7.91	7.750		1.11	1.00	0.455	pCi/L	98	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*97.0*		*30 - 110*
Y Carrier	*78.5*		*30 - 110*

Lab Sample ID: 810-73402-B-1-B DU **Client Sample ID: Duplicate**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 626385 **Prep Batch: 624482**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-228	0.161	U	0.1981	U	0.304	1.00	0.515	pCi/L	0.06	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*88.7*		*30 - 110*
Y Carrier	*83.7*		*30 - 110*

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

QC Association Summary

HPLC/IC

Analysis Batch: 117043

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	300.0	
860-55139-2	MW-11-20230808-01	Total/NA	Water	300.0	
860-55139-3	MW-12-20230808-01	Total/NA	Water	300.0	
860-55139-4	MW-13-20230809-01	Total/NA	Water	300.0	
860-55139-5	MW-14-20230809-01	Total/NA	Water	300.0	
860-55139-5 - DL	MW-14-20230809-01	Total/NA	Water	300.0	
860-55139-6	MW-17-20230809-01	Total/NA	Water	300.0	
860-55139-7	MW-15-20230809-01	Total/NA	Water	300.0	
MB 860-117043/3	Method Blank	Total/NA	Water	300.0	
LCS 860-117043/4	Lab Control Sample	Total/NA	Water	300.0	
LCSD 860-117043/5	Lab Control Sample Dup	Total/NA	Water	300.0	
LLCS 860-117043/7	Lab Control Sample	Total/NA	Water	300.0	
860-55139-1 MS	MW-7-20230808-01	Total/NA	Water	300.0	
860-55139-1 MSD	MW-7-20230808-01	Total/NA	Water	300.0	

Analysis Batch: 117046

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-8	MW-16-20230809-01	Total/NA	Water	300.0	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	300.0	
860-55139-10	FB-01-20230809-01	Total/NA	Water	300.0	
MB 860-117046/3	Method Blank	Total/NA	Water	300.0	
LCS 860-117046/4	Lab Control Sample	Total/NA	Water	300.0	
LCSD 860-117046/5	Lab Control Sample Dup	Total/NA	Water	300.0	
LLCS 860-117046/7	Lab Control Sample	Total/NA	Water	300.0	
860-55139-8 MS	MW-16-20230809-01	Total/NA	Water	300.0	
860-55139-8 MSD	MW-16-20230809-01	Total/NA	Water	300.0	

Analysis Batch: 117282

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	300.0	
860-55139-6	MW-17-20230809-01	Total/NA	Water	300.0	
MB 860-117282/3	Method Blank	Total/NA	Water	300.0	
MB 860-117282/58	Method Blank	Total/NA	Water	300.0	
LCS 860-117282/4	Lab Control Sample	Total/NA	Water	300.0	
LCS 860-117282/59	Lab Control Sample	Total/NA	Water	300.0	
LCSD 860-117282/5	Lab Control Sample Dup	Total/NA	Water	300.0	
LCSD 860-117282/60	Lab Control Sample Dup	Total/NA	Water	300.0	
LLCS 860-117282/7	Lab Control Sample	Total/NA	Water	300.0	
860-55300-A-1 MS	Matrix Spike	Total/NA	Water	300.0	
860-55300-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	300.0	

Metals

Prep Batch: 116933

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	3010A	
860-55139-2	MW-11-20230808-01	Total/NA	Water	3010A	
860-55139-3	MW-12-20230808-01	Total/NA	Water	3010A	
860-55139-4	MW-13-20230809-01	Total/NA	Water	3010A	
860-55139-5	MW-14-20230809-01	Total/NA	Water	3010A	
860-55139-6	MW-17-20230809-01	Total/NA	Water	3010A	

Metals (Continued)

Prep Batch: 116933 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-7	MW-15-20230809-01	Total/NA	Water	3010A	
860-55139-8	MW-16-20230809-01	Total/NA	Water	3010A	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	3010A	
860-55139-10	FB-01-20230809-01	Total/NA	Water	3010A	
MB 860-116933/1-A	Method Blank	Total/NA	Water	3010A	
LCS 860-116933/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 860-116933/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	
860-55139-1 MS	MW-7-20230808-01	Total/NA	Water	3010A	
860-55139-1 MSD	MW-7-20230808-01	Total/NA	Water	3010A	

Prep Batch: 116935

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	3010A	
860-55139-2	MW-11-20230808-01	Total/NA	Water	3010A	
860-55139-3	MW-12-20230808-01	Total/NA	Water	3010A	
860-55139-4	MW-13-20230809-01	Total/NA	Water	3010A	
860-55139-5	MW-14-20230809-01	Total/NA	Water	3010A	
860-55139-6	MW-17-20230809-01	Total/NA	Water	3010A	
860-55139-7	MW-15-20230809-01	Total/NA	Water	3010A	
860-55139-8	MW-16-20230809-01	Total/NA	Water	3010A	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	3010A	
860-55139-10	FB-01-20230809-01	Total/NA	Water	3010A	
MB 860-116935/1-A	Method Blank	Total/NA	Water	3010A	
LCS 860-116935/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 860-116935/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	
860-55109-C-1-A MS	Matrix Spike	Total/NA	Water	3010A	
860-55109-C-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	3010A	

Analysis Batch: 116994

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	6020B	116935
860-55139-1	MW-7-20230808-01	Total/NA	Water	6020B	116935
860-55139-2	MW-11-20230808-01	Total/NA	Water	6020B	116935
860-55139-2	MW-11-20230808-01	Total/NA	Water	6020B	116935
860-55139-3	MW-12-20230808-01	Total/NA	Water	6020B	116935
860-55139-3	MW-12-20230808-01	Total/NA	Water	6020B	116935
860-55139-4	MW-13-20230809-01	Total/NA	Water	6020B	116935
860-55139-4	MW-13-20230809-01	Total/NA	Water	6020B	116935
860-55139-5	MW-14-20230809-01	Total/NA	Water	6020B	116935
860-55139-5	MW-14-20230809-01	Total/NA	Water	6020B	116935
860-55139-5	MW-14-20230809-01	Total/NA	Water	6020B	116935
860-55139-6	MW-17-20230809-01	Total/NA	Water	6020B	116935
860-55139-6	MW-17-20230809-01	Total/NA	Water	6020B	116935
860-55139-7	MW-15-20230809-01	Total/NA	Water	6020B	116935
860-55139-7	MW-15-20230809-01	Total/NA	Water	6020B	116935
860-55139-8	MW-16-20230809-01	Total/NA	Water	6020B	116935
860-55139-8	MW-16-20230809-01	Total/NA	Water	6020B	116935
860-55139-9	DUP-01-20230809-01	Total/NA	Water	6020B	116935
860-55139-9	DUP-01-20230809-01	Total/NA	Water	6020B	116935
860-55139-10	FB-01-20230809-01	Total/NA	Water	6020B	116935
MB 860-116935/1-A	Method Blank	Total/NA	Water	6020B	116935

Metals (Continued)

Analysis Batch: 116994 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 860-116935/2-A	Lab Control Sample	Total/NA	Water	6020B	116935
LCSD 860-116935/3-A	Lab Control Sample Dup	Total/NA	Water	6020B	116935
860-55109-C-1-A MS	Matrix Spike	Total/NA	Water	6020B	116935
860-55109-C-1-B MSD	Matrix Spike Duplicate	Total/NA	Water	6020B	116935

Analysis Batch: 117096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	6010D	116933
860-55139-2	MW-11-20230808-01	Total/NA	Water	6010D	116933
860-55139-3	MW-12-20230808-01	Total/NA	Water	6010D	116933
860-55139-4	MW-13-20230809-01	Total/NA	Water	6010D	116933
860-55139-5	MW-14-20230809-01	Total/NA	Water	6010D	116933
860-55139-6	MW-17-20230809-01	Total/NA	Water	6010D	116933
860-55139-7	MW-15-20230809-01	Total/NA	Water	6010D	116933
860-55139-8	MW-16-20230809-01	Total/NA	Water	6010D	116933
860-55139-9	DUP-01-20230809-01	Total/NA	Water	6010D	116933
860-55139-10	FB-01-20230809-01	Total/NA	Water	6010D	116933
MB 860-116933/1-A	Method Blank	Total/NA	Water	6010D	116933
LCS 860-116933/2-A	Lab Control Sample	Total/NA	Water	6010D	116933
LCSD 860-116933/3-A	Lab Control Sample Dup	Total/NA	Water	6010D	116933
860-55139-1 MS	MW-7-20230808-01	Total/NA	Water	6010D	116933
860-55139-1 MSD	MW-7-20230808-01	Total/NA	Water	6010D	116933

General Chemistry

Analysis Batch: 117006

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	SM 2540C	
860-55139-2	MW-11-20230808-01	Total/NA	Water	SM 2540C	
860-55139-3	MW-12-20230808-01	Total/NA	Water	SM 2540C	
860-55139-4	MW-13-20230809-01	Total/NA	Water	SM 2540C	
860-55139-5	MW-14-20230809-01	Total/NA	Water	SM 2540C	
860-55139-6	MW-17-20230809-01	Total/NA	Water	SM 2540C	
MB 860-117006/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 860-117006/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 860-117006/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
LLCS 860-117006/4	Lab Control Sample	Total/NA	Water	SM 2540C	
820-9645-A-1 DU	Duplicate	Total/NA	Water	SM 2540C	

Analysis Batch: 117013

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-7	MW-15-20230809-01	Total/NA	Water	SM 2540C	
860-55139-8	MW-16-20230809-01	Total/NA	Water	SM 2540C	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	SM 2540C	
860-55139-10	FB-01-20230809-01	Total/NA	Water	SM 2540C	
MB 860-117013/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 860-117013/2	Lab Control Sample	Total/NA	Water	SM 2540C	
LCSD 860-117013/3	Lab Control Sample Dup	Total/NA	Water	SM 2540C	
LLCS 860-117013/4	Lab Control Sample	Total/NA	Water	SM 2540C	
860-55139-7 DU	MW-15-20230809-01	Total/NA	Water	SM 2540C	
860-55139-8 DU	MW-16-20230809-01	Total/NA	Water	SM 2540C	

General Chemistry

Analysis Batch: 117321

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	SM 4500 H+ B	
860-55139-2	MW-11-20230808-01	Total/NA	Water	SM 4500 H+ B	
860-55139-3	MW-12-20230808-01	Total/NA	Water	SM 4500 H+ B	
860-55139-4	MW-13-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-5	MW-14-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-6	MW-17-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-7	MW-15-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-8	MW-16-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-10	FB-01-20230809-01	Total/NA	Water	SM 4500 H+ B	
860-55139-1 DU	MW-7-20230808-01	Total/NA	Water	SM 4500 H+ B	

Rad

Prep Batch: 624480

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	PrecSep-21	
860-55139-2	MW-11-20230808-01	Total/NA	Water	PrecSep-21	
860-55139-3	MW-12-20230808-01	Total/NA	Water	PrecSep-21	
860-55139-4	MW-13-20230809-01	Total/NA	Water	PrecSep-21	
860-55139-5	MW-14-20230809-01	Total/NA	Water	PrecSep-21	
860-55139-6	MW-17-20230809-01	Total/NA	Water	PrecSep-21	
860-55139-7	MW-15-20230809-01	Total/NA	Water	PrecSep-21	
860-55139-8	MW-16-20230809-01	Total/NA	Water	PrecSep-21	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	PrecSep-21	
860-55139-10	FB-01-20230809-01	Total/NA	Water	PrecSep-21	
MB 160-624480/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-624480/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
810-73402-B-1-A DU	Duplicate	Total/NA	Water	PrecSep-21	

Prep Batch: 624482

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-55139-1	MW-7-20230808-01	Total/NA	Water	PrecSep_0	
860-55139-2	MW-11-20230808-01	Total/NA	Water	PrecSep_0	
860-55139-3	MW-12-20230808-01	Total/NA	Water	PrecSep_0	
860-55139-4	MW-13-20230809-01	Total/NA	Water	PrecSep_0	
860-55139-5	MW-14-20230809-01	Total/NA	Water	PrecSep_0	
860-55139-6	MW-17-20230809-01	Total/NA	Water	PrecSep_0	
860-55139-7	MW-15-20230809-01	Total/NA	Water	PrecSep_0	
860-55139-8	MW-16-20230809-01	Total/NA	Water	PrecSep_0	
860-55139-9	DUP-01-20230809-01	Total/NA	Water	PrecSep_0	
860-55139-10	FB-01-20230809-01	Total/NA	Water	PrecSep_0	
MB 160-624482/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-624482/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
810-73402-B-1-B DU	Duplicate	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Client Sample ID: MW-7-20230808-01

Lab Sample ID: 860-55139-1
Date Collected: 08/08/23 15:05
Matrix: Water
Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 19:05	WP	EET HOU
Total/NA	Analysis	300.0		10			117282	08/15/23 16:06	RBNS	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:02	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 17:44	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 17:51	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	50 mL	200 mL	117006	08/14/23 10:04	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:10	TL	EET HOU
Total/NA	Prep	PrecSep-21			991.30 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:31	SCB	EET SL
Total/NA	Prep	PrecSep_0			991.30 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-11-20230808-01

Lab Sample ID: 860-55139-2
Date Collected: 08/08/23 16:15
Matrix: Water
Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 19:28	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:26	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 17:46	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 17:53	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	100 mL	200 mL	117006	08/14/23 10:04	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:13	TL	EET HOU
Total/NA	Prep	PrecSep-21			1002.31 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:32	SCB	EET SL
Total/NA	Prep	PrecSep_0			1002.31 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-12-20230808-01

Lab Sample ID: 860-55139-3
Date Collected: 08/08/23 17:25
Matrix: Water
Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 19:38	WP	EET HOU

Lab Chronicle

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Client Sample ID: MW-12-20230808-01

Lab Sample ID: 860-55139-3

Date Collected: 08/08/23 17:25
Date Received: 08/11/23 12:46

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:28	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 17:48	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 17:55	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	200 mL	200 mL	117006	08/14/23 10:04	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:14	TL	EET HOU
Total/NA	Prep	PrecSep-21			1002.55 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:32	SCB	EET SL
Total/NA	Prep	PrecSep_0			1002.55 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-13-20230809-01

Lab Sample ID: 860-55139-4

Date Collected: 08/09/23 08:40
Date Received: 08/11/23 12:46

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 19:48	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:31	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:02	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 18:14	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	100 mL	200 mL	117006	08/14/23 10:04	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:16	TL	EET HOU
Total/NA	Prep	PrecSep-21			996.73 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:32	SCB	EET SL
Total/NA	Prep	PrecSep_0			996.73 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-14-20230809-01

Lab Sample ID: 860-55139-5

Date Collected: 08/09/23 09:40
Date Received: 08/11/23 12:46

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 20:36	WP	EET HOU
Total/NA	Analysis	300.0	DL	10			117043	08/14/23 20:46	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:33	JDM	EET HOU

Client Sample ID: MW-14-20230809-01

Lab Sample ID: 860-55139-5

Date Collected: 08/09/23 09:40

Matrix: Water

Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:05	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 18:16	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		10			116994	08/13/23 18:39	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	25 mL	200 mL	117006	08/14/23 10:04	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:17	TL	EET HOU
Total/NA	Prep	PrecSep-21			995.94 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:32	SCB	EET SL
Total/NA	Prep	PrecSep_0			995.94 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-17-20230809-01

Lab Sample ID: 860-55139-6

Date Collected: 08/09/23 10:45

Matrix: Water

Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 19:57	WP	EET HOU
Total/NA	Analysis	300.0		10			117282	08/15/23 16:13	RBNS	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:36	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:07	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 18:19	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	50 mL	200 mL	117006	08/14/23 10:04	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:19	TL	EET HOU
Total/NA	Prep	PrecSep-21			995.40 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:32	SCB	EET SL
Total/NA	Prep	PrecSep_0			995.40 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-15-20230809-01

Lab Sample ID: 860-55139-7

Date Collected: 08/09/23 12:05

Matrix: Water

Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117043	08/14/23 20:26	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:39	JDM	EET HOU

Client Sample ID: MW-15-20230809-01 Lab Sample ID: 860-55139-7

Date Collected: 08/09/23 12:05 **Matrix: Water**
Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:09	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 18:21	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	100 mL	200 mL	117013	08/14/23 10:08	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:21	TL	EET HOU
Total/NA	Prep	PrecSep-21			999.49 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:32	SCB	EET SL
Total/NA	Prep	PrecSep_0			999.49 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626385	09/01/23 11:26	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: MW-16-20230809-01 Lab Sample ID: 860-55139-8

Date Collected: 08/09/23 13:55 **Matrix: Water**
Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117046	08/14/23 19:24	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:41	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:12	DP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 18:23	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	100 mL	200 mL	117013	08/14/23 10:08	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:23	TL	EET HOU
Total/NA	Prep	PrecSep-21			994.38 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:33	SCB	EET SL
Total/NA	Prep	PrecSep_0			994.38 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626379	09/01/23 11:31	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: DUP-01-20230809-01 Lab Sample ID: 860-55139-9

Date Collected: 08/09/23 06:00 **Matrix: Water**
Date Received: 08/11/23 12:46

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117046	08/14/23 19:53	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:44	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:32	DP	EET HOU

Lab Chronicle

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Client Sample ID: DUP-01-20230809-01

Lab Sample ID: 860-55139-9

Date Collected: 08/09/23 06:00
Date Received: 08/11/23 12:46

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		50			116994	08/13/23 18:37	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	100 mL	200 mL	117013	08/14/23 10:08	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:25	TL	EET HOU
Total/NA	Prep	PrecSep-21			996.76 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:34	SCB	EET SL
Total/NA	Prep	PrecSep_0			996.76 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626379	09/01/23 11:31	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Client Sample ID: FB-01-20230809-01

Lab Sample ID: 860-55139-10

Date Collected: 08/09/23 00:00
Date Received: 08/11/23 12:46

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			117046	08/14/23 20:03	WP	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116933	08/13/23 10:00	MD	EET HOU
Total/NA	Analysis	6010D		1			117096	08/14/23 13:57	JDM	EET HOU
Total/NA	Prep	3010A			50 mL	50 mL	116935	08/13/23 10:30	MD	EET HOU
Total/NA	Analysis	6020B		1			116994	08/13/23 18:35	DP	EET HOU
Total/NA	Analysis	SM 2540C		1	200 mL	200 mL	117013	08/14/23 10:08	OH	EET HOU
Total/NA	Analysis	SM 4500 H+ B		1			117321	08/15/23 17:27	TL	EET HOU
Total/NA	Prep	PrecSep-21			998.10 mL	1.0 g	624480	08/17/23 10:24	KAC	EET SL
Total/NA	Analysis	903.0		1			627236	09/08/23 09:34	SCB	EET SL
Total/NA	Prep	PrecSep_0			998.10 mL	1.0 g	624482	08/17/23 10:32	KAC	EET SL
Total/NA	Analysis	904.0		1			626379	09/01/23 11:31	FLC	EET SL
Total/NA	Analysis	Ra226_Ra228 Pos		1			627951	09/14/23 08:49	FLC	EET SL

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Laboratory: Eurofins Houston

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704215-23-53	08-30-23

Laboratory: Eurofins St. Louis

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

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704193	07-31-24

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

Analysis Method	Prep Method	Matrix	Analyte
Ra226_Ra228 Pos		Water	Radium 226 and 228

Method Summary

Client: ERM-Southwest Inc.
Project/Site: Twin Oaks Power Plant

Job ID: 860-55139-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	EPA	EET HOU
6010D	Metals (ICP)	SW846	EET HOU
6020B	Metals (ICP/MS)	SW846	EET HOU
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET HOU
SM 4500 H+ B	pH	SM	EET HOU
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228 Pos	Combined Radium-226 and Radium-228	TAL-STL	EET SL
3010A	Preparation, Total Metals	SW846	EET HOU
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency
None = None
SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200
EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: ERM-Southwest Inc. Job ID: 860-55139-1
Project/Site: Twin Oaks Power Plant

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
860-55139-1	MW-7-20230808-01	Water	08/08/23 15:05	08/11/23 12:46
860-55139-2	MW-11-20230808-01	Water	08/08/23 16:15	08/11/23 12:46
860-55139-3	MW-12-20230808-01	Water	08/08/23 17:25	08/11/23 12:46
860-55139-4	MW-13-20230809-01	Water	08/09/23 08:40	08/11/23 12:46
860-55139-5	MW-14-20230809-01	Water	08/09/23 09:40	08/11/23 12:46
860-55139-6	MW-17-20230809-01	Water	08/09/23 10:45	08/11/23 12:46
860-55139-7	MW-15-20230809-01	Water	08/09/23 12:05	08/11/23 12:46
860-55139-8	MW-16-20230809-01	Water	08/09/23 13:55	08/11/23 12:46
860-55139-9	DUP-01-20230809-01	Water	08/09/23 06:00	08/11/23 12:46
860-55139-10	FB-01-20230809-01	Water	08/09/23 00:00	08/11/23 12:46

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477
Phone (281) 240-4200

Chain of Custody Record

eurofins
Enviro me t sc

Client Information			
Client Contact: Quintin Nel	Sampler: K Naegeli	Lab PM: Patel, Anita	Carrier Tracking No(s):
Company: ERM-Northeast	Phone: (512) 769-2473	E-Mail: Anita.Patel@et.eurofinsus.com	State of Origin: TX
Address: 295 Madison Avenue Suite 8A	PWSID:		COC No: 860-21375-7497 1
City: New York	Due Date Requested:		Page: Page 1 of 1
State, Zip: NY 10017	TAT Requested (days): 10 day		Job #:
Phone: 212-44-1900(Tel)	Compliance Project: Δ Yes Δ No		
Email: quintin.nel@erm.com	PO #:		
Project Name: Twin Oaks Power Plant	WO #: 0689854		
Site:	Project #: 86005616		
	SSOW#:		

Analysis Requested

Preservation Codes: A HCL; M Hexane; ...ne; ...laO2; ...O4S; ...SO3; ...S2O3; ...O4; ... Dodecahydrate; ...one; ...A; ...4-5; L EDA; T - ...mzma; Z other (specify); Other

860-55139 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Appendix III Metals Boron, Calcium	Appendix III chloride, fluoride, sulfate by 300	Appendix III pH and TDS 2540C	Appendix IV Metals Sb, Ba, Co, Se and Li	903.0 and 904.0- Radium 226 and 228(GFPC)	Total Number of containers	Special Instructions/Note
			Preservation Code:				D	N	N	D	D		
MW-7-20230808-01	8/8/23	1505	G	Water			X	X	X	X	X		
MW-11-20230808-01		1615		Water									
MW-12-20230808-01		1725		Water									
MW-13-20230809-01	8/9/23	0840		Water									
MW-14-20230809-01		0940		Water									
MW-17-20230809-01		1045		Water									
MW-15-20230809-01		1205		Water									
MW-16-20230809-01		1355		Water									
DUP-01-20230809-01		0600		Water									
FB-01-20230809-01				Water									
				Water									

Temp: 11.0 IR ID:HOU-338
C/F:-0.3
Corrected Temp: 10.7

Temp: 10.2 IR ID:HOU-338
C/F:-0.3
Corrected Temp: 9.9

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I II III IV Other (specify) EDD

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Kara Naegeli	Date/Time: 8/10/23 0930	Company: ERM	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by: [signature]	Date/Time: 8-11-23 9:34	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins Houston
4145 Greenbriar Dr
Stafford, TX 77477
Phone: 281-240-4200

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Patel, Anita	Carrier Tracking No(s):	COC No: 860-36647.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Anita.Patel@et.eurofinsus.com	State of Origin: Texas	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Texas		Job #: 860-55139-1
Address: 13715 Rider Trail North,	Due Date Requested: 8/18/2023			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Twin Oaks Power Plant	Project #: 86005616			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Radium 226 (GFPC)	904.0/PrecSep_0 Radium 228 (GFPC)	Ra226_228GFPC_P/ Combined Radium-226 and Radium-228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-7-20230808-01 (860-55139-1)	8/8/23	15:05 Central		Water			X	X	X	2	
MW-11-20230808-01 (860-55139-2)	8/8/23	16:15 Central		Water			X	X	X	2	
MW-12-20230808-01 (860-55139-3)	8/8/23	17:25 Central		Water			X	X	X	2	
MW-13-20230809-01 (860-55139-4)	8/9/23	08:40 Central		Water			X	X	X	2	
MW-14-20230809-01 (860-55139-5)	8/9/23	09:40 Central		Water			X	X	X	2	
MW-17-20230809-01 (860-55139-6)	8/9/23	10:45 Central		Water			X	X	X	2	
MW-15-20230809-01 (860-55139-7)	8/9/23	12:05 Central		Water			X	X	X	2	
MW-16-20230809-01 (860-55139-8)	8/9/23	13:55 Central		Water			X	X	X	2	
DUP-01-20230809-01 (860-55139-9)	8/9/23	06:00 Central		Water			X	X	X	2	

Preservation Codes:

A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA

M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Y - Trizma; Z - other (specify)

Other:

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing South Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing South Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing South Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing South Central, LLC.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ________ Months*

Deliverable Requested: I, II, III, IV, Other (specify) — Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:	Time:		Method of Shipment:	
Relinquished by: [signature]	Date/Time: 8-14-23 13:21	Company	Received by: FED EX		Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: Sura Worthington		Date/Time: AUG 16 2023 0910	Company: EHSR
Relinquished by:	Date/Time:	Company	Received by:		Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:			

Ver: 06/08/2021

Eurofins Houston
4145 Greenbriar Dr
Stafford, TX 77477
Phone: 281-240-4200

Chain of Custody Record

eurofins Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Patel, Anita	Carrier Tracking No(s):	COC No: 860-36647.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: Anita.Patel@et.eurofinsus.com	State of Origin: Texas	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Texas		Job #: 860-55139-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 8/18/2023			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Twin Oaks Power Plant	Project #: 86005616			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Radium 226 (GFPC)	904.0/PrecSep_0 Radium 228 (GFPC)	Ra226_228GFPC_PI Combined Radium-226 and Radium-228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
FB-01-20230809-01 (860-55139-10)	8/9/23	Central		Water			X	X	X	2	

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA

M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)

Other:

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing South Central, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing South Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing South Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing South Central, LLC.

Possible Hazard Identification
Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ________ Months*

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: FED EX Sierra Worthington	Date/Time: AUG 16 2023 0910	Company: EMSR
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: ERM-Southwest Inc. | Job Number: 860-55139-1

Login Number: 55139 | **List Source: Eurofins Houston**
List Number: 1
Creator: Babar, Syed

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	MELTED
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	

Login Sample Receipt Checklist

Client: ERM-Southwest Inc. Job Number: 860-55139-1

Login Number: 55139
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 08/16/23 01:45 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Data Usability Summary for Laboratory Package 860-55139-1

August 2023 Groundwater Sampling – Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

ERM reviewed one data package (Work Order Number 860-55139-1) from Eurofins of Houston, Texas for the analysis of nine (9) groundwater samples, including one blind field duplicate sample, collected on August 8 to August 9, 2023 at Twin Oaks Power Station, Robertson County, Texas. Data were reviewed for general conformance to the requirements of the following documents:

1) Twin Oaks Power Station, *Groundwater Sampling and Analysis Plan (October 2017)*;
2) Environmental Protection Agency's (EPA's) National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA-540-R-2017-001, January 2017);
3) Texas Commission on Environmental Quality's (TCEQ's) *Review and Reporting of COC Concentration Data Under TRRP* (RG-366/TRRP-13, May 2010); and
4) *CCR Landfill Draft Technical Guideline No. 32* (May 2020).

Eurofins is NELAC-accredited under the Texas Laboratory Accreditation Program for the matrices, analytes, and methods of analysis requested on the chain-of-custody documentation. Eurofins National Environmental Laboratory Accreditation Program (NELAP) certificate applicable to the period during which the laboratory generated the data in these reports is referenced in the laboratory reports.

Intended Use of Data: To provide concentration data on Appendix III and Appendix IV Coal Combustion Residuals (CCR) Rule parameters in the ground water at the facility.

Analyses requested included:

- SW846 6010C – Metals by Inductively Coupled Plasma (ICP)
- SW846 6020A – Metals by ICP/Mass Spectrometry (MS)
- SW846 7470A – Mercury by Cold Vapor Atomic Absorption (CVAA)
- EPA 300.0 – Anions, Ion Chromatography
- EPA 903.0 – Radium-226 by Gas Flow Proportional Counter (GFPC)
- EPA 904.0 – Radium-228 (GFPC)

Data were reviewed and validated as described in the TRRP-13 Guidance Document and the results of the review/validation are discussed in this Data Usability Summary (DUS). The following laboratory submittals were reviewed by ERM:

- Analytical data report;
- Laboratory review checklist (LRC);
- Exception reports (ERs); and
- Case narrative.

The results of supporting quality control (QC) analyses are summarized on the LRCs, ERs, and in the case narrative, which were included in this review.

The LRC, ERs, case narrative, and analytical data report are attached to this report.

INTRODUCTION

Eight (8) groundwater samples, one (1) blind field duplicate, and one (1) field blank were submitted to the laboratory for analysis of select metals and anions. Table 1 lists the sample identifications cross-referenced to laboratory identifications.

Project Data Quality Objectives

The QC sample recoveries and relative percent differences (RPD) were evaluated based on the following Project Data Quality Objectives (DQO):

Organic Compounds
Recovery 60-140%
RPD ≤40%

Inorganic Compounds
Recovery 70-130%
RPD ≤30%

Data were qualified in accordance with the TCEQ's TRRP-13 guidance document, including data qualifier codes and data qualifier code definitions.

DATA REVIEW / VALIDATION RESULTS

Analytical Results

Groundwater analytical results are reported in milligrams per liter (mg/L). *Not Detected* results are reported as less than the value of the reporting limit (RL).

Preservation and Holding Times

The samples were evaluated for agreement with the chain-of-custody (COC). The samples were received in the appropriate containers and in good condition. The corrected sample receipt temperatures (9.9°C and 10.7°C) were slightly above the acceptance criteria of 4 ± 2°C. However, temperature is not a required method of preservation for the analyses in this lab report according to their respective methodology; as such, no qualifiers were required. The samples were preserved in the field as specified by the method. The samples were prepared and analyzed within holding times, with the exception of pH. The holding time of pH is 15 minutes according to the method; as such, the samples were unable to be ran for pH within the recommended holding time. Therefore, the laboratory qualified all pH results as HF, sample analyzed outside of holding time.

Calibrations

According to the LRC, initial calibrations, continuing calibrations, and calibration verifications data met method requirements for metals and anions, as applicable.

Blanks

Metals, anions and radium were not detected in the method blanks. Boron and calcium were detected in the field blank (FB-01-20230809-01). Associated samples with results within five times the field blank concentrations for boron and calcium (0.0476 and 0.225 mg/L, respectively) were qualified with estimated high bias (JH).

Internal Standards and Surrogate Recoveries

According to the LRC, internal standard area counts and retention times were not applicable for the analyses requested. Surrogate recoveries were also not applicable for the analyses requested and therefore were not evaluated. Carrier percent yields for radioactive analyses were within acceptable limits.

Laboratory Control Samples and Precision

Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) precision and accuracy analysis (i.e., percent recovery and relative percentage difference [RPDs], and relative error ratio [RER]) results for all analyses were within DQO limits, with the following exception.

A LCS recovery in batch 117043 was less than DQO acceptance limits (66%) for Fluoride. However, re-runs of the LCS in the same batch were within DQO acceptance limits for all analytes. Based on professional judgement, no qualifiers were required.

Matrix Spike/Matrix Spike Duplicates

Matrix spike and matrix spike duplicate (MS/MSD) recoveries and associated RPDs were run on project-related sample MW-16-20230809-01 for metals and project-related sample DUP-01-20230809-01 for fluoride (anions) and were within DQO limits.

Field Precision

One pair of field precision samples were collected during the August 2023 event (MW-15-20230809-01 / DUP-01-20230809-01). RPD calculations for detected analytes for each field precision pair are shown in Table 3. All RPD were within DQO, with the following exceptions.

Boron, Radium-228, and Radium-226 and Radium-228 had field precision RPDs greater than DQO limits and results greater then two times the MQL; as such, the parent samples were qualified as estimated, J, for Boron, Radium-228, and Radium-226 and Radium-228.

Field Procedures

The samples were collected using procedures documented in the Groundwater Sampling and Analysis Plan for the site.

SUMMARY

No data were rejected during this review. Groundwater analytical data are useable for the purpose of providing concentration data on Appendix III and Appendix IV Coal Combustion Residuals (CCR) Rule parameters in ground water at the Twin Oaks Power Plant. Qualified data are listed in Table 2.

TABLE 1

Cross-Reference Field Sample Identifications and Laboratory Identifications
Laboratory ID 860-55139-1

Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Laboratory Identification	Field Identification	Description
860-55139-1	MW-7-20230808-01	Field Sample
860-55139-2	MW-11-20230808-01	Field Sample
860-55139-3	MW-12-20230808-01	Field Sample
860-55139-4	MW-13-20230809-01	Field Sample
860-55139-5	MW-14-20230809-01	Field Sample
860-55139-6	MW-17-20230809-01	Field Sample
860-55139-7	MW-15-20230809-01	Field Sample
860-55139-8	MW-16-20230809-01	Field Sample
860-55139-9	DUP-01-20230809-01	Duplicate Sample
860-55139-10	FB-01-20230809-01	Field Blank

TABLE 2

Qualified Data
Laboratory ID 860-55139-1

Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Field Identification	Analyte	Qualification	Rationale
MW-12-20230808-01	Boron	JH	Field Blank Contamination
MW-16-20230809-01	Boron	JH	Field Blank Contamination
MW-15-20230809-01	Boron	J	High Field Duplicate RPD
MW-15-20230809-01	Radium-228	J	High Field Duplicate RPD
MW-15-20230809-01	Radium-226 and 228	J	High Field Duplicate RPD
DUP-01-20230809-01	Boron	J	High Field Duplicate RPD
DUP-01-20230809-01	Radium-228	J	High Field Duplicate RPD
DUP-01-20230809-01	Radium-226 and 228	J	High Field Duplicate RPD

Notes:
J = Qualified in the DUS as detected at an estimated value.
JH = Qualified in the DUS as detected at an estimated value with high bias.

TABLE 3

Field Precision
Laboratory ID 860-55139-1

Twin Oaks Power Station
Coal Combustion Residuals (CCR) Landfill
Robertson County, Texas

Field Identification	Analyte	Sample Result (SR)		Duplicate Result (DR)		Relative Percent Difference (RPD)	Qualified
MW-15-20230809-01 / DUP-01-20230809-01	Chloride	136		136		0.00	A
	Sulfate	44.7		42.6		4.81	A
	Fluoride	<0.100	U	0.133	J	NC	A*
	Boron	0.0704		0.0513		31.39	*J*
	Calcium	34.1		33.6		1.48	A
	Barium	0.112		0.105		6.45	A
	Selenium	0.00374		0.00278		29.45	A
	Total Dissolved Solids	498		444		11.46	A
	pH	6.5	HF	6.6	HF	1.53	A
	Radium-226	0.468		0.555		17.01	A
	Radium-228	0.723		1.21		50.39	*J*
	Radium-226 and 228	1.19		1.77		39.19	*J*

NOTES:
Only detected analytes are listed in table.
Units in milligrams per liter (mg/L).
RPD = ((SR-DR)*200)/(SR+DR)
A = Acceptable data based on project data quality objectives (DQO).
J = Reported as estimated concentration between the sample detection limit (SDL) and the method quantitation limit (MQL).
B = The same analyte is found in the associated blank.
ND = Non-detect
NA = Not analyzed
NC = Not calculated
U = Analyzed but not detected above the Method Detection Limit (MDL) or the SDL.
J = Qualified in the DUS as detected at an estimated value.
A* = Acceptable data based on TRRP-13 guidance document.

APPENDIX C DERIVATION OF GROUNDWATER PROTECTION STANDARDS

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APPENDIX C

STATISTICAL METHODOLOGY FOR THE DERIVATION OF GROUNDWATER PROTECTION STANDARDS

1. INTRODUCTION

This report documents the development of groundwater protection standards (GWPS) for the Twin Oaks Power Station Coal Combustion Residuals (CCR) Landfill. GWPS concentration limits were calculated for each constituent designated in Appendix IV of Title 40, Code of Federal Regulations (CFR), Part 257, Subpart D (40 CFR § 257 *et seq.*) in accordance with 40 CFR § 257.95(h), Title 30, Texas Administrative Code (TAC), Chapter 352 (30 TAC § 352 *et seq*.) in accordance with 30 TAC § 352.951(b), United States Environmental Protection Agency (USEPA) Unified Guidance (USEPA, 2009), and Section 8 of the *Groundwater Sampling and Analysis Plan* (Hydrex Environmental, 2022). The Appendix IV constituents include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, radium-226/228, selenium, and thallium. Background concentrations for each of these constituents were characterized and compared against maximum contaminant levels established in CFR 141.62(b) and CFR 141.66(b) or regulatory threshold values established in CFR 257.95(h)(2), where available.

2. DATA PROCESSING STEPS

Several steps were taken when preparing the dataset to ensure that the dataset 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. The input data were transformed into a format that is compatible with ProUCL V5.2 for subsequent analysis. Input and output files from the ProUCL analysis are included in Attachment C.

2.1 NON-DETECTS

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 ≤ 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 B-1 (Attachment B) shows a summary of Appendix IV constituent detections by location.

3. EXPLORATORY DATA ANALYSIS

When calculating background groundwater concentrations, some assumptions are made about the underlying dataset. For example, some calculation 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 GWPS concentration limits: 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 (MW-07, MW-11, MW-12, and MW-16) and downgradient/compliance (MW-13, MW-14, MW-15, and MW-17) wells. Monitoring well locations are shown in Figure B-2 (Attachment B) for reference. Locations labeled as “Observation” wells (MW-18, MW-19, MW-20, MW-21, and MW-22) were added to the monitoring well network during the September 2022 sampling event. Samples from the “Observation” wells were only analyzed for Appendix III parameters, so these locations were not included in the GWPS calculations.

3.1 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 A-1 (Attachment A). Kaplan-Meier estimates for the mean and standard deviation are also provided for groups with fewer than 50% NDs.

Four Appendix IV constituents were not detected in any of the upgradient wells: antimony, cadmium, molybdenum, and thallium. Three Appendix IV constituents were not detected in any of the downgradient wells: mercury, molybdenum, and thallium. Two Appendix IV constituents were detected in 100% of upgradient and downgradient samples: radium-226/228 and barium.

3.2 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. Five different methods were used to identify potential outliers in the dataset, including two visual methods (probability plots [Figure B-3] and box plots [Figure B-4] shown in Attachment B) and three statistical tests (Tukey’s test[1], Dixon’s test[2], and Rosner’s test[3]). 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 3-1 shows samples that were identified as potential statistical outliers by these tests.

1 Tukey’s outlier test was performed using a cutoff of >3x the interquartile range (IQR).
2 Dixon’s outlier test was performed at a significance level (α) of 0.05 for groups with < 25 samples.
3 Rosner’s outlier test was performed at a significance level (α) of 0.05 for groups with ≥ 25 samples.

TABLE 3-1. SUMMARY OF POTENTIAL STATISTICAL OUTLIERS.

Well Type	Constituent	Well	Potential Outlier(s)	Outlier Method	Maximum Upgradient Concentration
Downgradient	Arsenic [ug/L]	MW-17	6.4	Tukey, Dixon	23.2
	Barium [ug/L]	MW-15	165	Dixon	243
	Lead [ug/L]	MW-13	4.08	Tukey, Dixon	14
		MW-15	8.59	Dixon	
	Lithium [ug/L]	MW-14	100	Tukey, Dixon	235
	Radium-226/228 [pCi/L]	MW-17	10.46	Dixon	9.85
	Selenium [ug/L]	MW-14	782; 856	Tukey	3.84
Upgradient	Beryllium [ug/L]	MW-16	3.96	Dixon	3.96
	Radium-226/228 [pCi/L]	MW-07	5.99	Dixon	9.85
		MW-11	5.69	Tukey	
		POOLED	9.85	Rosner	

Notes:

1. ug/L = microgram per liter; pCi/L = picocuries per liter
2. Potential outliers were analyzed with Tukey's outlier test *AND* either Dixon's *OR* Rosner's test, depending on the sample size. The "Outlier Method" column shows which statistical test identified the specified result as a potential outlier. Only detected values from well/analyte pairs with ≥ 4 detections were tested.

Amongst the downgradient wells, all potential statistical outliers fell within the range of detected values from upgradient wells except for one radium-226/228 result from MW-17 (10.46 picocuries per liter [pCi/L]) and two selenium results from MW-14 (782 micrograms per liter [ug/L] and 856 ug/L). The 10.46 pCi/L radium-226/228 result from MW-17 was only marginally higher (i.e., 6% higher) than the largest background value (9.85 pCi/L from MW-16). Therefore, the only downgradient outliers of potential interest are the two selenium results from MW-14. These selenium results are from the April and August 2023 sampling events, and they represent a notable change from historical conditions at this well (see time series figures in Figure B-5 [Attachment B] for reference).

Amongst the upgradient wells, two constituents had results that were identified as potential statistical outliers: beryllium and radium-226/228. Upon review of these results in context of the full set of records for each constituent (see box plot figures in Figure B-4 and time series figures in Figure B-5 [Attachment B] for reference), it was determined that the upgradient samples identified in Table 3-1 were not significantly outside the range of other background values and they are indicative of natural variability that is observable in most environmental datasets. 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."

Since the 2023 results for selenium at MW-14 were considered statistical outliers, only the pre-2023 data points were included when calculating intrawell background concentrations for downgradient wells (Section 4).

3.3 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 Attachment C). 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). Since the 2023 selenium results at MW-14 were identified as statistical outliers, only the pre-2023 data points were included in distribution testing for downgradient well distributions. All samples were included when testing for pooled upgradient well distributions. Results from goodness-of-fit distribution testing are shown in Table 3-2.

TABLE 3-2. DISTRIBUTIONS OF APPENDIX IV CONSTITUENTS BY WELL.

Constituent	Upgradient	Downgradient			
	Pooled	MW-13	MW-14	MW-15	MW-17
Antimony	-	-	-	-	-
Arsenic	Normal	Normal	Normal	-	Normal
Barium	Normal	Normal	Normal	NDD	Normal
Beryllium	Normal	-	-	-	-
Cadmium	-	-	-	-	-
Chromium	Normal	-	-	Normal	Normal
Cobalt	Normal	Normal	Normal	-	Normal
Fluoride	Normal	Normal	Normal	-	-
Lead	Normal	Normal	Normal	Normal	Normal
Lithium	Normal	-	Normal	-	Normal
Mercury	Normal	-	-	-	-
Molybdenum	-	-	-	-	-
Radium-226/228	Normal	Normal	Normal	Normal	Normal
Selenium	Normal	Normal	Normal	Normal	Normal
Thallium	-	-	-	-	-

Notes: "NDD" = no distribution detected; "-" = fewer than three detected values.

3.4 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. As with distribution testing, only pre-2023 samples were included when evaluating downgradient trends. All data points were included in the upgradient trend tests. Trend analysis results are summarized in Figure 3-1.

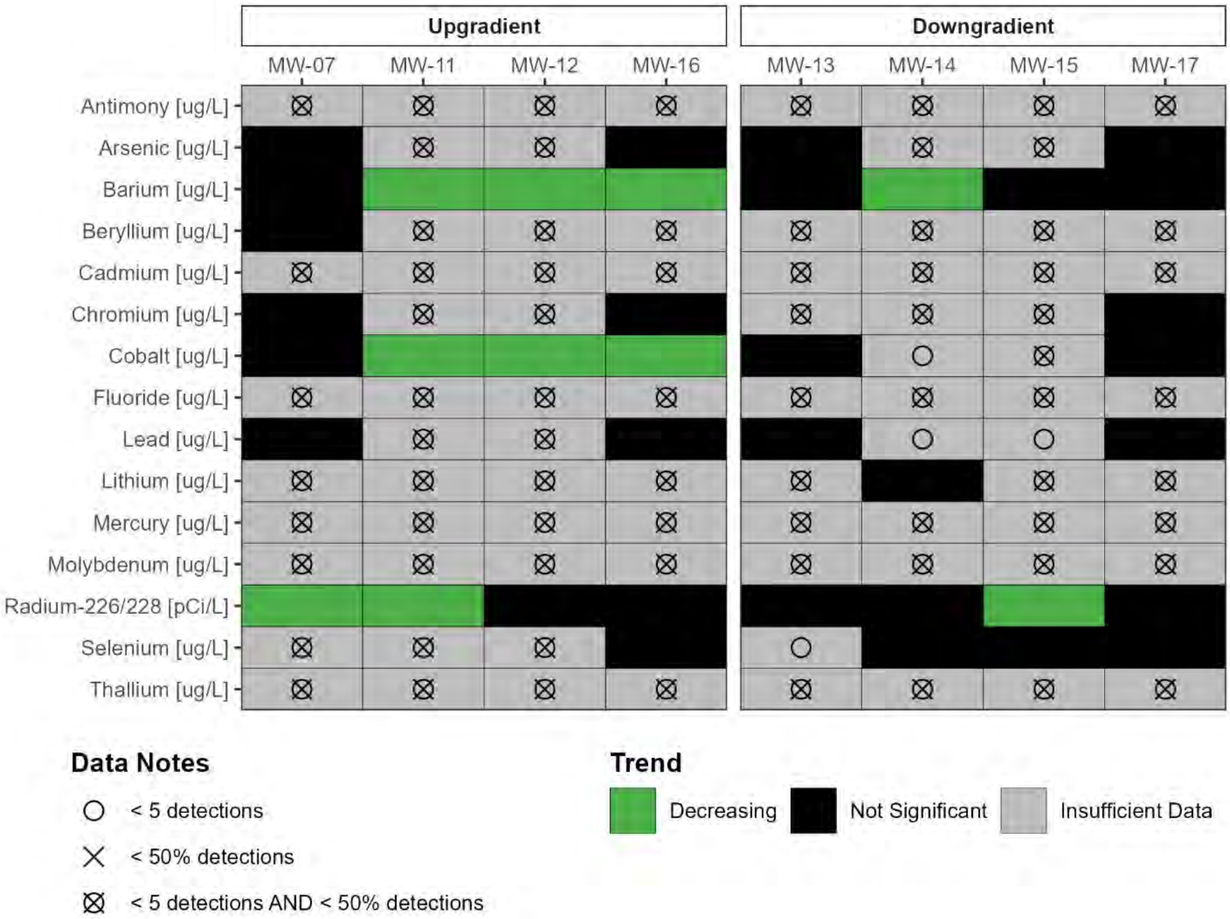

FIGURE 3-1. TREND ANALYSIS RESULTS.

A primary concern related to temporal trends in background evaluations is that trends may result in higher background values due to a higher degree of variability (ITRC, 2013, Section 5.3). The coefficient of variation (CV) – defined as the ratio of the standard deviation to the mean – is a measure of the amount of variability in a dataset. A CV value greater than 1 is typically considered to indicate a “high variability” dataset. None of the well/constituent pairs with statistically significant trends had a CV value greater than 1. Therefore, variability due to temporal trends is not expected to significantly bias background statistics. Nevertheless, background concentrations were calculated both with and without de-trending data for groups with significant trends to address any potential influence from temporal trends (Attachment C).[4] USEPA Unified Guidance recommends intrawell comparisons when non-stationarity is observed (USEPA, 2009, p. 3-5), so both interwell and intrawell background statistics were calculated for comparison (Section 4).

3.5 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

[4] 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.

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

Four of the fifteen Appendix IV constituents were neither normally nor lognormally distributed in downgradient wells: antimony, cadmium, molybdenum, and thallium. A set of F-tests run on each of the normally distributed analytes to evaluate the homogeneity of variance.[5] For each constituent, the well with the highest variance and the well with the lowest variance were selected for a pairwise comparison. None of the normally distributed Appendix IV constituents met the assumption of equal variance (i.e., p-values from the F-tests were all less than 0.05)[6]. Therefore, the non-parametric Kruskal-Wallis test was used to test for spatial variability.

Significant spatial variability was observed for 9 of the 15 Appendix IV constituents: arsenic, barium, beryllium, chromium, cobalt, lead, mercury, radium-226/228, and selenium (i.e., p-values from Kruskal-Wallis tests were less than 0.05). USEPA Unified Guidance recommends intrawell comparisons when non-stationarity is observed (USEPA, 2009, p. 3-5), so both interwell and intrawell background statistics were calculated for comparison (Section 4).

4. ESTABLISHING GROUNDWATER PROTECTION STANDARDS

Background concentrations were calculated for each Appendix IV constituent using both interwell and intrawell statistics. Resulting values were compared against maximum contaminant levels (MCL) or concentrations established by federal regulations and final GWPS concentration limits were selected in accordance with 40 CFR § 257.95(h) and 30 TAC § 352.951(b).

Background concentrations were calculated using an upper tolerance limit (UTL) approach, per recommendations in the USEPA Unified Guidance (USEPA, 2009, p. 7-24). For groups with no detected values, the maximum reporting limit was used as the UTL. For groups with at least one detected value and fewer than 50% detections, the maximum detected value was used as the UTL. All other UTL values were calculated using a coverage of 95% and confidence level of 95% in ProUCL V5.2 with methods determined by the sample size, frequency of detection, and distribution (see Attachment C for detailed ProUCL outputs).

All upgradient well results were pooled into a single dataset for the interwell background concentration and GWPS calculations. Since temporal and spatial variability was observed in the upgradient datasets, intrawell background concentrations and GWPS concentration limits were also calculated. Group UTLs were calculated for the raw data and, where temporal tends were observed, de-trended data.

In addition to concentration limits, the GWPS also establishes the list of constituents to be monitored, the point(s) of compliance, and the compliance monitoring period. All Appendix IV constituents will be monitored during the compliance monitoring period, which will continue until four independent samples have been collected. The four downgradient wells (MW-13, MW-14, MW-15, and MW-17) will be the points of compliance.

4.1 SELECTING FINAL GWPS CONCENTRATION LIMITS

Calculated GWPS concentration limits for the six Appendix IV constituents detected during the April 2023 groundwater sampling event are summarized in Table 4-1. Both interwell and

[5] The F-test is a statistical test that compares the sample variance between two populations.
[6] A p-value is the probability of obtaining a result at least as extreme as the observed result, assuming the null hypothesis is true.

intrawell background concentrations were lower than regulatory values for three of the six detected Appendix IV constituents: antimony, barium, and selenium. Since significant spatial and temporal variability was noted for Appendix IV constituent concentrations in upgradient wells (Section 3.5), intrawell GWPS concentration limits, surrounded by a bold border in Table 4-1, were selected as the most appropriate metric.

TABLE 4-1. GROUNDWATER PROTECTION STANDARDS FOR APPENDIX IV CONSTITUENTS.

Constituent	Regulatory Values	GWPS Concentration Limits				
		Interwell	Intrawell			
			MW-13	MW-14	MW-15	MW-17
Antimony [ug/L]	6 [a]	6	6	6	6	6
Barium [ug/L]	2000 [a]	2000 [d]	2000	2000 [d]	2000	2000
Cobalt [ug/L]	6 [c]	11.6 [d]	6	6	6	15.8
Lithium [ug/L]	40 [c]	235	68.6	119	40	50.1
Radium-226/228 [pCi/L]	5 [b]	9.85 [d]	8.48	7.76	5 [d]	12.7
Selenium [ug/L]	50 [a]	50	50	50	50	50

Notes:
1. ug/L = microgram per liter; pCi/L = picocuries per liter.
2. [a] = maximum contaminant level from 40 CFR 141.62(b); [b] = maximum contaminant level from 40 CFR 141.66(b); [c] = values from 40 CFR 257.95(h)(2). [d] = GWPS calculated from de-trended data. Where GWPS concentration limits are equal to regulatory values, calculated background concentrations were lower than regulatory values.

5. GROUNDWATER PROTECTION STANDARD SCREENING

Compliance testing will be performed by comparing the lower confidence limit from downgradient compliance monitoring samples against the appropriate GWPS to identify potential exceedances. This approach is consistent with USEPA Unified Guidance (USEPA, 2009, p. 7-25). USEPA Unified Guidance also states that "at least 4 distinct compliance point measurements should be used to define the mean confidence interval in the parametric case, and 3-7 values should be used with a non-parametric median test" (USEPA, 2009, p. 7-24). At the time of this report, only two compliance monitoring samples have been collected from each downgradient well. There is currently insufficient compliance monitoring data available to calculate reliable confidence intervals at the downgradient wells. Sampling will continue at downgradient wells until a sufficient number of independent samples have been collected to calculate a confidence interval around the mean.

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ATTACHMENT A. TABLES

TABLE A-1. DESCRIPTIVE STATISTICS.

Constituent	Well	Sample Counts		Minimum		Maximum		Median		Mean			Standard Deviations		
		All	Detects	All	Detects	All	Detects	All	Detects	All	Detects	KM	All	Detects	KM
Antimony [ug/L]	MW-13	10	0 (0%)	2		4		2		2.4			0.843		
	MW-14	10	0 (0%)	2		4		2		2.4			0.843		
	MW-15	10	2 (20%)	2	2.22	5.85	5.85	2	4.04	2.61	4.04		1.3	2.57	
	MW-17	10	0 (0%)	2		4		2		2.4			0.843		
	MW-07	10	0 (0%)	2		4		2		2.4			0.843		
	MW-11	10	0 (0%)	2		4		2		2.4			0.843		
	MW-12	10	0 (0%)	2		4		2		2.4			0.843		
	MW-16	10	0 (0%)	2		4		2		2.4			0.843		
	POOLED	40	0 (0%)	2		4		2		2.4			0.81		
Arsenic [ug/L]	MW-13	9	5 (56%)	2	2.04	4.55	4.55	2.53	2.86	2.85	3.12	2.67	0.985	0.987	0.861
	MW-14	9	3 (33%)	2	2.04	4.75	4.75	2	2.59	2.6	3.13		1.04	1.43	
	MW-15	9	1 (11%)	2	2.3	4	2.3	2	2.3	2.26	2.3		0.662		
	MW-17	9	5 (56%)	2	2.37	6.4	6.4	3.08	3.44	3.2	3.77	3.05	1.42	1.54	1.33
	MW-07	9	8 (89%)	3.17	3.17	14.3	14.3	8.39	8.78	8.64	9.22	8.55	3.74	3.54	3.66
	MW-11	9	2 (22%)	2	2.12	4	3.32	2	2.72	2.38	2.72		0.745	0.849	
	MW-12	9	0 (0%)	2		4		2		2.22			0.667		
	MW-16	9	8 (89%)	2.94	2.94	23.2	23.2	12	12.8	11.7	12.7	11.6	7.16	7	6.89
	POOLED	36	18 (50%)	2	2.12	23.2	23.2	3.66	9.79	6.25	10	6.05	5.69	5.94	5.72
Barium [ug/L]	MW-13	10	10 (100%)	69.3	69.3	197	197	136	136	136	136		37.6	37.6	
	MW-14	10	10 (100%)	20.7	20.7	293	293	126	126	145	145		93.4	93.4	
	MW-15	10	10 (100%)	74.9	74.9	165	165	88.6	88.6	98.8	98.8		26.9	26.9	
	MW-17	10	10 (100%)	129	129	544	544	253	253	276	276		128	128	
	MW-07	10	10 (100%)	14.4	14.4	243	243	144	144	126	126		76.6	76.6	
	MW-11	10	10 (100%)	16.6	16.6	89.3	89.3	45.1	45.1	48.2	48.2		25.2	25.2	
	MW-12	10	10 (100%)	88.4	88.4	157	157	132	132	128	128		22.6	22.6	
	MW-16	10	10 (100%)	47.5	47.5	217	217	176	176	157	157		59.9	59.9	
	POOLED	40	40 (100%)	14.4	14.4	243	243	128	128	115	115		64.2	64.2	

Notes: KM = Kaplan-Meier; these values are only provided for groups with <50% non-detects. Columns labeled “All” contain summary values for the entire dataset, whereas “Detects” columns summarize only the detected values. Downgradient wells are shaded gray.

Constituent	Well	Sample Counts		Minimum		Maximum		Median		Mean			Standard Deviations		
		All	Detects	All	Detects	All	Detects	All	Detects	All	Detects	KM	All	Detects	KM
Beryllium [ug/L]	MW-13	9	0 (0%)	2		2		2		2			0		
	MW-14	9	0 (0%)	2		2		2		2			0		
	MW-15	9	0 (0%)	2		2		2		2			0		
	MW-17	9	2 (22%)	2	2.01	2.92	2.92	2	2.46	2.1	2.46		0.306	0.643	
	MW-07	9	5 (56%)	2	2.17	3.39	3.39	2.17	2.74	2.39	2.7	2.39	0.507	0.491	0.478
	MW-11	9	0 (0%)	2		2		2		2			0		
	MW-12	9	0 (0%)	2		2		2		2			0		
	MW-16	9	4 (44%)	2	2.48	3.96	3.96	2	2.63	2.41	2.92		0.647	0.694	
	POOLED	36	9 (25%)	2	2.17	3.96	3.96	2	2.67	2.2	2.8		0.442	0.561	
Cadmium [ug/L]	MW-13	9	0 (0%)	2		2		2		2			0		
	MW-14	9	0 (0%)	2		2		2		2			0		
	MW-15	9	0 (0%)	2		2		2		2			0		
	MW-17	9	1 (11%)	2	2.58	2.58	2.58	2	2.58	2.06	2.58		0.193		
	MW-07	9	0 (0%)	2		2		2		2			0		
	MW-11	9	0 (0%)	2		2		2		2			0		
	MW-12	9	0 (0%)	2		2		2		2			0		
	MW-16	9	0 (0%)	2		2		2		2			0		
	POOLED	36	0 (0%)	2		2		2		2			0		
Chromium [ug/L]	MW-13	9	2 (22%)	4	4.99	5.66	5.66	4	5.32	4.29	5.32		0.608	0.474	
	MW-14	9	2 (22%)	4	4.07	5.04	5.04	4	4.56	4.12	4.56		0.345	0.686	
	MW-15	9	3 (33%)	4	4.42	8.71	8.71	4	4.51	4.63	5.88		1.54	2.45	
	MW-17	9	6 (67%)	4	4.03	16.8	16.8	8.13	10.4	8.22	10.3	8.22	4.61	4.24	4.34
	MW-07	9	6 (67%)	4	5.36	9.98	9.98	5.59	6.4	6.1	7.16	6.1	2.22	1.98	2.1
	MW-11	9	2 (22%)	4	4.03	5.83	5.83	4	4.93	4.21	4.93		0.609	1.27	
	MW-12	9	0 (0%)	4		4		4		4			0		
	MW-16	9	6 (67%)	4	6.25	10.7	10.7	6.73	7	6.67	8.01	6.67	2.55	1.99	2.4
	POOLED	36	14 (39%)	4	4.03	10.7	10.7	4	6.76	5.25	7.2		2.02	2.06	

Notes: KM = Kaplan-Meier; these values are only provided for groups with <50% non-detects. Columns labeled "All" contain summary values for the entire dataset, whereas "Detects" columns summarize only the detected values. Downgradient wells are shaded gray.

Constituent	Well	Sample Counts All	Sample Counts Detects	Minimum All	Minimum Detects	Maximum All	Maximum Detects	Median All	Median Detects	Mean All	Mean Detects	Mean KM	Standard Deviations All	Standard Deviations Detects	Standard Deviations KM
Cobalt [ug/L]	MW-13	10	7 (70%)	1.2	1.2	3.35	3.35	2.2	2.36	2.33	2.48	2.09	0.647	0.74	0.819
	MW-14	10	6 (60%)	2	2.26	4.97	4.97	2.48	3.29	2.84	3.4	2.84	1.02	0.974	0.971
	MW-15	10	2 (20%)	2	2.05	4.27	4.27	2	3.16	2.23	3.16		0.716	1.57	
	MW-17	10	9 (90%)	2	2.23	11.4	11.4	4.33	4.59	5.14	5.49	5.14	3.17	3.15	3.01
	MW-07	10	9 (90%)	1.02	1.02	11.6	11.6	6.38	6.38	6	6.44	5.9	3.44	3.33	3.39
	MW-11	10	8 (80%)	1.8	1.8	3.68	3.68	2.44	2.6	2.5	2.62	2.46	0.586	0.593	0.596
	MW-12	10	10 (100%)	2.83	2.83	6.78	6.78	4.82	4.82	4.8	4.8		1.42	1.42	
	MW-16	10	7 (70%)	2	2.32	11.6	11.6	6.09	7.94	5.9	7.56	5.9	3.7	3.11	3.51
	POOLED	40	34 (85%)	1.02	1.02	11.6	11.6	3.95	4.82	4.8	5.29	4.71	2.91	2.88	2.97
Fluoride [ug/L]	MW-13	21	3 (14%)	285	285	584	584	500	410	489	426		54.3	150	
	MW-14	21	5 (24%)	280	280	682	682	500	533	503	513		65.7	146	
	MW-15	21	2 (10%)	200	298	500	486	500	392	475	392		76.9	133	
	MW-17	21	3 (14%)	200	223	500	441	500	255	458	306		98.3	118	
	MW-07	21	2 (10%)	200	272	500	459	500	366	473	366		80.1	132	
	MW-11	21	3 (14%)	200	256	500	448	500	325	463	343		87.9	97.3	
	MW-12	21	2 (10%)	200	290	500	484	500	387	475	387		77.8	137	
	MW-16	21	3 (14%)	130	130	500	441	500	252	453	274		111	157	
	POOLED	84	10 (12%)	130	130	500	484	500	308	466	336		88.9	117	
Lead [ug/L]	MW-13	9	5 (56%)	2	2.06	4.08	4.08	2.06	2.36	2.35	2.63	2.35	0.677	0.833	0.638
	MW-14	9	4 (44%)	2	2.54	5.23	5.23	2	3.51	2.76	3.7		1.15	1.18	
	MW-15	9	4 (44%)	2	2.21	8.59	8.59	2	2.64	2.9	4.02		2.16	3.06	
	MW-17	9	6 (67%)	2	2.57	14	14	4.73	6.98	5.43	7.15	5.43	4	3.87	3.77
	MW-07	9	7 (78%)	2	3.85	8.77	8.77	6.42	6.53	5.5	6.5	5.5	2.46	1.68	2.32
	MW-11	9	2 (22%)	2	2.47	3.39	3.39	2	2.93	2.21	2.93		0.47	0.651	
	MW-12	9	0 (0%)	2		2		2		2			0		
	MW-16	9	7 (78%)	2	2.29	14	14	7.92	8.56	7.23	8.72	7.23	4.52	3.95	4.26
	POOLED	36	16 (44%)	2	2.29	14	14	2	6.76	4.23	7.03		3.34	3.33	

Notes: KM = Kaplan-Meier; these values are only provided for groups with <50% non-detects. Columns labeled “All” contain summary values for the entire dataset, whereas “Detects” columns summarize only the detected values. Downgradient wells are shaded gray.

Constituent	Well	Sample Counts		Minimum		Maximum		Median		Mean			Standard Deviations		
		All	Detects	All	Detects	All	Detects	All	Detects	All	Detects	KM	All	Detects	KM
Lithium [ug/L]	MW-13	10	2 (20%)	20	27.1	68.6	68.6	20	47.8	29.6	47.8		16	29.3	
	MW-14	10	7 (70%)	20	31.3	100	100	40.4	46.4	42.7	52.5	42.7	24.2	22.6	23
	MW-15	10	1 (10%)	20	21.3	40	21.3	20	21.3	24.1	21.3		8.37		
	MW-17	10	3 (30%)	20	21.9	50.1	50.1	21	24.6	27.7	32.2		11.3	15.6	
	MW-07	10	1 (10%)	20	235	235	235	20	235	45.5	235		67.1		
	MW-11	10	1 (10%)	20	139	139	139	20	139	35.9	139		37.2		
	MW-12	10	1 (10%)	20	34.3	40	34.3	20	34.3	25.4	34.3		8.88		
	MW-16	10	1 (10%)	20	41.5	41.5	41.5	20	41.5	26.2	41.5		9.91		
	POOLED	40	4 (10%)	20	34.3	235	235	20	90.2	33.2	112		38.3	94.6	
Mercury [ug/L]	MW-13	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	MW-14	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	MW-15	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	MW-17	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	MW-07	9	4 (44%)	0.2	0.219	0.313	0.313	0.2	0.236	0.223	0.251		0.0374	0.0423	
	MW-11	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	MW-12	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	MW-16	9	0 (0%)	0.2		0.2		0.2		0.2			0		
	POOLED	36	4 (11%)	0.2	0.219	0.313	0.313	0.2	0.236	0.206	0.251		0.0205	0.0423	
Molybdenum [ug/L]	MW-13	9	0 (0%)	2		2		2		2			0		
	MW-14	9	0 (0%)	2		2		2		2			0		
	MW-15	9	0 (0%)	2		2		2		2			0		
	MW-17	9	0 (0%)	2		2		2		2			0		
	MW-07	9	0 (0%)	2		2		2		2			0		
	MW-11	9	0 (0%)	2		2		2		2			0		
	MW-12	9	0 (0%)	2		2		2		2			0		
	MW-16	9	0 (0%)	2		2		2		2			0		
	POOLED	36	0 (0%)	2		2		2		2			0		

Notes: KM = Kaplan-Meier; these values are only provided for groups with <50% non-detects. Columns labeled “All” contain summary values for the entire dataset, whereas “Detects” columns summarize only the detected values. Downgradient wells are shaded gray.

Constituent	Well	Sample Counts		Minimum		Maximum		Median		Mean			Standard Deviations		
		All	Detects	All	Detects	All	Detects	All	Detects	All	Detects	KM	All	Detects	KM
Radium-226/228 [pCi/L]	MW-13	10	10 (100%)	1.07	1.07	5.67	5.67	3.72	3.72	3.5	3.5		1.41	1.41	
	MW-14	10	10 (100%)	1.83	1.83	5.92	5.92	2.74	2.74	3.18	3.18		1.35	1.35	
	MW-15	10	10 (100%)	0.551	0.551	3.53	3.53	1.94	1.94	1.91	1.91		0.903	0.903	
	MW-17	10	10 (100%)	3.38	3.38	10.46	10.46	4.18	4.18	4.99	4.99		2.16	2.16	
	MW-07	9	9 (100%)	0.521	0.521	5.99	5.99	1.82	1.82	2.23	2.23		1.64	1.64	
	MW-11	10	10 (100%)	0.276	0.276	5.69	5.69	1.9	1.9	2.14	2.14		1.57	1.57	
	MW-12	10	10 (100%)	1.44	1.44	4.53	4.53	3.19	3.19	3.06	3.06		1.05	1.05	
	MW-16	10	10 (100%)	1.5	1.5	9.85	9.85	4.76	4.76	4.85	4.85		2.45	2.45	
	POOLED	39	39 (100%)	0.276	0.276	9.85	9.85	2.47	2.47	3.09	3.09		2.01	2.01	
Selenium [ug/L]	MW-13	10	5 (50%)	2	2.65	21.3	21.3	2.33	13.4	6.9	11.8	6.9	7.81	8.79	7.41
	MW-14	10	10 (100%)	2.09	2.09	856	856	6.8	6.8	169	169		343	343	
	MW-15	10	10 (100%)	2.31	2.31	3.98	3.98	2.97	2.97	3.05	3.05		0.53	0.53	
	MW-17	10	10 (100%)	5.28	5.28	11.2	11.2	6.94	6.94	7.65	7.65		1.89	1.89	
	MW-07	10	1 (10%)	2	3.4	3.4	3.4	2	3.4	2.14	3.4		0.443		
	MW-11	10	0 (0%)	2		2		2		2			0		
	MW-12	10	0 (0%)	2		2		2		2			0		
	MW-16	10	8 (80%)	1.68	1.68	3.84	3.84	2.41	2.66	2.62	2.77	2.55	0.725	0.735	0.754
	POOLED	40	9 (22%)	1.68	1.68	3.84	3.84	2	2.81	2.19	2.84		0.483	0.719	
Thallium [ug/L]	MW-13	9	0 (0%)	2		2		2		2			0		
	MW-14	9	0 (0%)	2		2		2		2			0		
	MW-15	9	0 (0%)	2		2		2		2			0		
	MW-17	9	0 (0%)	2		2		2		2			0		
	MW-07	9	0 (0%)	2		2		2		2			0		
	MW-11	9	0 (0%)	2		2		2		2			0		
	MW-12	9	0 (0%)	2		2		2		2			0		
	MW-16	9	0 (0%)	2		2		2		2			0		
	POOLED	36	0 (0%)	2		2		2		2			0		

Notes: KM = Kaplan-Meier; these values are only provided for groups with <50% non-detects. Columns labeled "All" contain summary values for the entire dataset, whereas "Detects" columns summarize only the detected values. Downgradient wells are shaded gray.

ATTACHMENT B. FIGURES

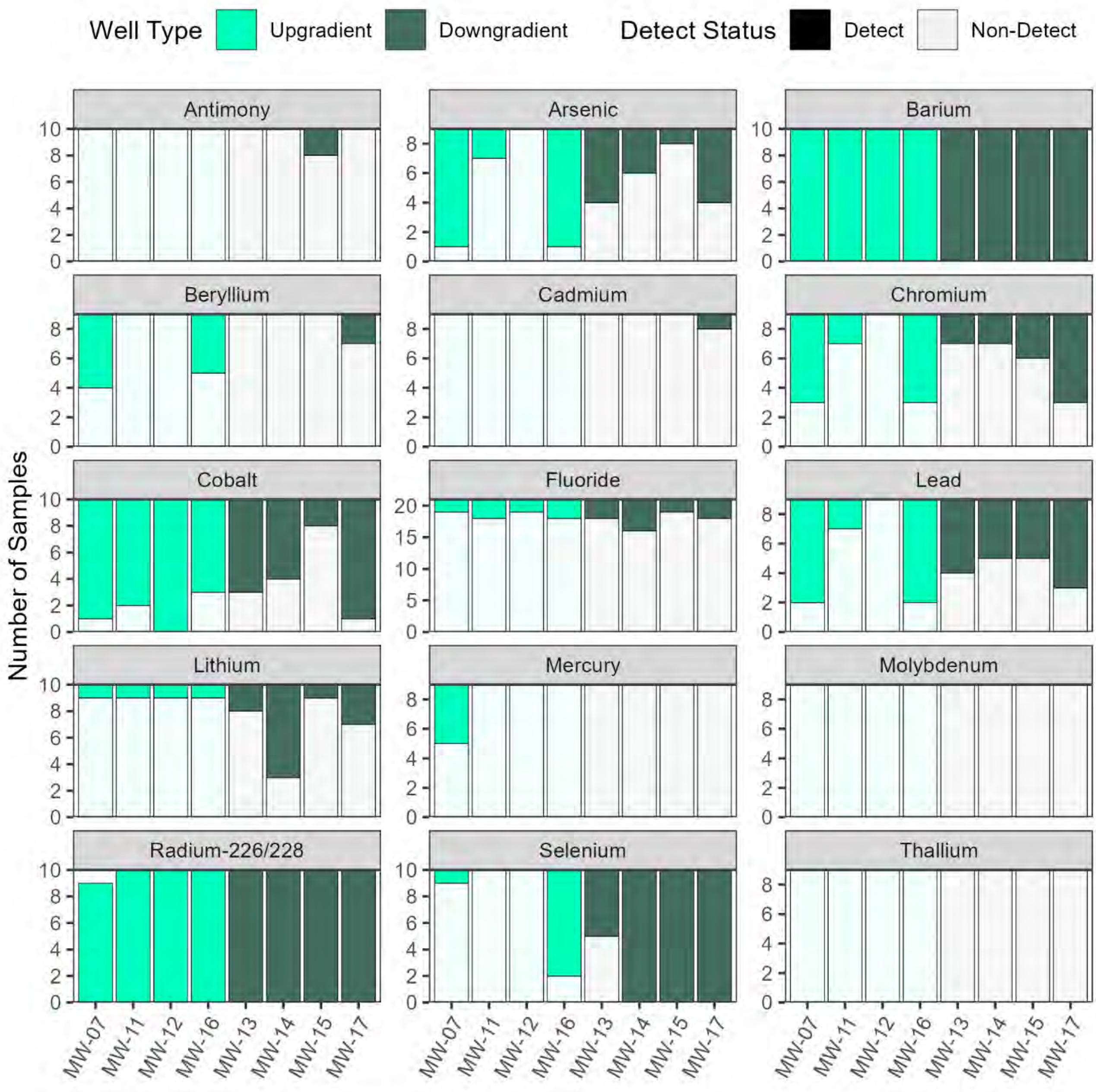


FIGURE B-1. SUMMARY OF APPENDIX IV CONSTITUENT DETECTIONS BY WELL.

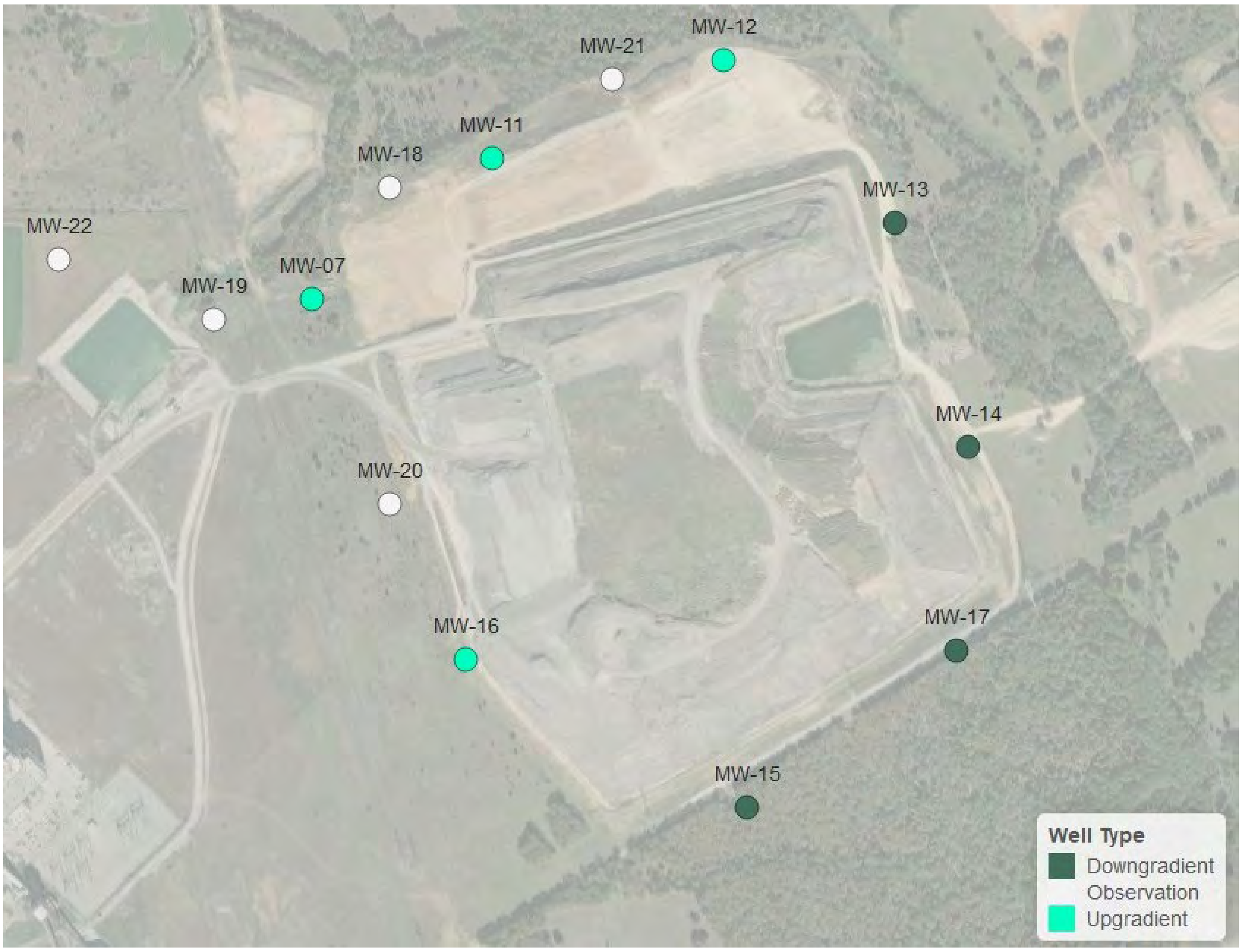
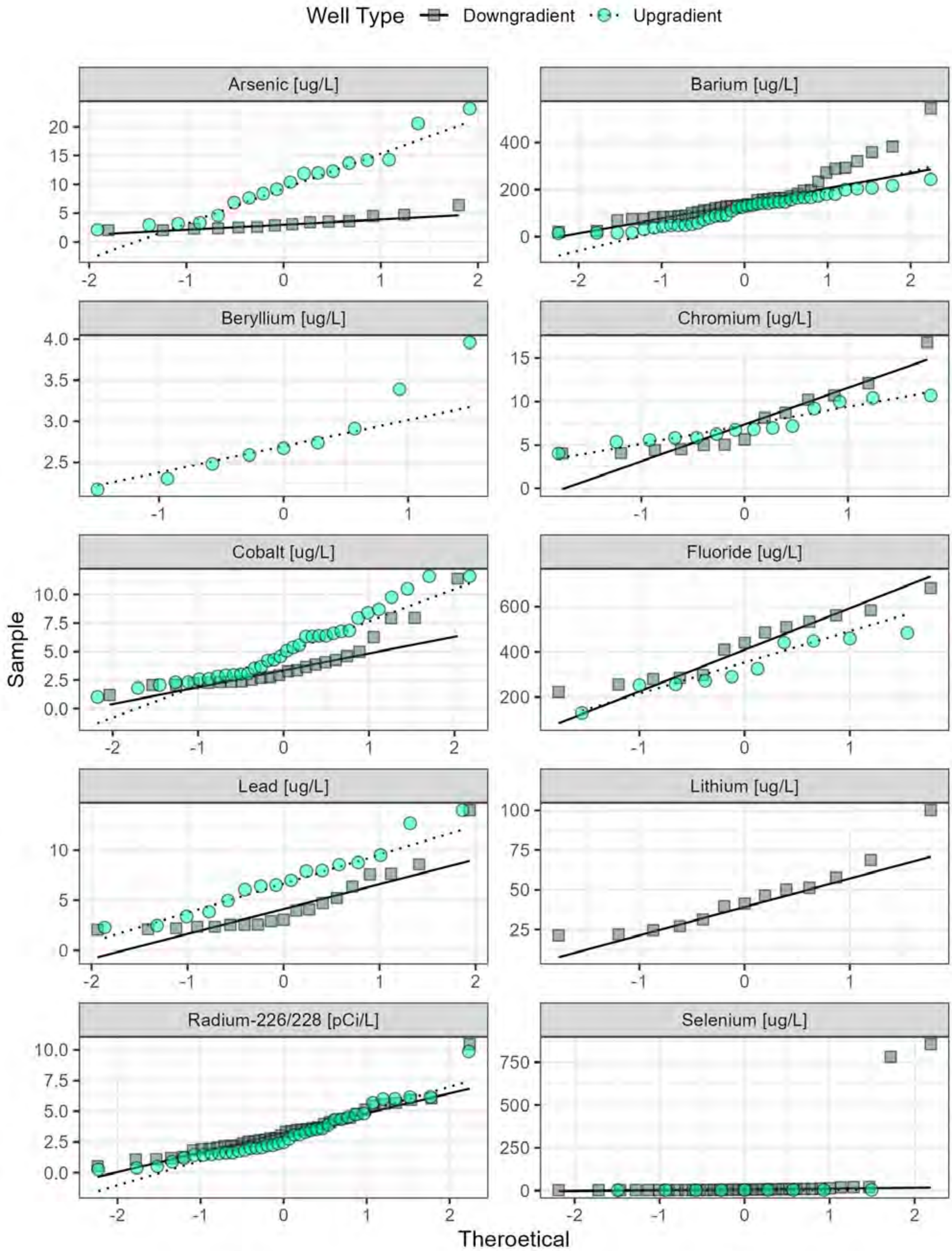


FIGURE B-2. MONITORING WELL LOCATIONS.



Note: This figure shows detected values only; groups with fewer than 5 detections are not shown.

FIGURE B-3. APPENDIX IV CONSTITUENT PROBABILITY PLOTS.

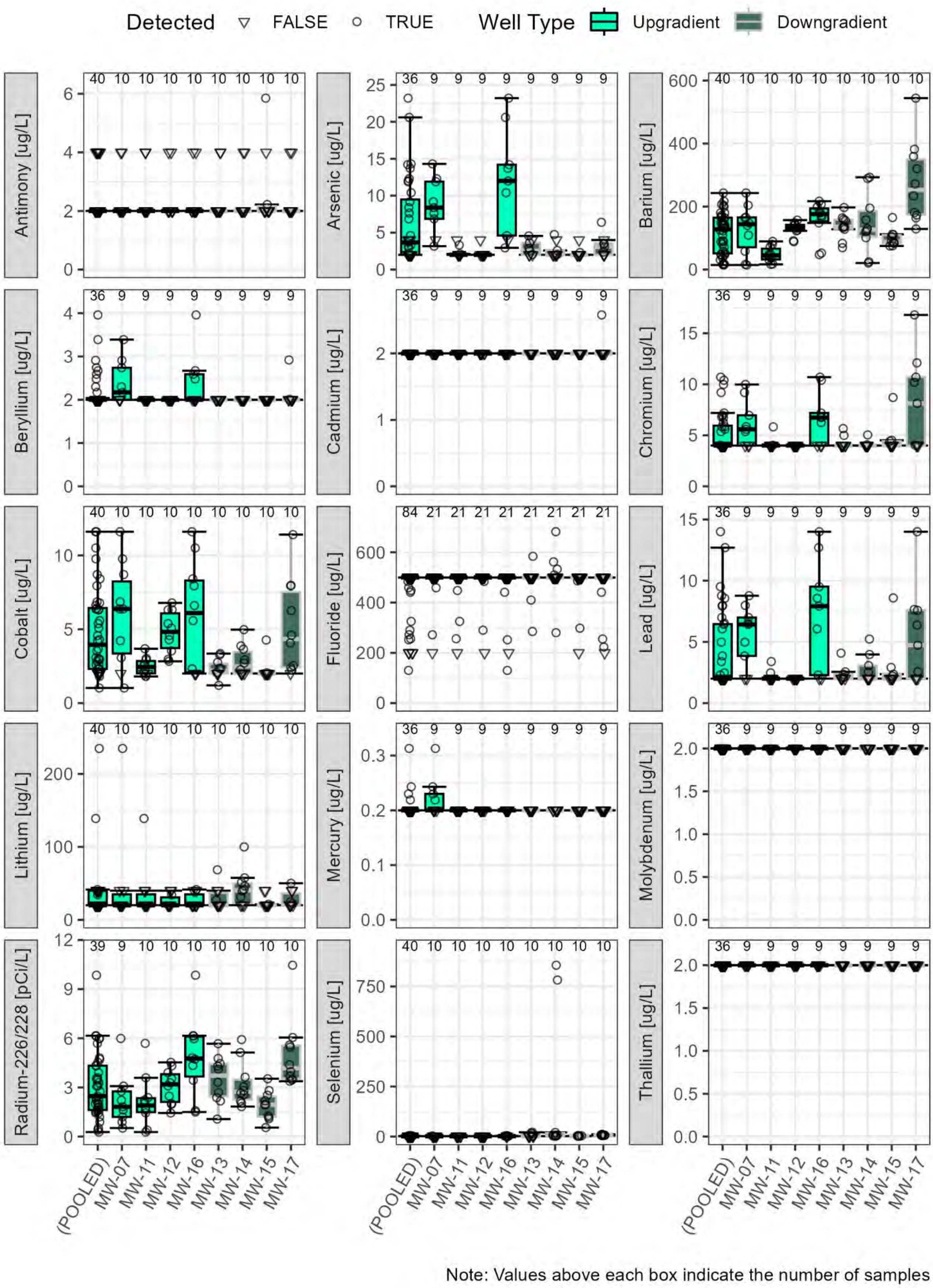
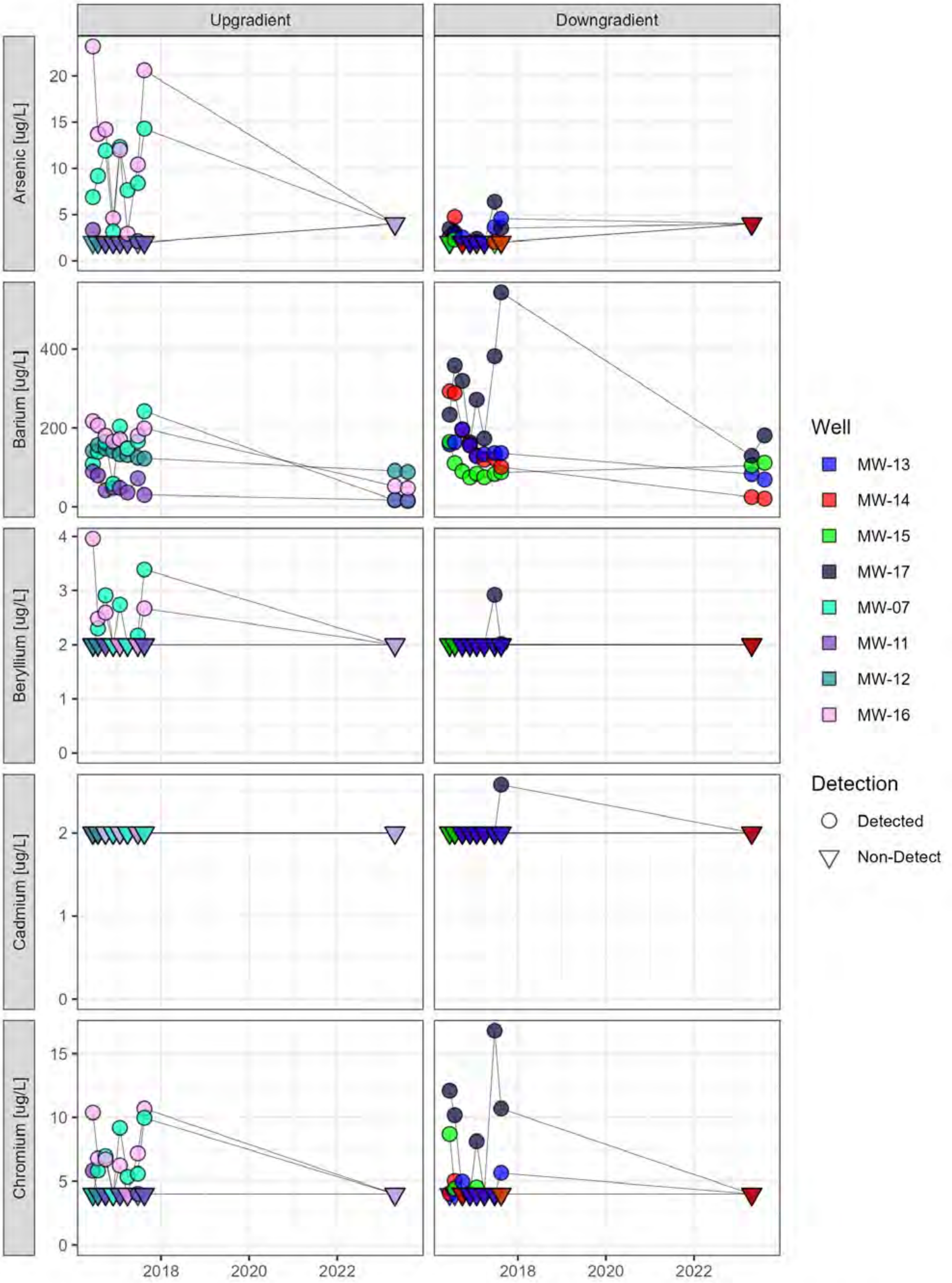


FIGURE B-4. BOX PLOTS FOR APPENDIX IV CONSTITUENT CONCENTRATIONS.



Note: Non-detects are shown at the reporting limit

FIGURE B-5-A. TIME SERIES FIGURES FOR APPENDIX IV CONSTITUENTS.

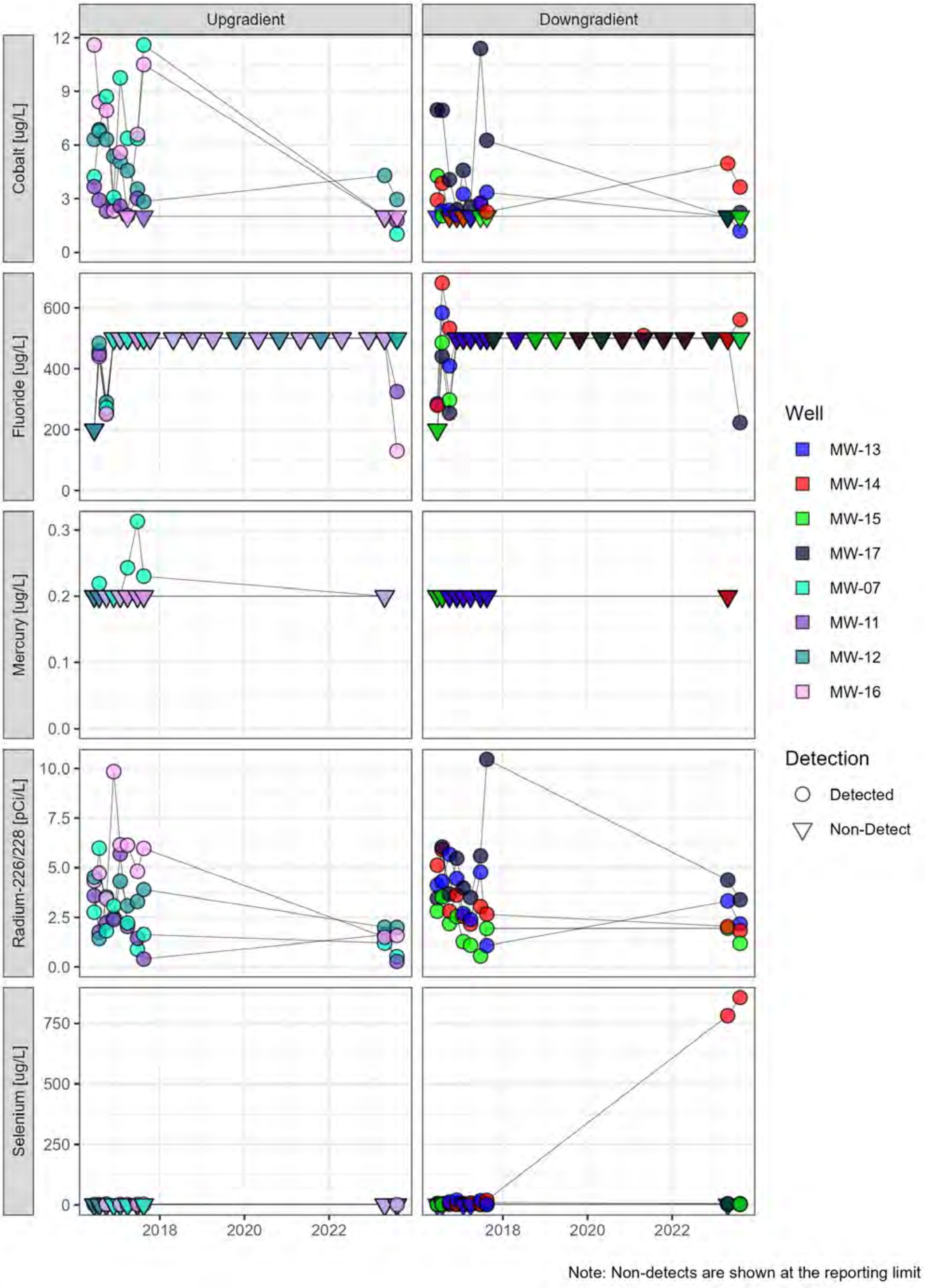


FIGURE B-5-B. TIME SERIES FIGURES FOR APPENDIX IV CONSTITUENTS.

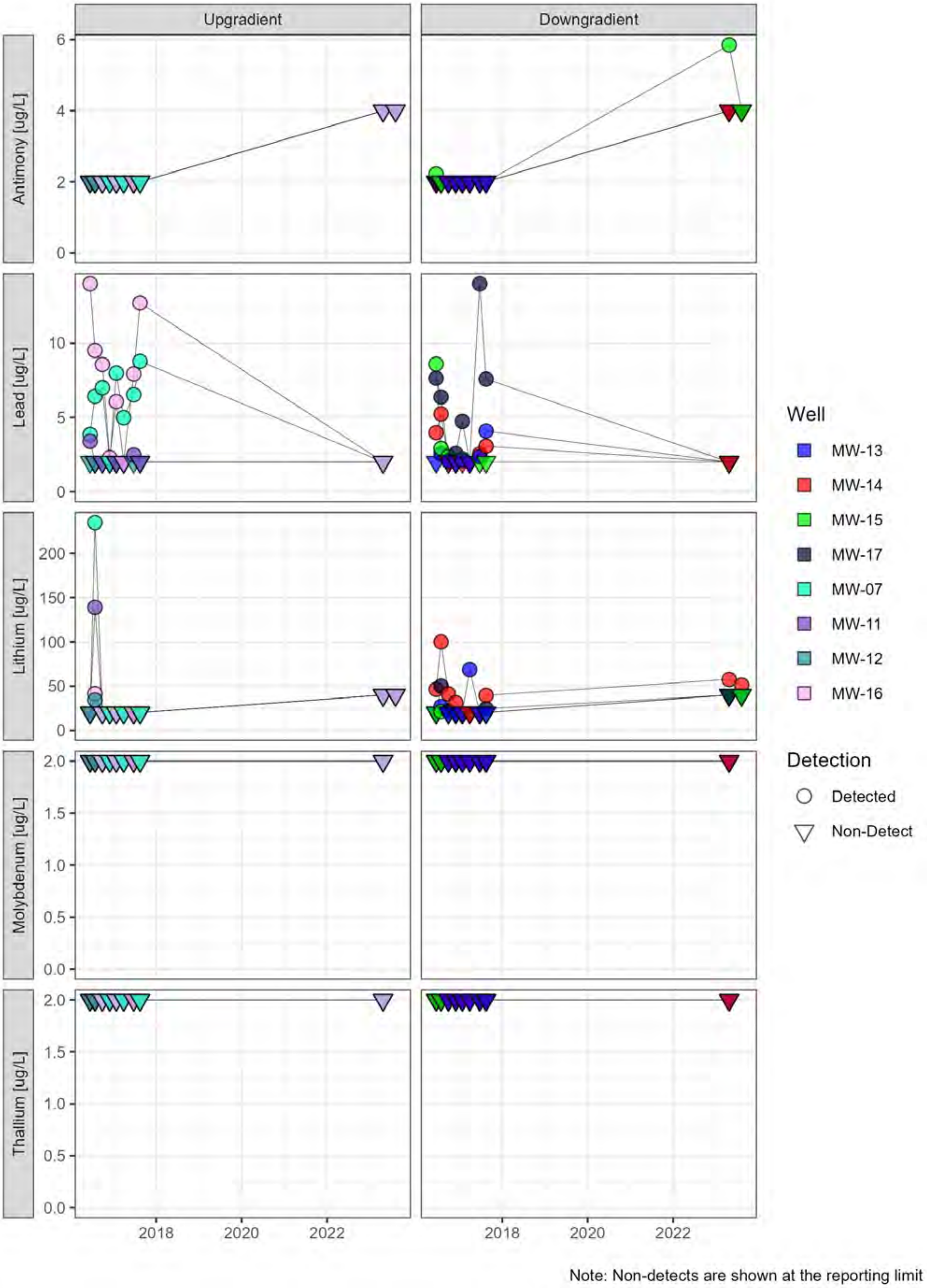


FIGURE B-5-C. TIME SERIES FIGURES FOR APPENDIX IV CONSTITUENTS.

ATTACHMENT C. PROUCL INPUTS AND OUTPUT

Background Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.2 12/6/2023 12:28:29 PM
From File	file111246bb22d33.xls
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Observations	1
Number of Bootstrap Operations	2000

report_result_value (antimony [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	40	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	40
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (antimony [ug/l]_interwell_pooled-upgradient) was not processed!

report_result_value (antimony [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (antimony [ug/l]_intrawell_mw-13) was not processed!

report_result_value (antimony [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (antimony [ug/l]_intrawell_mw-14) was not processed!

report_result_value (antimony [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	2.22	Minimum Non-Detect	2
Maximum Detect	2.22	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	2.22	SD Detected	N/A
Mean of Detected Logged Data	0.798	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 report_result_value (antimony [ug/l]_intrawell_mw-15) was not processed!

report_result_value (antimony [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (antimony [ug/l]_intrawell_mw-17) was not processed!

report_result_value (arsenic [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	20		
Number of Detects	18	Number of Non-Detects	18
Number of Distinct Detects	18	Number of Distinct Non-Detects	2
Minimum Detect	2.12	Minimum Non-Detect	2
Maximum Detect	23.2	Maximum Non-Detect	4
Variance Detected	35.32	Percent Non-Detects	50%
Mean Detected	10.05	SD Detected	5.943
Mean of Detected Logged Data	2.107	SD of Detected Logged Data	0.699

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.858	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.126	**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) Background Statistics Assuming Normal Distribution

KM Mean	6.045	KM SD	5.72
95% UTL95% Coverage	18.33	95% KM UPL (t)	15.84
90% KM Percentile (z)	13.38	95% KM Percentile (z)	15.45
99% KM Percentile (z)	19.35	95% KM USL	22.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	5.634	SD	6.105
95% UTL95% Coverage	18.75	95% UPL (t)	16.09
90% Percentile (z)	13.46	95% Percentile (z)	15.68
99% Percentile (z)	19.84	95% USL	22.87

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	0.373	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.131	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.205	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)	2.654	k star (bias corrected MLE)	2.248
Theta hat (MLE)	3.786	Theta star (bias corrected MLE)	4.468
nu hat (MLE)	95.53	nu star (bias corrected)	80.94
MLE Mean (bias corrected)	10.05		
MLE Sd (bias corrected)	6.7	95% Percentile of Chisquare (2kstar)	10.28

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	5.241
Maximum	23.2	Median	2.419
SD	6.42	CV	1.225
k hat (MLE)	0.319	k star (bias corrected MLE)	0.311
Theta hat (MLE)	16.41	Theta star (bias corrected MLE)	16.84
nu hat (MLE)	22.99	nu star (bias corrected)	22.41
MLE Mean (bias corrected)	5.241	MLE Sd (bias corrected)	9.393
95% Percentile of Chisquare (2kstar)	2.814	90% Percentile	15.39
95% Percentile	23.69	99% Percentile	45.17

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	33.85	44.21	95% Approx. Gamma UPL	22.86	27.3
95% Gamma USL	57.06	84.6			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.045	SD (KM)	5.72
Variance (KM)	32.71	SE of Mean (KM)	0.981
k hat (KM)	1.117	k star (KM)	1.043
nu hat (KM)	80.43	nu star (KM)	75.07
theta hat (KM)	5.411	theta star (KM)	5.798
80% gamma percentile (KM)	9.696	90% gamma percentile (KM)	13.78
95% gamma percentile (KM)	17.85	99% gamma percentile (KM)	27.26

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	21.04	21.79	95% Approx. Gamma UPL	16.37	16.57
95% KM Gamma Percentile	15.71	15.85	95% Gamma USL	29.9	32.19

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.146	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	5.821	Mean in Log Scale	1.213
SD in Original Scale	5.987	SD in Log Scale	1.11
95% UTL95% Coverage	36.52	95% BCA UTL95% Coverage	23.2
95% Bootstrap (%) UTL95% Coverage	23.2	95% UPL (t)	22.52
90% Percentile (z)	13.95	95% Percentile (z)	20.88
99% Percentile (z)	44.5	95% USL	77.3

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.409	95% KM UTL (Lognormal)95% Coverage	25.38
KM SD of Logged Data	0.85	95% KM UPL (Lognormal)	17.53
95% KM Percentile Lognormal (z)	16.55	95% KM USL (Lognormal)	45.05

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	5.634	Mean in Log Scale	1.131
SD in Original Scale	6.105	SD in Log Scale	1.123
95% UTL95% Coverage	34.56	95% UPL (t)	21.2
90% Percentile (z)	13.06	95% Percentile (z)	19.64
99% Percentile (z)	42.21	95% USL	73.77

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	36	95% UTL with95% Coverage	23.2
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	20.99
95% USL	23.2	95% KM Chebyshev UPL	31.32

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.

report_result_value (arsenic [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	2.04	Minimum Non-Detect	2
Maximum Detect	4.55	Maximum Non-Detect	2
Variance Detected	0.974	Percent Non-Detects	37.5%
Mean Detected	3.124	SD Detected	0.987
Mean of Detected Logged Data	1.1	SD of Detected Logged Data	0.313

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.205	**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) Background Statistics Assuming Normal Distribution

KM Mean	2.703	KM SD	0.885
95% UTL95% Coverage	5.523	95% KM UPL (t)	4.481
90% KM Percentile (z)	3.837	95% KM Percentile (z)	4.158
99% KM Percentile (z)	4.761	95% KM USL	4.501

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.328	SD	1.329
95% UTL95% Coverage	6.562	95% UPL (t)	4.997
90% Percentile (z)	4.03	95% Percentile (z)	4.513
99% Percentile (z)	5.418	95% USL	5.027

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	0.198	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	**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)	12.89	k star (bias corrected MLE)	5.289
Theta hat (MLE)	0.242	Theta star (bias corrected MLE)	0.591
nu hat (MLE)	128.9	nu star (bias corrected)	52.89
MLE Mean (bias corrected)	3.124		
MLE Sd (bias corrected)	1.358	95% Percentile of Chisquare (2kstar)	19.1

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	0.116	Mean	2.201
Maximum	4.55	Median	2.285
SD	1.503	CV	0.683
k hat (MLE)	1.409	k star (bias corrected MLE)	0.964
Theta hat (MLE)	1.562	Theta star (bias corrected MLE)	2.283
nu hat (MLE)	22.55	nu star (bias corrected)	15.43
MLE Mean (bias corrected)	2.201	MLE Sd (bias corrected)	2.242
95% Percentile of Chisquare (2kstar)	5.852	90% Percentile	5.115
95% Percentile	6.68	99% Percentile	10.33

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	14.35	17.83	95% Approx. Gamma UPL	7.752	8.705
95% Gamma USL	7.853	8.834			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.703	SD (KM)	0.885
Variance (KM)	0.783	SE of Mean (KM)	0.35
k hat (KM)	9.324	k star (KM)	5.911
nu hat (KM)	149.2	nu star (KM)	94.58
theta hat (KM)	0.29	theta star (KM)	0.457
80% gamma percentile (KM)	3.567	90% gamma percentile (KM)	4.189
95% gamma percentile (KM)	4.752	99% gamma percentile (KM)	5.933

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	6.109	6.217	95% Approx. Gamma UPL	4.589	4.608
95% KM Gamma Percentile	4.176	4.18	95% Gamma USL	4.615	4.635

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.162	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.421	Mean in Log Scale	0.765
SD in Original Scale	1.233	SD in Log Scale	0.533
95% UTL95% Coverage	11.75	95% BCA UTL95% Coverage	4.55
95% Bootstrap (%) UTL95% Coverage	4.55	95% UPL (t)	6.272
90% Percentile (z)	4.255	95% Percentile (z)	5.164
99% Percentile (z)	7.427	95% USL	6.347

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.947	95% KM UTL (Lognormal)95% Coverage	6.624
KM SD of Logged Data	0.296	95% KM UPL (Lognormal)	4.675
95% KM Percentile Lognormal (z)	4.196	95% KM USL (Lognormal)	4.705

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.328	Mean in Log Scale	0.687
SD in Original Scale	1.329	SD in Log Scale	0.616
95% UTL95% Coverage	14.18	95% UPL (t)	6.861
90% Percentile (z)	4.381	95% Percentile (z)	5.48
99% Percentile (z)	8.341	95% USL	6.955

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	8	95% UTL with95% Coverage	4.55
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.55
95% USL	4.55	95% KM Chebyshev UPL	6.794

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.

report_result_value (arsenic [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	2.04	Minimum Non-Detect	2
Maximum Detect	4.75	Maximum Non-Detect	2
Variance Detected	2.052	Percent Non-Detects	62.5%
Mean Detected	3.127	SD Detected	1.432
Mean of Detected Logged Data	1.074	SD of Detected Logged Data	0.436

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.313	**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) Background Statistics Assuming Normal Distribution

KM Mean	2.423	KM SD	0.9
95% UTL95% Coverage	5.292	95% KM UPL (t)	4.232
90% KM Percentile (z)	3.576	95% KM Percentile (z)	3.903
99% KM Percentile (z)	4.517	95% KM USL	4.252

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.798	SD	1.341
95% UTL95% Coverage	6.071	95% UPL (t)	4.492
90% Percentile (z)	3.516	95% Percentile (z)	4.003
99% Percentile (z)	4.917	95% USL	4.522

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	0.351	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.317	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.433	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.771	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.402	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	46.63	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

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	1.191
Maximum	4.75	Median	0.0594
SD	1.777	CV	1.492
k hat (MLE)	0.294	k star (bias corrected MLE)	0.267
Theta hat (MLE)	4.05	Theta star (bias corrected MLE)	4.458
nu hat (MLE)	4.706	nu star (bias corrected)	4.275
MLE Mean (bias corrected)	1.191	MLE Sd (bias corrected)	2.304
95% Percentile of Chisquare (2kstar)	2.535	90% Percentile	3.556
95% Percentile	5.651	99% Percentile	11.18

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	19.61	29.27	95% Approx. Gamma UPL	7.552	9.029
95% Gamma USL	7.713	9.263			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.423	SD (KM)	0.9
Variance (KM)	0.811	SE of Mean (KM)	0.39
k hat (KM)	7.24	k star (KM)	4.609
nu hat (KM)	115.8	nu star (KM)	73.74
theta hat (KM)	0.335	theta star (KM)	0.526
80% gamma percentile (KM)	3.286	90% gamma percentile (KM)	3.934
95% gamma percentile (KM)	4.526	99% gamma percentile (KM)	5.783

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	5.537	5.579	95% Approx. Gamma UPL	4.142	4.131
95% KM Gamma Percentile	3.764	3.746	95% Gamma USL	4.166	4.155

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.277	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.551	Mean in Log Scale	0.00665
SD in Original Scale	1.533	SD in Log Scale	1.019
95% UTL95% Coverage	25.89	95% BCA UTL95% Coverage	4.75
95% Bootstrap (%) UTL95% Coverage	4.75	95% UPL (t)	7.801
90% Percentile (z)	3.715	95% Percentile (z)	5.38
99% Percentile (z)	10.77	95% USL	7.979

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.836	95% KM UTL (Lognormal)95% Coverage	5.731
KM SD of Logged Data	0.285	95% KM UPL (Lognormal)	4.095
95% KM Percentile Lognormal (z)	3.69	95% KM USL (Lognormal)	4.121

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.798	Mean in Log Scale	0.403
SD in Original Scale	1.341	SD in Log Scale	0.603
95% UTL95% Coverage	10.22	95% UPL (t)	5.024
90% Percentile (z)	3.239	95% Percentile (z)	4.032
99% Percentile (z)	6.081	95% USL	5.091

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	8	95% UTL with95% Coverage	4.75
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.75
95% USL	4.75	95% KM Chebyshev UPL	6.585

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.

report_result_value (arsenic [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	2.3	Minimum Non-Detect	2
Maximum Detect	2.3	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	2.3	SD Detected	N/A
Mean of Detected Logged Data	0.833	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 report_result_value (arsenic [ug/l]_intrawell_mw-15) was not processed!

report_result_value (arsenic [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	2.37	Minimum Non-Detect	2
Maximum Detect	6.4	Maximum Non-Detect	2
Variance Detected	2.379	Percent Non-Detects	37.5%
Mean Detected	3.766	SD Detected	1.542
Mean of Detected Logged Data	1.269	SD of Detected Logged Data	0.365

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.358	**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) Background Statistics Assuming Normal Distribution

KM Mean	3.104	KM SD	1.386
95% UTL95% Coverage	7.52	95% KM UPL (t)	5.888
90% KM Percentile (z)	4.88	95% KM Percentile (z)	5.383
99% KM Percentile (z)	6.327	95% KM USL	5.919

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.729	SD	1.846
95% UTL95% Coverage	8.613	95% UPL (t)	6.439
90% Percentile (z)	5.095	95% Percentile (z)	5.766
99% Percentile (z)	7.024	95% USL	6.48

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	0.457	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.328	**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)	8.894	k star (bias corrected MLE)	3.691
Theta hat (MLE)	0.423	Theta star (bias corrected MLE)	1.02
nu hat (MLE)	88.94	nu star (bias corrected)	36.91
MLE Mean (bias corrected)	3.766		
MLE Sd (bias corrected)	1.96	95% Percentile of Chisquare (2kstar)	14.62

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	2.519
Maximum	6.4	Median	2.725
SD	2.095	CV	0.831
k hat (MLE)	0.714	k star (bias corrected MLE)	0.53
Theta hat (MLE)	3.529	Theta star (bias corrected MLE)	4.757
nu hat (MLE)	11.42	nu star (bias corrected)	8.473
MLE Mean (bias corrected)	2.519	MLE Sd (bias corrected)	3.462
95% Percentile of Chisquare (2kstar)	3.986	90% Percentile	6.734
95% Percentile	9.482	99% Percentile	16.2

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	24.19	35.06	95% Approx. Gamma UPL	11.64	14.41
95% Gamma USL	11.82	14.68			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.104	SD (KM)	1.386
Variance (KM)	1.92	SE of Mean (KM)	0.548
k hat (KM)	5.017	k star (KM)	3.219
nu hat (KM)	80.26	nu star (KM)	51.5
theta hat (KM)	0.619	theta star (KM)	0.964
80% gamma percentile (KM)	4.39	90% gamma percentile (KM)	5.424
95% gamma percentile (KM)	6.385	99% gamma percentile (KM)	8.46

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	8.529	8.742	95% Approx. Gamma UPL	6.003	6.032
95% KM Gamma Percentile	5.337	5.338	95% Gamma USL	6.045	6.076

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.305	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.858	Mean in Log Scale	0.896
SD in Original Scale	1.721	SD in Log Scale	0.599
95% UTL95% Coverage	16.51	95% BCA UTL95% Coverage	6.4
95% Bootstrap (%) UTL95% Coverage	6.4	95% UPL (t)	8.159
90% Percentile (z)	5.277	95% Percentile (z)	6.559
99% Percentile (z)	9.862	95% USL	8.267

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.053	95% KM UTL (Lognormal)95% Coverage	9.61
KM SD of Logged Data	0.38	95% KM UPL (Lognormal)	6.146
95% KM Percentile Lognormal (z)	5.351	95% KM USL (Lognormal)	6.198

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.729	Mean in Log Scale	0.793
SD in Original Scale	1.846	SD in Log Scale	0.712
95% UTL95% Coverage	21.38	95% UPL (t)	9.244
90% Percentile (z)	5.505	95% Percentile (z)	7.13
99% Percentile (z)	11.58	95% USL	9.391

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	8	95% UTL with95% Coverage	6.4
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	6.4
95% USL	6.4	95% KM Chebyshev UPL	9.51

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.

report_result_value (barium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	34
Minimum	14.4	First Quartile	51.28
Second Largest	217	Median	128
Maximum	243	Third Quartile	164.5
Mean	114.9	SD	64.17
Coefficient of Variation	0.559	Skewness	-0.0157
Mean of logged Data	4.509	SD of logged Data	0.792

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.919	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.162	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	250.7	90% Percentile (z)	197.1
95% UPL (t)	224.3	95% Percentile (z)	220.4
95% USL	298.9	99% Percentile (z)	264.1

Gamma GOF Test

A-D Test Statistic	1.226	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.758	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.141	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.285	k star (bias corrected MLE)	2.131
Theta hat (MLE)	50.26	Theta star (bias corrected MLE)	53.91
nu hat (MLE)	182.8	nu star (bias corrected)	170.5
MLE Mean (bias corrected)	114.9	MLE Sd (bias corrected)	78.69

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	272.3	90% Percentile	220.1
95% Hawkins Wixley (HW) Approx. Gamma UPL	285.3	95% Percentile	267.1
95% WH Approx. Gamma UTL with 95% Coverage	332.2	99% Percentile	370.9
95% HW Approx. Gamma UTL with 95% Coverage	355.7		
95% WH USL	463.2	95% HW USL	516.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.199	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	486	90% Percentile (z)	250.7
95% UPL (t)	350.9	95% Percentile (z)	334.3
95% USL	880.6	99% Percentile (z)	573.6

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	40	95% UTL with 95% Coverage	243
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	243	95% BCA Bootstrap UTL with 95% Coverage	243
95% UPL	216.5	90% Percentile	199.5
90% Chebyshev UPL	309.8	95% Percentile	207.5
95% Chebyshev UPL	398.1	99% Percentile	232.9
95% USL	243		

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.

report_result_value (barium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Minimum	128	First Quartile	135.3
Second Largest	164	Median	146
Maximum	197	Third Quartile	160.3
Mean	151.1	SD	22.92
Coefficient of Variation	0.152	Skewness	1.172
Mean of logged Data	5.009	SD of logged Data	0.144

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	224.2	90% Percentile (z)	180.5
95% UPL (t)	197.2	95% Percentile (z)	188.8
95% USL	197.7	99% Percentile (z)	204.4

Gamma GOF Test

A-D Test Statistic	0.458	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.261	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.293	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)	53.26	k star (bias corrected MLE)	33.37
Theta hat (MLE)	2.838	Theta star (bias corrected MLE)	4.529
nu hat (MLE)	852.2	nu star (bias corrected)	533.9
MLE Mean (bias corrected)	151.1	MLE Sd (bias corrected)	26.16

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	199	90% Percentile	185.5
95% Hawkins Wixley (HW) Approx. Gamma UPL	199.2	95% Percentile	196.6
95% WH Approx. Gamma UTL with 95% Coverage	232	99% Percentile	218.5
95% HW Approx. Gamma UTL with 95% Coverage	233.2		
95% WH USL	199.6	95% HW USL	199.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.247	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	237.2	90% Percentile (z)	180.1
95% UPL (t)	200.1	95% Percentile (z)	189.8
95% USL	200.8	99% Percentile (z)	209.5

Nonparametric Distribution Free Background Statistics
Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	197
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	197	95% BCA Bootstrap UTL with 95% Coverage	197
95% UPL	197	90% Percentile	173.9
90% Chebyshev UPL	224.1	95% Percentile	185.5
95% Chebyshev UPL	257.1	99% Percentile	194.7
95% USL	197		

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.

report_result_value (barium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	101	First Quartile	122.3
Second Largest	289	Median	144
Maximum	293	Third Quartile	218.5
Mean	176.1	SD	76.37
Coefficient of Variation	0.434	Skewness	0.935
Mean of logged Data	5.096	SD of logged Data	0.407

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.827	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	419.5	90% Percentile (z)	274
95% UPL (t)	329.6	95% Percentile (z)	301.7
95% USL	331.3	99% Percentile (z)	353.8

Gamma GOF Test

A-D Test Statistic	0.541	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.233	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	6.774	k star (bias corrected MLE)	4.317
Theta hat (MLE)	26	Theta star (bias corrected MLE)	40.8
nu hat (MLE)	108.4	nu star (bias corrected)	69.07
MLE Mean (bias corrected)	176.1	MLE Sd (bias corrected)	84.77

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	351.2	90% Percentile	289.7
95% Hawkins Wixley (HW) Approx. Gamma UPL	355.2	95% Percentile	334.7
95% WH Approx. Gamma UTL with 95% Coverage	504.4	99% Percentile	430.3
95% HW Approx. Gamma UTL with 95% Coverage	522.3		
95% WH USL	353.8	95% HW USL	357.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.212	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	597	90% Percentile (z)	275
95% UPL (t)	369.8	95% Percentile (z)	318.8
95% USL	373.2	99% Percentile (z)	420.7

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	293
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	293	95% BCA Bootstrap UTL with 95% Coverage	293
95% UPL	293	90% Percentile	290.2
90% Chebyshev UPL	419.1	95% Percentile	291.6
95% Chebyshev UPL	529.2	99% Percentile	292.7
95% USL	293		

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.

report_result_value (barium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	74.9	First Quartile	81.55
Second Largest	111	Median	85.8
Maximum	165	Third Quartile	95.18
Mean	96.43	SD	29.9
Coefficient of Variation	0.31	Skewness	2.148
Mean of logged Data	4.535	SD of logged Data	0.261

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.718	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	191.7	90% Percentile (z)	134.7
95% UPL (t)	156.5	95% Percentile (z)	145.6
95% USL	157.2	99% Percentile (z)	166

Gamma GOF Test

A-D Test Statistic	0.859	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.323	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.294	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	15.14	k star (bias corrected MLE)	9.544
Theta hat (MLE)	6.37	Theta star (bias corrected MLE)	10.1
nu hat (MLE)	242.2	nu star (bias corrected)	152.7
MLE Mean (bias corrected)	96.43	MLE Sd (bias corrected)	31.21

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	156.9	90% Percentile	138
95% Hawkins Wixley (HW) Approx. Gamma UPL	157.1	95% Percentile	152.8
95% WH Approx. Gamma UTL with 95% Coverage	204.2	99% Percentile	183.4
95% HW Approx. Gamma UTL with 95% Coverage	206.4		
95% WH USL	157.8	95% HW USL	157.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.793	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.306	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	214.3	90% Percentile (z)	130.3
95% UPL (t)	157.6	95% Percentile (z)	143.3
95% USL	158.5	99% Percentile (z)	171.2

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	165
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	165	95% BCA Bootstrap UTL with 95% Coverage	165
95% UPL	165	90% Percentile	127.2
90% Chebyshev UPL	191.6	95% Percentile	146.1
95% Chebyshev UPL	234.7	99% Percentile	161.2
95% USL	165		

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.

report_result_value (barium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	164	First Quartile	218.8
Second Largest	382	Median	296
Maximum	544	Third Quartile	364.8
Mean	306	SD	125.1
Coefficient of Variation	0.409	Skewness	0.821
Mean of logged Data	5.651	SD of logged Data	0.408

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	704.8	90% Percentile (z)	466.4
95% UPL (t)	557.5	95% Percentile (z)	511.8
95% USL	560.2	99% Percentile (z)	597.1

Gamma GOF Test

A-D Test Statistic	0.199	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.145	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	7.078	k star (bias corrected MLE)	4.507
Theta hat (MLE)	43.23	Theta star (bias corrected MLE)	67.89
nu hat (MLE)	113.3	nu star (bias corrected)	72.12
MLE Mean (bias corrected)	306	MLE Sd (bias corrected)	144.1

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	602.7	90% Percentile	499.1
95% Hawkins Wixley (HW) Approx. Gamma UPL	611.7	95% Percentile	575
95% WH Approx. Gamma UTL with 95% Coverage	860.3	99% Percentile	736.2
95% HW Approx. Gamma UTL with 95% Coverage	894.9		
95% WH USL	607	95% HW USL	616.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	1045	90% Percentile (z)	480.3
95% UPL (t)	646.4	95% Percentile (z)	557
95% USL	652.3	99% Percentile (z)	735.7

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	544
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	544	95% BCA Bootstrap UTL with 95% Coverage	544
95% UPL	544	90% Percentile	430.6
90% Chebyshev UPL	704.2	95% Percentile	487.3
95% Chebyshev UPL	884.6	99% Percentile	532.7
95% USL	544		

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.

report_result_value (beryllium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	10		
Number of Detects	9	Number of Non-Detects	27
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	2.17	Minimum Non-Detect	2
Maximum Detect	3.96	Maximum Non-Detect	2
Variance Detected	0.315	Percent Non-Detects	75%
Mean Detected	2.801	SD Detected	0.561
Mean of Detected Logged Data	1.014	SD of Detected Logged Data	0.188

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.21	**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

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	2.2	KM SD	0.436
95% UTL95% Coverage	3.138	95% KM UPL (t)	2.948
90% KM Percentile (z)	2.759	95% KM Percentile (z)	2.918
99% KM Percentile (z)	3.215	95% KM USL	3.432

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.45	SD	0.835
95% UTL95% Coverage	3.245	95% UPL (t)	2.881
90% Percentile (z)	2.521	95% Percentile (z)	2.824
99% Percentile (z)	3.393	95% USL	3.809

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	0.335	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.191	**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

Gamma Statistics on Detected Data Only

k hat (MLE)	30.71	k star (bias corrected MLE)	20.55
Theta hat (MLE)	0.0912	Theta star (bias corrected MLE)	0.136
nu hat (MLE)	552.8	nu star (bias corrected)	369.8
MLE Mean (bias corrected)	2.801		
MLE Sd (bias corrected)	0.618	95% Percentile of Chisquare (2kstar)	57.05

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	1.335
Maximum	3.96	Median	1.201
SD	1.055	CV	0.791
k hat (MLE)	0.765	k star (bias corrected MLE)	0.72
Theta hat (MLE)	1.746	Theta star (bias corrected MLE)	1.855
nu hat (MLE)	55.06	nu star (bias corrected)	51.81
MLE Mean (bias corrected)	1.335	MLE Sd (bias corrected)	1.574
95% Percentile of Chisquare (2kstar)	4.85	90% Percentile	3.329
95% Percentile	4.499	99% Percentile	7.284

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	6.147	7.534	95% Approx. Gamma UPL	4.558	5.278
95% Gamma USL	9.28	12.37			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.2	SD (KM)	0.436
Variance (KM)	0.19	SE of Mean (KM)	0.0771
k hat (KM)	25.44	k star (KM)	23.34
nu hat (KM)	1831	nu star (KM)	1680
theta hat (KM)	0.0865	theta star (KM)	0.0943
80% gamma percentile (KM)	2.572	90% gamma percentile (KM)	2.8
95% gamma percentile (KM)	2.999	99% gamma percentile (KM)	3.396

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	3.102	3.098	95% Approx. Gamma UPL	2.897	2.891
95% KM Gamma Percentile	2.866	2.859	95% Gamma USL	3.44	3.442

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.179	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.707	Mean in Log Scale	0.44
SD in Original Scale	0.774	SD in Log Scale	0.443
95% UTL95% Coverage	4.02	95% BCA UTL95% Coverage	3.96
95% Bootstrap (%) UTL95% Coverage	3.96	95% UPL (t)	3.315
90% Percentile (z)	2.738	95% Percentile (z)	3.216
99% Percentile (z)	4.35	95% USL	5.422

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.773	95% KM UTL (Lognormal)95% Coverage	3.087
KM SD of Logged Data	0.165	95% KM UPL (Lognormal)	2.873
95% KM Percentile Lognormal (z)	2.841	95% KM USL (Lognormal)	3.45

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.45	Mean in Log Scale	0.253
SD in Original Scale	0.835	SD in Log Scale	0.454
95% UTL95% Coverage	3.418	95% UPL (t)	2.805
90% Percentile (z)	2.306	95% Percentile (z)	2.719
99% Percentile (z)	3.706	95% USL	4.645

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	36	95% UTL with95% Coverage	3.96
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.476
95% USL	3.96	95% KM Chebyshev UPL	4.128

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.

report_result_value (beryllium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (beryllium [ug/l]_intrawell_mw-13) was not processed!

report_result_value (beryllium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (beryllium [ug/l]_intrawell_mw-14) was not processed!

report_result_value (beryllium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (beryllium [ug/l]_intrawell_mw-15) was not processed!

report_result_value (beryllium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	2.01	Minimum Non-Detect	2
Maximum Detect	2.92	Maximum Non-Detect	2
Variance Detected	0.414	Percent Non-Detects	75%
Mean Detected	2.465	SD Detected	0.643
Mean of Detected Logged Data	0.885	SD of Detected Logged Data	0.264

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	2.116	KM SD	0.304
95% UTL95% Coverage	3.084	95% KM UPL (t)	2.727
90% KM Percentile (z)	2.506	95% KM Percentile (z)	2.616
99% KM Percentile (z)	2.823	95% KM USL	2.733

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.366	SD	0.72
95% UTL95% Coverage	3.662	95% UPL (t)	2.814
90% Percentile (z)	2.29	95% Percentile (z)	2.551
99% Percentile (z)	3.042	95% USL	2.83

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)	29.01	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.085	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	116.1	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)	2.116	SD (KM)	0.304
Variance (KM)	0.0923	SE of Mean (KM)	0.152
k hat (KM)	48.52	k star (KM)	30.41
nu hat (KM)	776.4	nu star (KM)	486.6
theta hat (KM)	0.0436	theta star (KM)	0.0696
80% gamma percentile (KM)	2.431	90% gamma percentile (KM)	2.621
95% gamma percentile (KM)	2.785	99% gamma percentile (KM)	3.11

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	3.11	3.113	95% Approx. Gamma UPL	2.707	2.705
95% KM Gamma Percentile	2.59	2.587	95% Gamma USL	2.715	2.712

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

Mean in Original Scale	1.122	Mean in Log Scale	-0.157
SD in Original Scale	0.908	SD in Log Scale	0.79
95% UTL95% Coverage	10.59	95% BCA UTL95% Coverage	2.92
95% Bootstrap (%) UTL95% Coverage	2.92	95% UPL (t)	4.179
90% Percentile (z)	2.352	95% Percentile (z)	3.133
99% Percentile (z)	5.367	95% USL	4.253

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.741	95% KM UTL (Lognormal)95% Coverage	3.124
KM SD of Logged Data	0.125	95% KM UPL (Lognormal)	2.697
95% KM Percentile Lognormal (z)	2.577	95% KM USL (Lognormal)	2.704

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.366	Mean in Log Scale	0.221
SD in Original Scale	0.72	SD in Log Scale	0.422
95% UTL95% Coverage	4.782	95% UPL (t)	2.911
90% Percentile (z)	2.142	95% Percentile (z)	2.496
99% Percentile (z)	3.327	95% USL	2.938

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	8	95% UTL with95% Coverage	2.92
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	2.92
95% USL	2.92	95% KM Chebyshev UPL	3.521

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.

report_result_value (cadmium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (cadmium [ug/l]_interwell_pooled-upgradient) was not processed!

report_result_value (cadmium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (cadmium [ug/l]_intrawell_mw-13) was not processed!

report_result_value (cadmium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (cadmium [ug/l]_intrawell_mw-14) was not processed!

report_result_value (cadmium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (cadmium [ug/l]_intrawell_mw-15) was not processed!

report_result_value (cadmium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	2.58	Minimum Non-Detect	2
Maximum Detect	2.58	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	2.58	SD Detected	N/A
Mean of Detected Logged Data	0.948	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 report_result_value (cadmium [ug/l]_intrawell_mw-17) was not processed!

report_result_value (chromium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	15		
Number of Detects	14	Number of Non-Detects	22
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	4.03	Minimum Non-Detect	4
Maximum Detect	10.7	Maximum Non-Detect	4
Variance Detected	4.253	Percent Non-Detects	61.11%
Mean Detected	7.205	SD Detected	2.062
Mean of Detected Logged Data	1.937	SD of Detected Logged Data	0.283

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.217	**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	5.246	KM SD	1.994
95% UTL95% Coverage	9.531	95% KM UPL (t)	8.662
90% KM Percentile (z)	7.802	95% KM Percentile (z)	8.527
99% KM Percentile (z)	9.886	95% KM USL	10.88

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	4.024	SD	2.864
95% UTL95% Coverage	10.18	95% UPL (t)	8.93
90% Percentile (z)	7.694	95% Percentile (z)	8.735
99% Percentile (z)	10.69	95% USL	12.11

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	0.488	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.181	**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)	13.55	k star (bias corrected MLE)	10.7
Theta hat (MLE)	0.532	Theta star (bias corrected MLE)	0.674
nu hat (MLE)	379.4	nu star (bias corrected)	299.5
MLE Mean (bias corrected)	7.205		
MLE Sd (bias corrected)	2.203	95% Percentile of Chisquare (2kstar)	33.16

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	3.952
Maximum	10.7	Median	3.481
SD	3.131	CV	0.792
k hat (MLE)	0.704	k star (bias corrected MLE)	0.664
Theta hat (MLE)	5.609	Theta star (bias corrected MLE)	5.949
nu hat (MLE)	50.72	nu star (bias corrected)	47.83
MLE Mean (bias corrected)	3.952	MLE Sd (bias corrected)	4.848
95% Percentile of Chisquare (2kstar)	4.608	90% Percentile	10.04
95% Percentile	13.71	99% Percentile	22.49

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	18.55	23.26	95% Approx. Gamma UPL	13.71	16.18
95% Gamma USL	28.11	38.54			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.246	SD (KM)	1.994
Variance (KM)	3.977	SE of Mean (KM)	0.345
k hat (KM)	6.921	k star (KM)	6.363
nu hat (KM)	498.3	nu star (KM)	458.1
theta hat (KM)	0.758	theta star (KM)	0.825
80% gamma percentile (KM)	6.87	90% gamma percentile (KM)	8.025
95% gamma percentile (KM)	9.069	99% gamma percentile (KM)	11.25

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	9.676	9.706	95% Approx. Gamma UPL	8.572	8.564
95% KM Gamma Percentile	8.408	8.396	95% Gamma USL	11.57	11.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.165	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	4.65	Mean in Log Scale	1.399
SD in Original Scale	2.524	SD in Log Scale	0.537
95% UTL95% Coverage	12.83	95% BCA UTL95% Coverage	10.7
95% Bootstrap (%) UTL95% Coverage	10.7	95% UPL (t)	10.16
90% Percentile (z)	8.058	95% Percentile (z)	9.794
99% Percentile (z)	14.12	95% USL	18.44

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.601	95% KM UTL (Lognormal)95% Coverage	9.817
KM SD of Logged Data	0.318	95% KM UPL (Lognormal)	8.547
95% KM Percentile Lognormal (z)	8.364	95% KM USL (Lognormal)	12.17

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	4.024	Mean in Log Scale	1.177
SD in Original Scale	2.864	SD in Log Scale	0.639
95% UTL95% Coverage	12.8	95% UPL (t)	9.694
90% Percentile (z)	7.359	95% Percentile (z)	9.282
99% Percentile (z)	14.35	95% USL	19.71

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	36	95% UTL with95% Coverage	10.7
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	10.45
95% USL	10.7	95% KM Chebyshev UPL	14.06

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.

report_result_value (chromium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	4.99	Minimum Non-Detect	4
Maximum Detect	5.66	Maximum Non-Detect	4
Variance Detected	0.224	Percent Non-Detects	75%
Mean Detected	5.325	SD Detected	0.474
Mean of Detected Logged Data	1.67	SD of Detected Logged Data	0.0891

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	4.331	KM SD	0.598
95% UTL95% Coverage	6.236	95% KM UPL (t)	5.532
90% KM Percentile (z)	5.097	95% KM Percentile (z)	5.314
99% KM Percentile (z)	5.722	95% KM USL	5.546

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.831	SD	1.55
95% UTL95% Coverage	7.77	95% UPL (t)	5.945
90% Percentile (z)	4.817	95% Percentile (z)	5.38
99% Percentile (z)	6.436	95% USL	5.979

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)	252.3	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0211	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1009	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)	4.331	SD (KM)	0.598
Variance (KM)	0.357	SE of Mean (KM)	0.299
k hat (KM)	52.51	k star (KM)	32.9
nu hat (KM)	840.2	nu star (KM)	526.5
theta hat (KM)	0.0825	theta star (KM)	0.132
80% gamma percentile (KM)	4.951	90% gamma percentile (KM)	5.323
95% gamma percentile (KM)	5.643	99% gamma percentile (KM)	6.279

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	6.36	6.378	95% Approx. Gamma UPL	5.539	5.54
95% KM Gamma Percentile	5.3	5.298	95% Gamma USL	5.554	5.555

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

Mean in Original Scale	3.859	Mean in Log Scale	1.319
SD in Original Scale	1.048	SD in Log Scale	0.266
95% UTL95% Coverage	8.741	95% BCA UTL95% Coverage	5.66
95% Bootstrap (%) UTL95% Coverage	5.66	95% UPL (t)	6.388
90% Percentile (z)	5.262	95% Percentile (z)	5.796
99% Percentile (z)	6.95	95% USL	6.425

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.457	95% KM UTL (Lognormal)95% Coverage	6.437
KM SD of Logged Data	0.127	95% KM UPL (Lognormal)	5.543
95% KM Percentile Lognormal (z)	5.292	95% KM USL (Lognormal)	5.559

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.831	Mean in Log Scale	0.937
SD in Original Scale	1.55	SD in Log Scale	0.454
95% UTL95% Coverage	10.84	95% UPL (t)	6.354
90% Percentile (z)	4.567	95% Percentile (z)	5.385
99% Percentile (z)	7.336	95% USL	6.418

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	8	95% UTL with95% Coverage	5.66
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	5.66
95% USL	5.66	95% KM Chebyshev UPL	7.095

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.

report_result_value (chromium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	4.07	Minimum Non-Detect	4
Maximum Detect	5.04	Maximum Non-Detect	4
Variance Detected	0.47	Percent Non-Detects	75%
Mean Detected	4.555	SD Detected	0.686
Mean of Detected Logged Data	1.511	SD of Detected Logged Data	0.151

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	4.139	KM SD	0.341
95% UTL95% Coverage	5.227	95% KM UPL (t)	4.825
90% KM Percentile (z)	4.576	95% KM Percentile (z)	4.7
99% KM Percentile (z)	4.933	95% KM USL	4.832

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.639	SD	1.211
95% UTL95% Coverage	6.498	95% UPL (t)	5.072
90% Percentile (z)	4.19	95% Percentile (z)	4.63
99% Percentile (z)	5.456	95% USL	5.099

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)	87.87	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0518	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	351.5	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)	4.139	SD (KM)	0.341
Variance (KM)	0.117	SE of Mean (KM)	0.171
k hat (KM)	147	k star (KM)	91.93
nu hat (KM)	2351	nu star (KM)	1471
theta hat (KM)	0.0282	theta star (KM)	0.045
80% gamma percentile (KM)	4.497	90% gamma percentile (KM)	4.701
95% gamma percentile (KM)	4.873	99% gamma percentile (KM)	5.209

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	5.244	5.247	95% Approx. Gamma UPL	4.812	4.81
95% KM Gamma Percentile	4.683	4.681	95% Gamma USL	4.82	4.818

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

Mean in Original Scale	2.731	Mean in Log Scale	0.914
SD in Original Scale	1.268	SD in Log Scale	0.452
95% UTL95% Coverage	10.54	95% BCA UTL95% Coverage	5.04
95% Bootstrap (%) UTL95% Coverage	5.04	95% UPL (t)	6.188
90% Percentile (z)	4.453	95% Percentile (z)	5.248
99% Percentile (z)	7.141	95% USL	6.25

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.417	95% KM UTL (Lognormal)95% Coverage	5.254
KM SD of Logged Data	0.0758	95% KM UPL (Lognormal)	4.805
95% KM Percentile Lognormal (z)	4.674	95% KM USL (Lognormal)	4.813

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.639	Mean in Log Scale	0.897
SD in Original Scale	1.211	SD in Log Scale	0.383
95% UTL95% Coverage	8.306	95% UPL (t)	5.293
90% Percentile (z)	4.006	95% Percentile (z)	4.604
99% Percentile (z)	5.976	95% USL	5.338

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	8	95% UTL with95% Coverage	5.04
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	5.04
95% USL	5.04	95% KM Chebyshev UPL	5.717

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.

report_result_value (chromium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	4.42	Minimum Non-Detect	4
Maximum Detect	8.71	Maximum Non-Detect	4
Variance Detected	6.009	Percent Non-Detects	62.5%
Mean Detected	5.88	SD Detected	2.451
Mean of Detected Logged Data	1.719	SD of Detected Logged Data	0.386

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.766	**Shapiro Wilk GOF Test**		
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level		
Lilliefors Test Statistic	0.379	**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) Background Statistics Assuming Normal Distribution

KM Mean	4.705	KM SD	1.527
95% UTL95% Coverage	9.57	95% KM UPL (t)	7.773
90% KM Percentile (z)	6.661	95% KM Percentile (z)	7.216
99% KM Percentile (z)	8.256	95% KM USL	7.807

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	3.455	SD	2.398
95% UTL95% Coverage	11.1	95% UPL (t)	8.273
90% Percentile (z)	6.528	95% Percentile (z)	7.399
99% Percentile (z)	9.033	95% USL	8.326

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	0.588	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.419	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.432	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.672	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.608	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	58.03	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

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	2.329
Maximum	8.71	Median	0.48
SD	3.235	CV	1.389
k hat (MLE)	0.278	k star (bias corrected MLE)	0.257
Theta hat (MLE)	8.372	Theta star (bias corrected MLE)	9.055
nu hat (MLE)	4.451	nu star (bias corrected)	4.115
MLE Mean (bias corrected)	2.329	MLE Sd (bias corrected)	4.592
95% Percentile of Chisquare (2kstar)	2.469	90% Percentile	6.975
95% Percentile	11.18	99% Percentile	22.32

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	39.57	62.95	95% Approx. Gamma UPL	15.27	19.22
95% Gamma USL	15.6	19.72			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.705	SD (KM)	1.527
Variance (KM)	2.331	SE of Mean (KM)	0.661
k hat (KM)	9.499	k star (KM)	6.02
nu hat (KM)	152	nu star (KM)	96.32
theta hat (KM)	0.495	theta star (KM)	0.782
80% gamma percentile (KM)	6.197	90% gamma percentile (KM)	7.269
95% gamma percentile (KM)	8.238	99% gamma percentile (KM)	10.27

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	9.874	9.923	95% Approx. Gamma UPL	7.603	7.58
95% KM Gamma Percentile	6.978	6.947	95% Gamma USL	7.642	7.62

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.772	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.376	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	3.139	Mean in Log Scale	0.839
SD in Original Scale	2.671	SD in Log Scale	0.844
95% UTL95% Coverage	34.02	95% BCA UTL95% Coverage	8.71
95% Bootstrap (%) UTL95% Coverage	8.71	95% UPL (t)	12.6
90% Percentile (z)	6.819	95% Percentile (z)	9.264
99% Percentile (z)	16.46	95% USL	12.84

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.511	95% KM UTL (Lognormal)95% Coverage	10.1
KM SD of Logged Data	0.251	95% KM UPL (Lognormal)	7.509
95% KM Percentile Lognormal (z)	6.852	95% KM USL (Lognormal)	7.551

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	3.455	Mean in Log Scale	1.078
SD in Original Scale	2.398	SD in Log Scale	0.57
95% UTL95% Coverage	18.05	95% UPL (t)	9.23
90% Percentile (z)	6.097	95% Percentile (z)	7.499
99% Percentile (z)	11.06	95% USL	9.347

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	8	95% UTL with95% Coverage	8.71
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	8.71
95% USL	8.71	95% KM Chebyshev UPL	11.76

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.

report_result_value (chromium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	7		
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	4.03	Minimum Non-Detect	4
Maximum Detect	16.8	Maximum Non-Detect	4
Variance Detected	17.94	Percent Non-Detects	25%
Mean Detected	10.33	SD Detected	4.235
Mean of Detected Logged Data	2.249	SD of Detected Logged Data	0.482

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.171	**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) Background Statistics Assuming Normal Distribution

KM Mean	8.745	KM SD	4.326
95% UTL95% Coverage	22.53	95% KM UPL (t)	17.44
90% KM Percentile (z)	14.29	95% KM Percentile (z)	15.86
99% KM Percentile (z)	18.81	95% KM USL	17.53

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	8.245	SD	5.26
95% UTL95% Coverage	25.01	95% UPL (t)	18.82
90% Percentile (z)	14.99	95% Percentile (z)	16.9
99% Percentile (z)	20.48	95% USL	18.93

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	0.282	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.209	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.333	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)	6.023	k star (bias corrected MLE)	3.123
Theta hat (MLE)	1.715	Theta star (bias corrected MLE)	3.307
nu hat (MLE)	72.28	nu star (bias corrected)	37.47
MLE Mean (bias corrected)	10.33		
MLE Sd (bias corrected)	5.844	95% Percentile of Chisquare (2kstar)	12.96

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	0.742	Mean	8.152
Maximum	16.8	Median	9.165
SD	5.409	CV	0.663
k hat (MLE)	1.647	k star (bias corrected MLE)	1.113
Theta hat (MLE)	4.95	Theta star (bias corrected MLE)	7.327
nu hat (MLE)	26.35	nu star (bias corrected)	17.8
MLE Mean (bias corrected)	8.152	MLE Sd (bias corrected)	7.728
95% Percentile of Chisquare (2kstar)	6.421	90% Percentile	18.28
95% Percentile	23.52	99% Percentile	35.59

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	48.69	58.37	95% Approx. Gamma UPL	26.99	29.62
95% Gamma USL	27.32	30.03			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.745	SD (KM)	4.326
Variance (KM)	18.71	SE of Mean (KM)	1.675
k hat (KM)	4.086	k star (KM)	2.637
nu hat (KM)	65.38	nu star (KM)	42.2
theta hat (KM)	2.14	theta star (KM)	3.316
80% gamma percentile (KM)	12.67	90% gamma percentile (KM)	15.96
95% gamma percentile (KM)	19.06	99% gamma percentile (KM)	25.81

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	30.26	32.22	95% Approx. Gamma UPL	19.77	20.27
95% KM Gamma Percentile	17.1	17.36	95% Gamma USL	19.94	20.46

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.227	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	8.499	Mean in Log Scale	1.96
SD in Original Scale	4.932	SD in Log Scale	0.678
95% UTL95% Coverage	61.63	95% BCA UTL95% Coverage	16.8
95% Bootstrap (%) UTL95% Coverage	16.8	95% UPL (t)	27.74
90% Percentile (z)	16.93	95% Percentile (z)	21.66
99% Percentile (z)	34.38	95% USL	28.16

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	2.034	95% KM UTL (Lognormal)95% Coverage	41.89
KM SD of Logged Data	0.534	95% KM UPL (Lognormal)	22.34
95% KM Percentile Lognormal (z)	18.39	95% KM USL (Lognormal)	22.61

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	8.245	Mean in Log Scale	1.86
SD in Original Scale	5.26	SD in Log Scale	0.828
95% UTL95% Coverage	89.85	95% UPL (t)	33.91
90% Percentile (z)	18.56	95% Percentile (z)	25.07
99% Percentile (z)	44.07	95% USL	34.53

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	8	95% UTL with95% Coverage	16.8
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	16.8
95% USL	16.8	95% KM Chebyshev UPL	28.75

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.

report_result_value (cobalt [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	40	Number of Missing Observations	0
Number of Distinct Observations	34		
Number of Detects	34	Number of Non-Detects	6
Number of Distinct Detects	33	Number of Distinct Non-Detects	1
Minimum Detect	1.02	Minimum Non-Detect	2
Maximum Detect	11.6	Maximum Non-Detect	2
Variance Detected	8.323	Percent Non-Detects	15%
Mean Detected	5.293	SD Detected	2.885
Mean of Detected Logged Data	1.511	SD of Detected Logged Data	0.589

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.908	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.175	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	4.71	KM SD	2.968
95% UTL95% Coverage	11	95% KM UPL (t)	9.774
90% KM Percentile (z)	8.514	95% KM Percentile (z)	9.593
99% KM Percentile (z)	11.62	95% KM USL	13.22

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	4.649	SD	3.074
95% UTL95% Coverage	11.16	95% UPL (t)	9.893
90% Percentile (z)	8.589	95% Percentile (z)	9.706
99% Percentile (z)	11.8	95% USL	13.46

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	0.352	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.119	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.152	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)	3.369	k star (bias corrected MLE)	3.091
Theta hat (MLE)	1.571	Theta star (bias corrected MLE)	1.712
nu hat (MLE)	229.1	nu star (bias corrected)	210.2
MLE Mean (bias corrected)	5.293		
MLE Sd (bias corrected)	3.01	95% Percentile of Chisquare (2kstar)	12.86

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	0.101	Mean	4.643
Maximum	11.6	Median	3.95
SD	3.088	CV	0.665
k hat (MLE)	1.806	k star (bias corrected MLE)	1.687
Theta hat (MLE)	2.571	Theta star (bias corrected MLE)	2.752
nu hat (MLE)	144.5	nu star (bias corrected)	135
MLE Mean (bias corrected)	4.643	MLE Sd (bias corrected)	3.575
95% Percentile of Chisquare (2kstar)	8.455	90% Percentile	9.404
95% Percentile	11.63	99% Percentile	16.63

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	14.62	15.86	95% Approx. Gamma UPL	11.79	12.46
95% Gamma USL	20.91	23.79			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.71	SD (KM)	2.968
Variance (KM)	8.812	SE of Mean (KM)	0.479
k hat (KM)	2.518	k star (KM)	2.346
nu hat (KM)	201.4	nu star (KM)	187.7
theta hat (KM)	1.871	theta star (KM)	2.008
80% gamma percentile (KM)	6.919	90% gamma percentile (KM)	8.828
95% gamma percentile (KM)	10.63	99% gamma percentile (KM)	14.6

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	13.12	13.69	95% Approx. Gamma UPL	10.81	11.09
95% KM Gamma Percentile	10.49	10.74	95% Gamma USL	18.15	19.59

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.943	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.125	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.137	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	4.72	Mean in Log Scale	1.338
SD in Original Scale	2.994	SD in Log Scale	0.689
95% UTL95% Coverage	16.39	95% BCA UTL95% Coverage	11.6
95% Bootstrap (%) UTL95% Coverage	11.6	95% UPL (t)	12.35
90% Percentile (z)	9.217	95% Percentile (z)	11.84
99% Percentile (z)	18.93	95% USL	27.48

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.33	95% KM UTL (Lognormal)95% Coverage	16.48
KM SD of Logged Data	0.696	95% KM UPL (Lognormal)	12.38
95% KM Percentile Lognormal (z)	11.87	95% KM USL (Lognormal)	27.78

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	4.649	Mean in Log Scale	1.284
SD in Original Scale	3.074	SD in Log Scale	0.769
95% UTL95% Coverage	18.41	95% UPL (t)	13.41
90% Percentile (z)	9.678	95% Percentile (z)	12.8
99% Percentile (z)	21.62	95% USL	32.79

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	40	95% UTL with95% Coverage	11.6
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
Approximate Sample Size needed to achieve specified CC	59	95% UPL	11.55
95% USL	11.6	95% KM Chebyshev UPL	17.81

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.

report_result_value (cobalt [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	7		
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	2.07	Minimum Non-Detect	2
Maximum Detect	3.35	Maximum Non-Detect	2
Variance Detected	0.276	Percent Non-Detects	25%
Mean Detected	2.69	SD Detected	0.526
Mean of Detected Logged Data	0.974	SD of Detected Logged Data	0.195

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.235	**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) Background Statistics Assuming Normal Distribution

KM Mean	2.518	KM SD	0.512
95% UTL95% Coverage	4.149	95% KM UPL (t)	3.546
90% KM Percentile (z)	3.173	95% KM Percentile (z)	3.359
99% KM Percentile (z)	3.708	95% KM USL	3.557

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.268	SD	0.9
95% UTL95% Coverage	5.135	95% UPL (t)	4.075
90% Percentile (z)	3.42	95% Percentile (z)	3.747
99% Percentile (z)	4.36	95% USL	4.095

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	0.369	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.332	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)	31.76	k star (bias corrected MLE)	15.99
Theta hat (MLE)	0.0847	Theta star (bias corrected MLE)	0.168
nu hat (MLE)	381.1	nu star (bias corrected)	191.9
MLE Mean (bias corrected)	2.69		
MLE Sd (bias corrected)	0.673	95% Percentile of Chisquare (2kstar)	46.17

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	1.322	Mean	2.385
Maximum	3.35	Median	2.35
SD	0.723	CV	0.303
k hat (MLE)	11.55	k star (bias corrected MLE)	7.301
Theta hat (MLE)	0.207	Theta star (bias corrected MLE)	0.327
nu hat (MLE)	184.8	nu star (bias corrected)	116.8
MLE Mean (bias corrected)	2.385	MLE Sd (bias corrected)	0.883
95% Percentile of Chisquare (2kstar)	24.47	90% Percentile	3.563
95% Percentile	3.997	99% Percentile	4.901

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	5.546	5.72	95% Approx. Gamma UPL	4.134	4.188
95% Gamma USL	4.158	4.214			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.518	SD (KM)	0.512
Variance (KM)	0.262	SE of Mean (KM)	0.198
k hat (KM)	24.2	k star (KM)	15.21
nu hat (KM)	387.2	nu star (KM)	243.3
theta hat (KM)	0.104	theta star (KM)	0.166
80% gamma percentile (KM)	3.039	90% gamma percentile (KM)	3.372
95% gamma percentile (KM)	3.665	99% gamma percentile (KM)	4.257

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	4.414	4.458	95% Approx. Gamma UPL	3.615	3.625
95% KM Gamma Percentile	3.389	3.393	95% Gamma USL	3.629	3.64

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.223	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.422	Mean in Log Scale	0.85
SD in Original Scale	0.669	SD in Log Scale	0.284
95% UTL95% Coverage	5.792	95% BCA UTL95% Coverage	3.35
95% Bootstrap (%) UTL95% Coverage	3.35	95% UPL (t)	4.144
90% Percentile (z)	3.368	95% Percentile (z)	3.735
99% Percentile (z)	4.534	95% USL	4.17

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean of Logged Data	0.904	95% KM UTL (Lognormal)95% Coverage	4.611
KM SD of Logged Data	0.196	95% KM UPL (Lognormal)	3.66
95% KM Percentile Lognormal (z)	3.408	95% KM USL (Lognormal)	3.676

Background DL/2 Statistics Assuming Lognormal Distribution			
Mean in Original Scale	2.268	Mean in Log Scale	0.73
SD in Original Scale	0.9	SD in Log Scale	0.48
95% UTL95% Coverage	9.578	95% UPL (t)	5.444
90% Percentile (z)	3.839	95% Percentile (z)	4.57
99% Percentile (z)	6.338	95% USL	5.502

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	8	95% UTL with95% Coverage	3.35
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.35
95% USL	3.35	95% KM Chebyshev UPL	4.884

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.

report_result_value (cobalt [ug/l]_intrawell_mw-14)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.26	Minimum Non-Detect	2
Maximum Detect	3.87	Maximum Non-Detect	2
Variance Detected	0.46	Percent Non-Detects	50%
Mean Detected	2.943	SD Detected	0.678
Mean of Detected Logged Data	1.06	SD of Detected Logged Data	0.224

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution			
KM Mean	2.471	KM SD	0.628
95% UTL95% Coverage	4.473	95% KM UPL (t)	3.734
90% KM Percentile (z)	3.276	95% KM Percentile (z)	3.505
99% KM Percentile (z)	3.933	95% KM USL	3.747

DL/2 Substitution Background Statistics Assuming Normal Distribution			
Mean	1.971	SD	1.129
95% UTL95% Coverage	5.57	95% UPL (t)	4.241
90% Percentile (z)	3.418	95% Percentile (z)	3.829
99% Percentile (z)	4.598	95% USL	4.266

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	0.257	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.233	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	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)	26.32	k star (bias corrected MLE)	6.747
Theta hat (MLE)	0.112	Theta star (bias corrected MLE)	0.436
nu hat (MLE)	210.6	nu star (bias corrected)	53.97
MLE Mean (bias corrected)	2.943		
MLE Sd (bias corrected)	1.133	95% Percentile of Chisquare (2kstar)	23.02

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	0.279	Mean	1.949
Maximum	3.87	Median	1.904
SD	1.205	CV	0.618
k hat (MLE)	2.17	k star (bias corrected MLE)	1.44
Theta hat (MLE)	0.898	Theta star (bias corrected MLE)	1.354
nu hat (MLE)	34.72	nu star (bias corrected)	23.04
MLE Mean (bias corrected)	1.949	MLE Sd (bias corrected)	1.624
95% Percentile of Chisquare (2kstar)	7.605	90% Percentile	4.102
95% Percentile	5.148	99% Percentile	7.514

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	9.894	11.38	95% Approx. Gamma UPL	5.762	6.173
95% Gamma USL	5.826	6.25			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.471	SD (KM)	0.628
Variance (KM)	0.395	SE of Mean (KM)	0.256
k hat (KM)	15.48	k star (KM)	9.756
nu hat (KM)	247.6	nu star (KM)	156.1
theta hat (KM)	0.16	theta star (KM)	0.253
80% gamma percentile (KM)	3.101	90% gamma percentile (KM)	3.524
95% gamma percentile (KM)	3.9	99% gamma percentile (KM)	4.673

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	4.761	4.81	95% Approx. Gamma UPL	3.775	3.782
95% KM Gamma Percentile	3.5	3.5	95% Gamma USL	3.792	3.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.224	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.183	Mean in Log Scale	0.698
SD in Original Scale	0.947	SD in Log Scale	0.439
95% UTL95% Coverage	8.135	95% BCA UTL95% Coverage	3.87
95% Bootstrap (%) UTL95% Coverage	3.87	95% UPL (t)	4.852
90% Percentile (z)	3.525	95% Percentile (z)	4.135
99% Percentile (z)	5.576	95% USL	4.9

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.877	95% KM UTL (Lognormal)95% Coverage	4.985
KM SD of Logged Data	0.229	95% KM UPL (Lognormal)	3.807
95% KM Percentile Lognormal (z)	3.502	95% KM USL (Lognormal)	3.826

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.971	Mean in Log Scale	0.53
SD in Original Scale	1.129	SD in Log Scale	0.585
95% UTL95% Coverage	10.97	95% UPL (t)	5.508
90% Percentile (z)	3.597	95% Percentile (z)	4.449
99% Percentile (z)	6.63	95% USL	5.58

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	8	95% UTL with95% Coverage	3.87
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.87
95% USL	3.87	95% KM Chebyshev UPL	5.376

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.

report_result_value (cobalt [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	2.05	Minimum Non-Detect	2
Maximum Detect	4.27	Maximum Non-Detect	2
Variance Detected	2.464	Percent Non-Detects	75%
Mean Detected	3.16	SD Detected	1.57
Mean of Detected Logged Data	1.085	SD of Detected Logged Data	0.519

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	2.29	KM SD	0.749
95% UTL95% Coverage	4.676	95% KM UPL (t)	3.794
90% KM Percentile (z)	3.249	95% KM Percentile (z)	3.521
99% KM Percentile (z)	4.031	95% KM USL	3.811

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.54	SD	1.163
95% UTL95% Coverage	5.245	95% UPL (t)	3.876
90% Percentile (z)	3.03	95% Percentile (z)	3.452
99% Percentile (z)	4.245	95% USL	3.902

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)	7.756	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.407	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	31.03	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)	2.29	SD (KM)	0.749
Variance (KM)	0.56	SE of Mean (KM)	0.374
k hat (KM)	9.359	k star (KM)	5.933
nu hat (KM)	149.7	nu star (KM)	94.92
theta hat (KM)	0.245	theta star (KM)	0.386
80% gamma percentile (KM)	3.021	90% gamma percentile (KM)	3.547
95% gamma percentile (KM)	4.023	99% gamma percentile (KM)	5.021

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	4.802	4.822	95% Approx. Gamma UPL	3.699	3.685
95% KM Gamma Percentile	3.395	3.378	95% Gamma USL	3.718	3.705

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

Mean in Original Scale	1.004	Mean in Log Scale	-0.962
SD in Original Scale	1.472	SD in Log Scale	1.552
95% UTL95% Coverage	53.67	95% BCA UTL95% Coverage	4.27
95% Bootstrap (%) UTL95% Coverage	4.27	95% UPL (t)	8.636
90% Percentile (z)	2.791	95% Percentile (z)	4.905
99% Percentile (z)	14.12	95% USL	8.938

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.791	95% KM UTL (Lognormal)95% Coverage	4.89
KM SD of Logged Data	0.25	95% KM UPL (Lognormal)	3.644
95% KM Percentile Lognormal (z)	3.327	95% KM USL (Lognormal)	3.664

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.54	Mean in Log Scale	0.271
SD in Original Scale	1.163	SD in Log Scale	0.539
95% UTL95% Coverage	7.31	95% UPL (t)	3.875
90% Percentile (z)	2.617	95% Percentile (z)	3.183
99% Percentile (z)	4.596	95% USL	3.921

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	8	95% UTL with95% Coverage	4.27
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.27
95% USL	4.27	95% KM Chebyshev UPL	5.751

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.

report_result_value (cobalt [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.39	First Quartile	3.688
Second Largest	7.96	Median	5.425
Maximum	11.4	Third Quartile	7.945
Mean	5.894	SD	3.104
Coefficient of Variation	0.527	Skewness	0.607
Mean of logged Data	1.643	SD of logged Data	0.561

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	15.79	90% Percentile (z)	9.872
95% UPL (t)	12.13	95% Percentile (z)	11
95% USL	12.2	99% Percentile (z)	13.12

Gamma GOF Test

A-D Test Statistic	0.255	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.16	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	3.983	k star (bias corrected MLE)	2.573
Theta hat (MLE)	1.48	Theta star (bias corrected MLE)	2.291
nu hat (MLE)	63.73	nu star (bias corrected)	41.16
MLE Mean (bias corrected)	5.894	MLE Sd (bias corrected)	3.674

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	13.91	90% Percentile	10.82
95% Hawkins Wixley (HW) Approx. Gamma UPL	14.3	95% Percentile	12.94
95% WH Approx. Gamma UTL with 95% Coverage	21.6	99% Percentile	17.57
95% HW Approx. Gamma UTL with 95% Coverage	23.13		
95% WH USL	14.03	95% HW USL	14.44

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.153	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	30.92	90% Percentile (z)	10.61
95% UPL (t)	15.97	95% Percentile (z)	13.02
95% USL	16.17	99% Percentile (z)	19.08

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	11.4
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	11.4	95% BCA Bootstrap UTL with 95% Coverage	11.4
95% UPL	11.4	90% Percentile	8.992
90% Chebyshev UPL	15.77	95% Percentile	10.2
95% Chebyshev UPL	20.25	99% Percentile	11.16
95% USL	11.4		

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.

report_result_value (fluoride [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	84	Number of Missing Observations	0
Number of Distinct Observations	12		
Number of Detects	10	Number of Non-Detects	74
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	130	Minimum Non-Detect	200
Maximum Detect	484	Maximum Non-Detect	500
Variance Detected	13647	Percent Non-Detects	88.1%
Mean Detected	335.7	SD Detected	116.8
Mean of Detected Logged Data	5.751	SD of Detected Logged Data	0.404

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	1.952	d2max (for USL)	3.149

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.781	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.304	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	276.9	KM SD	131.9
95% UTL95% Coverage	534.5	95% KM UPL (t)	497.7
90% KM Percentile (z)	446	95% KM Percentile (z)	494
99% KM Percentile (z)	583.9	95% KM USL	692.4

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	253.1	SD	58.65
95% UTL95% Coverage	367.5	95% UPL (t)	351.2
90% Percentile (z)	328.2	95% Percentile (z)	349.5
99% Percentile (z)	389.5	95% USL	437.8

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	0.48	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.267	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)	7.79	k star (bias corrected MLE)	5.52
Theta hat (MLE)	43.09	Theta star (bias corrected MLE)	60.82
nu hat (MLE)	155.8	nu star (bias corrected)	110.4
MLE Mean (bias corrected)	335.7		
MLE Sd (bias corrected)	142.9	95% Percentile of Chisquare (2kstar)	19.73

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	27.18	Mean	283.4
Maximum	679	Median	268
SD	139.8	CV	0.493
k hat (MLE)	3.593	k star (bias corrected MLE)	3.473
Theta hat (MLE)	78.88	Theta star (bias corrected MLE)	81.61
nu hat (MLE)	603.7	nu star (bias corrected)	583.4
MLE Mean (bias corrected)	283.4	MLE Sd (bias corrected)	152.1
95% Percentile of Chisquare (2kstar)	13.99	90% Percentile	487.3
95% Percentile	570.8	99% Percentile	750.3

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	643	665.9	95% Approx. Gamma UPL	573.6	588.5
95% Gamma USL	1005	1088			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	276.9	SD (KM)	131.9
Variance (KM)	17408	SE of Mean (KM)	37.17
k hat (KM)	4.405	k star (KM)	4.256
nu hat (KM)	740.1	nu star (KM)	715
theta hat (KM)	62.86	theta star (KM)	65.07
80% gamma percentile (KM)	379.1	90% gamma percentile (KM)	456.8
95% gamma percentile (KM)	528.1	99% gamma percentile (KM)	680

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	599.1	612.5	95% Approx. Gamma UPL	537.8	545.9
95% KM Gamma Percentile	531.8	539.4	95% Gamma USL	915.7	970.3

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.199	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	289.1	Mean in Log Scale	5.536
SD in Original Scale	152.6	SD in Log Scale	0.518
95% UTL95% Coverage	696.9	95% BCA UTL95% Coverage	655.2
95% Bootstrap (%) UTL95% Coverage	655.2	95% UPL (t)	603.3
90% Percentile (z)	492.6	95% Percentile (z)	594.5
99% Percentile (z)	845.9	95% USL	1295

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.498	95% KM UTL (Lognormal)95% Coverage	666.1
KM SD of Logged Data	0.514	95% KM UPL (Lognormal)	577.2
95% KM Percentile Lognormal (z)	568.9	95% KM USL (Lognormal)	1232

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	253.1	Mean in Log Scale	5.505
SD in Original Scale	58.65	SD in Log Scale	0.253
95% UTL95% Coverage	403.3	95% UPL (t)	375.8
90% Percentile (z)	340.3	95% Percentile (z)	373.1
99% Percentile (z)	443.5	95% USL	546.3

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	83	95% UTL with95% Coverage	500
Approx, f used to compute achieved CC	2.184	Approximate Actual Confidence Coefficient achieved by UTL	0.927
Approximate Sample Size needed to achieve specified CC	59	95% UPL	500
95% USL	500	95% KM Chebyshev UPL	855.5

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.

report_result_value (fluoride [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	6
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	285	Minimum Non-Detect	500
Maximum Detect	584	Maximum Non-Detect	500
Variance Detected	22550	Percent Non-Detects	66.67%
Mean Detected	426.3	SD Detected	150.2
Mean of Detected Logged Data	6.013	SD of Detected Logged Data	0.359

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.21	**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) Background Statistics Assuming Normal Distribution

KM Mean	373.8	KM SD	94.85
95% UTL95% Coverage	661.3	95% KM UPL (t)	559.7
90% KM Percentile (z)	495.3	95% KM Percentile (z)	529.8
99% KM Percentile (z)	594.4	95% KM USL	573.9

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	308.8	SD	115.8
95% UTL95% Coverage	659.8	95% UPL (t)	535.8
90% Percentile (z)	457.2	95% Percentile (z)	499.3
99% Percentile (z)	578.2	95% USL	553.1

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	0.246	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.226	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.432	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.96	k star (bias corrected MLE)	N/A
Theta hat (MLE)	35.63	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	71.79	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

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	235.1	Mean	371.9
Maximum	584	Median	363.5
SD	106.5	CV	0.286
k hat (MLE)	14.44	k star (bias corrected MLE)	9.702
Theta hat (MLE)	25.75	Theta star (bias corrected MLE)	38.33
nu hat (MLE)	259.9	nu star (bias corrected)	174.6
MLE Mean (bias corrected)	371.9	MLE Sd (bias corrected)	119.4
95% Percentile of Chisquare (2kstar)	30.66	90% Percentile	530.8
95% Percentile	587.6	99% Percentile	704.3

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	769.6	783.6	95% Approx. Gamma UPL	602.8	606.7
95% Gamma USL	624.4	629.4			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	373.8	SD (KM)	94.85
Variance (KM)	8996	SE of Mean (KM)	56.88
k hat (KM)	15.53	k star (KM)	10.43
nu hat (KM)	279.5	nu star (KM)	187.7
theta hat (KM)	24.07	theta star (KM)	35.85
80% gamma percentile (KM)	466.1	90% gamma percentile (KM)	527.7
95% gamma percentile (KM)	582.3	99% gamma percentile (KM)	694.2

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	710.9	719.7	95% Approx. Gamma UPL	571.7	573.8
95% KM Gamma Percentile	534.5	535.4	95% Gamma USL	589.9	592.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.176	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	370.2	Mean in Log Scale	5.881
SD in Original Scale	104.3	SD in Log Scale	0.27
95% UTL95% Coverage	810.9	95% BCA UTL95% Coverage	584
95% Bootstrap (%) UTL95% Coverage	584	95% UPL (t)	607.6
90% Percentile (z)	506	95% Percentile (z)	558.1
99% Percentile (z)	670.6	95% USL	632.6

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.894	95% KM UTL (Lognormal)95% Coverage	751.5
KM SD of Logged Data	0.24	95% KM UPL (Lognormal)	581
95% KM Percentile Lognormal (z)	538.6	95% KM USL (Lognormal)	602.2

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	308.8	Mean in Log Scale	5.685
SD in Original Scale	115.8	SD in Log Scale	0.304
95% UTL95% Coverage	740.5	95% UPL (t)	534.6
90% Percentile (z)	434.9	95% Percentile (z)	485.7
99% Percentile (z)	597.6	95% USL	559.5

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	9	95% UTL with95% Coverage	584
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	584
95% USL	584	95% KM Chebyshev UPL	809.6

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.

report_result_value (fluoride [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	6
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	280	Minimum Non-Detect	500
Maximum Detect	682	Maximum Non-Detect	500
Variance Detected	41302	Percent Non-Detects	66.67%
Mean Detected	498.3	SD Detected	203.2
Mean of Detected Logged Data	6.146	SD of Detected Logged Data	0.46

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.234	**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) Background Statistics Assuming Normal Distribution

KM Mean	352.8	KM SD	140.6
95% UTL95% Coverage	779	95% KM UPL (t)	628.4
90% KM Percentile (z)	533	95% KM Percentile (z)	584.1
99% KM Percentile (z)	679.9	95% KM USL	649.4

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	332.8	SD	160.4
95% UTL95% Coverage	819.1	95% UPL (t)	647.3
90% Percentile (z)	538.4	95% Percentile (z)	596.7
99% Percentile (z)	706	95% USL	671.2

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	0.313	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.288	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.433	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.837	k star (bias corrected MLE)	N/A
Theta hat (MLE)	63.59	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	47.02	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

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	121	Mean	346.9
Maximum	682	Median	299.7
SD	174.7	CV	0.504
k hat (MLE)	4.443	k star (bias corrected MLE)	3.036
Theta hat (MLE)	78.09	Theta star (bias corrected MLE)	114.3
nu hat (MLE)	79.97	nu star (bias corrected)	54.65
MLE Mean (bias corrected)	346.9	MLE Sd (bias corrected)	199.1
95% Percentile of Chisquare (2kstar)	12.7	90% Percentile	613.9
95% Percentile	725.6	99% Percentile	967.6

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	1132	1198	95% Approx. Gamma UPL	768.8	787
95% Gamma USL	814	836.8			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	352.8	SD (KM)	140.6
Variance (KM)	19772	SE of Mean (KM)	57.4
k hat (KM)	6.295	k star (KM)	4.27
nu hat (KM)	113.3	nu star (KM)	76.87
theta hat (KM)	56.05	theta star (KM)	82.61
80% gamma percentile (KM)	482.7	90% gamma percentile (KM)	581.5
95% gamma percentile (KM)	672.2	99% gamma percentile (KM)	865.2

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	838.1	848.6	95% Approx. Gamma UPL	627	626.9
95% KM Gamma Percentile	572.4	570.8	95% Gamma USL	654	654.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.28	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	354.2	Mean in Log Scale	5.785
SD in Original Scale	162.3	SD in Log Scale	0.43
95% UTL95% Coverage	1199	95% BCA UTL95% Coverage	682
95% Bootstrap (%) UTL95% Coverage	682	95% UPL (t)	756.1
90% Percentile (z)	564.7	95% Percentile (z)	660.2
99% Percentile (z)	885.1	95% USL	806.3

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.805	95% KM UTL (Lognormal)95% Coverage	886.8
KM SD of Logged Data	0.324	95% KM UPL (Lognormal)	626.7
95% KM Percentile Lognormal (z)	565.9	95% KM USL (Lognormal)	657.8

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	332.8	Mean in Log Scale	5.73
SD in Original Scale	160.4	SD in Log Scale	0.388
95% UTL95% Coverage	997.3	95% UPL (t)	658.4
90% Percentile (z)	506	95% Percentile (z)	582.6
99% Percentile (z)	758.8	95% USL	697.6

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	9	95% UTL with95% Coverage	682
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	682
95% USL	682	95% KM Chebyshev UPL	998.8

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.

report_result_value (fluoride [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	298	Minimum Non-Detect	200
Maximum Detect	486	Maximum Non-Detect	500
Variance Detected	17672	Percent Non-Detects	77.78%
Mean Detected	392	SD Detected	132.9
Mean of Detected Logged Data	5.942	SD of Detected Logged Data	0.346

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	328	KM SD	118.7
95% UTL95% Coverage	687.7	95% KM UPL (t)	560.6
90% KM Percentile (z)	480.1	95% KM Percentile (z)	523.2
99% KM Percentile (z)	604.1	95% KM USL	578.3

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	264.9	SD	99.06
95% UTL95% Coverage	565.1	95% UPL (t)	459.1
90% Percentile (z)	391.8	95% Percentile (z)	427.8
99% Percentile (z)	495.3	95% USL	473.9

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)	17.05	k star (bias corrected MLE)	N/A
Theta hat (MLE)	22.99	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	68.2	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)	328	SD (KM)	118.7
Variance (KM)	14083	SE of Mean (KM)	96.89
k hat (KM)	7.639	k star (KM)	5.167
nu hat (KM)	137.5	nu star (KM)	93.01
theta hat (KM)	42.93	theta star (KM)	63.48
80% gamma percentile (KM)	439.3	90% gamma percentile (KM)	521.1
95% gamma percentile (KM)	595.6	99% gamma percentile (KM)	752.8

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	804.8	828.4	95% Approx. Gamma UPL	596.2	602.6
95% KM Gamma Percentile	542.5	545.9	95% Gamma USL	622.8	630.9

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

Mean in Original Scale	307.6	Mean in Log Scale	5.582
SD in Original Scale	170.7	SD in Log Scale	0.589
95% UTL95% Coverage	1582	95% BCA UTL95% Coverage	616
95% Bootstrap (%) UTL95% Coverage	616	95% UPL (t)	842.1
90% Percentile (z)	564.8	95% Percentile (z)	699.5
99% Percentile (z)	1045	95% USL	919.5

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.727	95% KM UTL (Lognormal)95% Coverage	923.1
KM SD of Logged Data	0.363	95% KM UPL (Lognormal)	625.7
95% KM Percentile Lognormal (z)	558.1	95% KM USL (Lognormal)	660.6

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	264.9	Mean in Log Scale	5.513
SD in Original Scale	99.06	SD in Log Scale	0.405
95% UTL95% Coverage	845.8	95% UPL (t)	548.2
90% Percentile (z)	416.5	95% Percentile (z)	482.5
99% Percentile (z)	635.9	95% USL	582.4

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	9	95% UTL with95% Coverage	500
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	500
95% USL	500	95% KM Chebyshev UPL	873.3

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.

report_result_value (fluoride [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	255	Minimum Non-Detect	200
Maximum Detect	441	Maximum Non-Detect	500
Variance Detected	17298	Percent Non-Detects	77.78%
Mean Detected	348	SD Detected	131.5
Mean of Detected Logged Data	5.815	SD of Detected Logged Data	0.387

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	298.7	KM SD	103.1
95% UTL95% Coverage	611.2	95% KM UPL (t)	500.8
90% KM Percentile (z)	430.8	95% KM Percentile (z)	468.3
99% KM Percentile (z)	538.6	95% KM USL	516.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	255.1	SD	85.71
95% UTL95% Coverage	514.9	95% UPL (t)	423.1
90% Percentile (z)	365	95% Percentile (z)	396.1
99% Percentile (z)	454.5	95% USL	435.9

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)	13.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	25.47	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	54.64	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)	298.7	SD (KM)	103.1
Variance (KM)	10634	SE of Mean (KM)	84.2
k hat (KM)	8.389	k star (KM)	5.667
nu hat (KM)	151	nu star (KM)	102
theta hat (KM)	35.6	theta star (KM)	52.71
80% gamma percentile (KM)	396	90% gamma percentile (KM)	466.5
95% gamma percentile (KM)	530.4	99% gamma percentile (KM)	664.8

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	693.7	709.3	95% Approx. Gamma UPL	522.9	526.7
95% KM Gamma Percentile	478.6	480.4	95% Gamma USL	544.9	549.8

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

Mean in Original Scale	269	Mean in Log Scale	5.413
SD in Original Scale	165.5	SD in Log Scale	0.659
95% UTL95% Coverage	1653	95% BCA UTL95% Coverage	575.1
95% Bootstrap (%) UTL95% Coverage	575.1	95% UPL (t)	816.2
90% Percentile (z)	521.9	95% Percentile (z)	663.1
99% Percentile (z)	1039	95% USL	900.7

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.643	95% KM UTL (Lognormal)95% Coverage	769.1
KM SD of Logged Data	0.331	95% KM UPL (Lognormal)	539.8
95% KM Percentile Lognormal (z)	486.3	95% KM USL (Lognormal)	567.1

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	255.1	Mean in Log Scale	5.485
SD in Original Scale	85.71	SD in Log Scale	0.379
95% UTL95% Coverage	760.6	95% UPL (t)	506.8
90% Percentile (z)	391.8	95% Percentile (z)	449.7
99% Percentile (z)	582.3	95% USL	536.3

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	9	95% UTL with95% Coverage	500
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	500
95% USL	500	95% KM Chebyshev UPL	772.5

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.

report_result_value (lead [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	17		
Number of Detects	16	Number of Non-Detects	20
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	2.29	Minimum Non-Detect	2
Maximum Detect	14	Maximum Non-Detect	2
Variance Detected	11.09	Percent Non-Detects	55.56%
Mean Detected	7.026	SD Detected	3.33
Mean of Detected Logged Data	1.83	SD of Detected Logged Data	0.529

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.844	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.113	**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) Background Statistics Assuming Normal Distribution

KM Mean	4.234	KM SD	3.295
95% UTL95% Coverage	11.31	95% KM UPL (t)	9.878
90% KM Percentile (z)	8.457	95% KM Percentile (z)	9.654
99% KM Percentile (z)	11.9	95% KM USL	13.54

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	3.678	SD	3.738
95% UTL95% Coverage	11.71	95% UPL (t)	10.08
90% Percentile (z)	8.469	95% Percentile (z)	9.827
99% Percentile (z)	12.38	95% USL	14.23

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	0.269	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.132	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.216	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)	4.354	k star (bias corrected MLE)	3.579
Theta hat (MLE)	1.614	Theta star (bias corrected MLE)	1.963
nu hat (MLE)	139.3	nu star (bias corrected)	114.5
MLE Mean (bias corrected)	7.026		
MLE Sd (bias corrected)	3.714	95% Percentile of Chisquare (2kstar)	14.3

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	3.452
Maximum	14	Median	2.054
SD	3.957	CV	1.146
k hat (MLE)	0.363	k star (bias corrected MLE)	0.351
Theta hat (MLE)	9.514	Theta star (bias corrected MLE)	9.832
nu hat (MLE)	26.12	nu star (bias corrected)	25.28
MLE Mean (bias corrected)	3.452	MLE Sd (bias corrected)	5.826
95% Percentile of Chisquare (2kstar)	3.05	90% Percentile	9.964
95% Percentile	15	99% Percentile	27.83

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	21.53	27.92	95% Approx. Gamma UPL	14.74	17.57
95% Gamma USL	35.73	52.25			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.234	SD (KM)	3.295
Variance (KM)	10.86	SE of Mean (KM)	0.567
k hat (KM)	1.651	k star (KM)	1.532
nu hat (KM)	118.9	nu star (KM)	110.3
theta hat (KM)	2.565	theta star (KM)	2.764
80% gamma percentile (KM)	6.536	90% gamma percentile (KM)	8.778
95% gamma percentile (KM)	10.95	99% gamma percentile (KM)	15.85

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	12.36	12.61	95% Approx. Gamma UPL	9.986	10.04
95% KM Gamma Percentile	9.645	9.675	95% Gamma USL	16.74	17.55

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.906	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.166	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	4.008	Mean in Log Scale	1.003
SD in Original Scale	3.543	SD in Log Scale	0.92
95% UTL95% Coverage	19.66	95% BCA UTL95% Coverage	14
95% Bootstrap (%) UTL95% Coverage	14	95% UPL (t)	13.17
90% Percentile (z)	8.858	95% Percentile (z)	12.37
99% Percentile (z)	23.16	95% USL	36.59

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.199	95% KM UTL (Lognormal)95% Coverage	13.7
KM SD of Logged Data	0.66	95% KM UPL (Lognormal)	10.28
95% KM Percentile Lognormal (z)	9.825	95% KM USL (Lognormal)	21.4

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	3.678	Mean in Log Scale	0.814
SD in Original Scale	3.738	SD in Log Scale	0.985
95% UTL95% Coverage	18.74	95% UPL (t)	12.2
90% Percentile (z)	7.976	95% Percentile (z)	11.41
99% Percentile (z)	22.33	95% USL	36.45

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	36	95% UTL with95% Coverage	14
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	12.9
95% USL	14	95% KM Chebyshev UPL	18.8

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.

report_result_value (lead [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	2.06	Minimum Non-Detect	2
Maximum Detect	4.08	Maximum Non-Detect	2
Variance Detected	0.694	Percent Non-Detects	37.5%
Mean Detected	2.632	SD Detected	0.833
Mean of Detected Logged Data	0.934	SD of Detected Logged Data	0.278

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.339	**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) Background Statistics Assuming Normal Distribution

KM Mean	2.395	KM SD	0.664
95% UTL95% Coverage	4.511	95% KM UPL (t)	3.729
90% KM Percentile (z)	3.246	95% KM Percentile (z)	3.487
99% KM Percentile (z)	3.939	95% KM USL	3.744

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.02	SD	1.054
95% UTL95% Coverage	5.378	95% UPL (t)	4.137
90% Percentile (z)	3.37	95% Percentile (z)	3.753
99% Percentile (z)	4.471	95% USL	4.161

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	0.609	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**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)	15	k star (bias corrected MLE)	6.135
Theta hat (MLE)	0.175	Theta star (bias corrected MLE)	0.429
nu hat (MLE)	150	nu star (bias corrected)	61.35
MLE Mean (bias corrected)	2.632		
MLE Sd (bias corrected)	1.063	95% Percentile of Chisquare (2kstar)	21.39

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	0.273	Mean	1.91
Maximum	4.08	Median	2.085
SD	1.199	CV	0.628
k hat (MLE)	2.15	k star (bias corrected MLE)	1.427
Theta hat (MLE)	0.888	Theta star (bias corrected MLE)	1.338
nu hat (MLE)	34.41	nu star (bias corrected)	22.84
MLE Mean (bias corrected)	1.91	MLE Sd (bias corrected)	1.599
95% Percentile of Chisquare (2kstar)	7.561	90% Percentile	4.029
95% Percentile	5.06	99% Percentile	7.395

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	9.744	11.22	95% Approx. Gamma UPL	5.666	6.072
95% Gamma USL	5.729	6.148			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.395	SD (KM)	0.664
Variance (KM)	0.441	SE of Mean (KM)	0.262
k hat (KM)	13.01	k star (KM)	8.217
nu hat (KM)	208.2	nu star (KM)	131.5
theta hat (KM)	0.184	theta star (KM)	0.291
80% gamma percentile (KM)	3.055	90% gamma percentile (KM)	3.509
95% gamma percentile (KM)	3.914	99% gamma percentile (KM)	4.753

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	4.683	4.712	95% Approx. Gamma UPL	3.694	3.69
95% KM Gamma Percentile	3.419	3.41	95% Gamma USL	3.711	3.708

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.297	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.105	Mean in Log Scale	0.656
SD in Original Scale	0.97	SD in Log Scale	0.449
95% UTL95% Coverage	8.056	95% BCA UTL95% Coverage	4.08
95% Bootstrap (%) UTL95% Coverage	4.08	95% UPL (t)	4.749
90% Percentile (z)	3.425	95% Percentile (z)	4.032
99% Percentile (z)	5.475	95% USL	4.796

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.844	95% KM UTL (Lognormal)95% Coverage	4.813
KM SD of Logged Data	0.228	95% KM UPL (Lognormal)	3.679
95% KM Percentile Lognormal (z)	3.385	95% KM USL (Lognormal)	3.697

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.02	Mean in Log Scale	0.584
SD in Original Scale	1.054	SD in Log Scale	0.527
95% UTL95% Coverage	9.615	95% UPL (t)	5.17
90% Percentile (z)	3.522	95% Percentile (z)	4.266
99% Percentile (z)	6.109	95% USL	5.23

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	8	95% UTL with95% Coverage	4.08
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.08
95% USL	4.08	95% KM Chebyshev UPL	5.464

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.

report_result_value (lead [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.54	Minimum Non-Detect	2
Maximum Detect	5.23	Maximum Non-Detect	2
Variance Detected	1.39	Percent Non-Detects	50%
Mean Detected	3.7	SD Detected	1.179
Mean of Detected Logged Data	1.271	SD of Detected Logged Data	0.314

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution

KM Mean	2.85	KM SD	1.115
95% UTL95% Coverage	6.404	95% KM UPL (t)	5.091
90% KM Percentile (z)	4.279	95% KM Percentile (z)	4.684
99% KM Percentile (z)	5.444	95% KM USL	5.116

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.35	SD	1.637
95% UTL95% Coverage	7.566	95% UPL (t)	5.639
90% Percentile (z)	4.447	95% Percentile (z)	5.042
99% Percentile (z)	6.157	95% USL	5.675

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	0.229	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.221	**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)	13.54	k star (bias corrected MLE)	3.551
Theta hat (MLE)	0.273	Theta star (bias corrected MLE)	1.042
nu hat (MLE)	108.3	nu star (bias corrected)	28.4
MLE Mean (bias corrected)	3.7		
MLE Sd (bias corrected)	1.964	95% Percentile of Chisquare (2kstar)	14.21

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	2.11
Maximum	5.23	Median	1.918
SD	1.909	CV	0.905
k hat (MLE)	0.594	k star (bias corrected MLE)	0.455
Theta hat (MLE)	3.551	Theta star (bias corrected MLE)	4.641
nu hat (MLE)	9.506	nu star (bias corrected)	7.274
MLE Mean (bias corrected)	2.11	MLE Sd (bias corrected)	3.129
95% Percentile of Chisquare (2kstar)	3.613	90% Percentile	5.819
95% Percentile	8.383	99% Percentile	14.75

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	23.32	34.43	95% Approx. Gamma UPL	10.72	13.34
95% Gamma USL	10.9	13.62			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.85	SD (KM)	1.115
Variance (KM)	1.244	SE of Mean (KM)	0.455
k hat (KM)	6.531	k star (KM)	4.165
nu hat (KM)	104.5	nu star (KM)	66.65
theta hat (KM)	0.436	theta star (KM)	0.684
80% gamma percentile (KM)	3.911	90% gamma percentile (KM)	4.721
95% gamma percentile (KM)	5.466	99% gamma percentile (KM)	7.053

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	7.254	7.421	95% Approx. Gamma UPL	5.238	5.265
95% KM Gamma Percentile	4.7	4.705	95% Gamma USL	5.272	5.301

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.186	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.509	Mean in Log Scale	0.756
SD in Original Scale	1.511	SD in Log Scale	0.623
95% UTL95% Coverage	15.5	95% BCA UTL95% Coverage	5.23
95% Bootstrap (%) UTL95% Coverage	5.23	95% UPL (t)	7.445
90% Percentile (z)	4.73	95% Percentile (z)	5.932
99% Percentile (z)	9.069	95% USL	7.548

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.982	95% KM UTL (Lognormal)95% Coverage	8.073
KM SD of Logged Data	0.347	95% KM UPL (Lognormal)	5.364
95% KM Percentile Lognormal (z)	4.726	95% KM USL (Lognormal)	5.406

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.35	Mean in Log Scale	0.635
SD in Original Scale	1.637	SD in Log Scale	0.71
95% UTL95% Coverage	18.13	95% UPL (t)	7.861
90% Percentile (z)	4.689	95% Percentile (z)	6.068
99% Percentile (z)	9.844	95% USL	7.986

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	8	95% UTL with95% Coverage	5.23
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	5.23
95% USL	5.23	95% KM Chebyshev UPL	8.006

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.

report_result_value (lead [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.21	Minimum Non-Detect	2
Maximum Detect	8.59	Maximum Non-Detect	2
Variance Detected	9.383	Percent Non-Detects	50%
Mean Detected	4.018	SD Detected	3.063
Mean of Detected Logged Data	1.218	SD of Detected Logged Data	0.633

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.712	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution

KM Mean	3.009	KM SD	2.13
95% UTL95% Coverage	9.797	95% KM UPL (t)	7.289
90% KM Percentile (z)	5.738	95% KM Percentile (z)	6.512
99% KM Percentile (z)	7.963	95% KM USL	7.336

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.509	SD	2.573
95% UTL95% Coverage	10.71	95% UPL (t)	7.68
90% Percentile (z)	5.807	95% Percentile (z)	6.742
99% Percentile (z)	8.496	95% USL	7.737

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	0.662	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.382	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.397	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)	3.046	k star (bias corrected MLE)	0.928
Theta hat (MLE)	1.319	Theta star (bias corrected MLE)	4.329
nu hat (MLE)	24.37	nu star (bias corrected)	7.425
MLE Mean (bias corrected)	4.018		
MLE Sd (bias corrected)	4.17	95% Percentile of Chisquare (2kstar)	5.71

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	2.014
Maximum	8.59	Median	1.11
SD	2.934	CV	1.457
k hat (MLE)	0.29	k star (bias corrected MLE)	0.264
Theta hat (MLE)	6.951	Theta star (bias corrected MLE)	7.616
nu hat (MLE)	4.635	nu star (bias corrected)	4.23
MLE Mean (bias corrected)	2.014	MLE Sd (bias corrected)	3.916
95% Percentile of Chisquare (2kstar)	2.517	90% Percentile	6.018
95% Percentile	9.584	99% Percentile	19.01

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	33.49	53.17	95% Approx. Gamma UPL	13.05	16.45
95% Gamma USL	13.33	16.88			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.009	SD (KM)	2.13
Variance (KM)	4.536	SE of Mean (KM)	0.869
k hat (KM)	1.996	k star (KM)	1.331
nu hat (KM)	31.93	nu star (KM)	21.29
theta hat (KM)	1.508	theta star (KM)	2.261
80% gamma percentile (KM)	4.715	90% gamma percentile (KM)	6.456
95% gamma percentile (KM)	8.161	99% gamma percentile (KM)	12.04

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	10.66	10.84	95% Approx. Gamma UPL	6.887	6.831
95% KM Gamma Percentile	5.932	5.853	95% Gamma USL	6.948	6.894

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.78	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.343	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.289	Mean in Log Scale	0.26
SD in Original Scale	2.734	SD in Log Scale	1.169
95% UTL95% Coverage	53.8	95% BCA UTL95% Coverage	8.59
95% Bootstrap (%) UTL95% Coverage	8.59	95% UPL (t)	13.58
90% Percentile (z)	5.8	95% Percentile (z)	8.868
99% Percentile (z)	19.67	95% USL	13.94

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.955	95% KM UTL (Lognormal)95% Coverage	11.55
KM SD of Logged Data	0.468	95% KM UPL (Lognormal)	6.658
95% KM Percentile Lognormal (z)	5.613	95% KM USL (Lognormal)	6.727

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.509	Mean in Log Scale	0.609
SD in Original Scale	2.573	SD in Log Scale	0.772
95% UTL95% Coverage	21.49	95% UPL (t)	8.665
90% Percentile (z)	4.941	95% Percentile (z)	6.54
99% Percentile (z)	11.06	95% USL	8.814

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	8	95% UTL with95% Coverage	8.59
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	8.59
95% USL	8.59	95% KM Chebyshev UPL	12.86

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.

report_result_value (lead [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	7		
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	2.57	Minimum Non-Detect	2
Maximum Detect	14	Maximum Non-Detect	2
Variance Detected	14.96	Percent Non-Detects	25%
Mean Detected	7.148	SD Detected	3.868
Mean of Detected Logged Data	1.841	SD of Detected Logged Data	0.565

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.283	**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) Background Statistics Assuming Normal Distribution

KM Mean	5.861	KM SD	3.784
95% UTL95% Coverage	17.92	95% KM UPL (t)	13.47
90% KM Percentile (z)	10.71	95% KM Percentile (z)	12.09
99% KM Percentile (z)	14.66	95% KM USL	13.55

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	5.611	SD	4.334
95% UTL95% Coverage	19.42	95% UPL (t)	14.32
90% Percentile (z)	11.17	95% Percentile (z)	12.74
99% Percentile (z)	15.69	95% USL	14.42

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	0.252	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.7	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.333	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)	4.139	k star (bias corrected MLE)	2.18
Theta hat (MLE)	1.727	Theta star (bias corrected MLE)	3.278
nu hat (MLE)	49.67	nu star (bias corrected)	26.17
MLE Mean (bias corrected)	7.148		
MLE Sd (bias corrected)	4.841	95% Percentile of Chisquare (2kstar)	10.07

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	5.4
Maximum	14	Median	5.55
SD	4.602	CV	0.852
k hat (MLE)	0.599	k star (bias corrected MLE)	0.457
Theta hat (MLE)	9.022	Theta star (bias corrected MLE)	11.81
nu hat (MLE)	9.576	nu star (bias corrected)	7.318
MLE Mean (bias corrected)	5.4	MLE Sd (bias corrected)	7.984
95% Percentile of Chisquare (2kstar)	3.627	90% Percentile	14.87
95% Percentile	21.41	99% Percentile	37.62

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	57.42	87.26	95% Approx. Gamma UPL	26.81	34.22
95% Gamma USL	27.24	34.9			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.861	SD (KM)	3.784
Variance (KM)	14.32	SE of Mean (KM)	1.466
k hat (KM)	2.399	k star (KM)	1.583
nu hat (KM)	38.39	nu star (KM)	25.33
theta hat (KM)	2.443	theta star (KM)	3.703
80% gamma percentile (KM)	9.015	90% gamma percentile (KM)	12.05
95% gamma percentile (KM)	15	99% gamma percentile (KM)	21.62

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	25.32	27.48	95% Approx. Gamma UPL	15.39	15.88
95% KM Gamma Percentile	12.95	13.18	95% Gamma USL	15.54	16.06

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.2	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	5.753	Mean in Log Scale	1.489
SD in Original Scale	4.17	SD in Log Scale	0.815
95% UTL95% Coverage	59.54	95% BCA UTL95% Coverage	14
95% Bootstrap (%) UTL95% Coverage	14	95% UPL (t)	22.8
90% Percentile (z)	12.6	95% Percentile (z)	16.94
99% Percentile (z)	29.52	95% USL	23.22

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.554	95% KM UTL (Lognormal)95% Coverage	39.8
KM SD of Logged Data	0.668	95% KM UPL (Lognormal)	18.12
95% KM Percentile Lognormal (z)	14.2	95% KM USL (Lognormal)	18.39

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	5.611	Mean in Log Scale	1.381
SD in Original Scale	4.334	SD in Log Scale	0.977
95% UTL95% Coverage	89.51	95% UPL (t)	28.33
90% Percentile (z)	13.91	95% Percentile (z)	19.84
99% Percentile (z)	38.61	95% USL	28.95

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	8	95% UTL with95% Coverage	14
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	14
95% USL	14	95% KM Chebyshev UPL	23.36

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.

report_result_value (lithium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	40	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	4	Number of Non-Detects	36
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	34.3	Minimum Non-Detect	20
Maximum Detect	235	Maximum Non-Detect	40
Variance Detected	8955	Percent Non-Detects	90%
Mean Detected	112.5	SD Detected	94.63
Mean of Detected Logged Data	4.414	SD of Detected Logged Data	0.933

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.886	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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	29.34	KM SD	37.95
95% UTL95% Coverage	109.7	95% KM UPL (t)	94.08
90% KM Percentile (z)	77.98	95% KM Percentile (z)	91.77
99% KM Percentile (z)	117.6	95% KM USL	138.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	22.25	SD	40.4
95% UTL95% Coverage	107.8	95% UPL (t)	91.16
90% Percentile (z)	74.02	95% Percentile (z)	88.7
99% Percentile (z)	116.2	95% USL	138.1

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	0.383	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.661	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.308	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.399	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)	1.768	k star (bias corrected MLE)	0.609
Theta hat (MLE)	63.62	Theta star (bias corrected MLE)	184.8
nu hat (MLE)	14.14	nu star (bias corrected)	4.869
MLE Mean (bias corrected)	112.5		
MLE Sd (bias corrected)	144.1	95% Percentile of Chisquare (2kstar)	4.357

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	11.25
Maximum	235	Median	0.01
SD	43.08	CV	3.828
k hat (MLE)	0.128	k star (bias corrected MLE)	0.135
Theta hat (MLE)	87.71	Theta star (bias corrected MLE)	83.14
nu hat (MLE)	10.27	nu star (bias corrected)	10.83
MLE Mean (bias corrected)	11.25	MLE Sd (bias corrected)	30.59
95% Percentile of Chisquare (2kstar)	1.518	90% Percentile	32.8
95% Percentile	63.1	99% Percentile	153

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	44.04	34.16	95% Approx. Gamma UPL	26.22	18.11
95% Gamma USL	94.46	88.19			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	29.34	SD (KM)	37.95
Variance (KM)	1440	SE of Mean (KM)	6.933
k hat (KM)	0.598	k star (KM)	0.57
nu hat (KM)	47.82	nu star (KM)	45.57
theta hat (KM)	49.09	theta star (KM)	51.52
80% gamma percentile (KM)	48.36	90% gamma percentile (KM)	77.21
95% gamma percentile (KM)	107.6	99% gamma percentile (KM)	181.4

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	79.65	76.1	95% Approx. Gamma UPL	65.44	62.32
95% KM Gamma Percentile	63.49	60.45	95% Gamma USL	110.6	107

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.27	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	13.09	Mean in Log Scale	-0.335
SD in Original Scale	42.71	SD in Log Scale	2.602
95% UTL95% Coverage	176.6	95% BCA UTL95% Coverage	235
95% Bootstrap (%) UTL95% Coverage	235	95% UPL (t)	60.55
90% Percentile (z)	20.08	95% Percentile (z)	51.67
99% Percentile (z)	304.3	95% USL	1244

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.141	95% KM UTL (Lognormal)95% Coverage	66.28
KM SD of Logged Data	0.497	95% KM UPL (Lognormal)	54.02
95% KM Percentile Lognormal (z)	52.4	95% KM USL (Lognormal)	96.24

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	22.25	Mean in Log Scale	2.652
SD in Original Scale	40.4	SD in Log Scale	0.705
95% UTL95% Coverage	63.13	95% UPL (t)	47.23
90% Percentile (z)	35.02	95% Percentile (z)	45.25
99% Percentile (z)	73.16	95% USL	107.1

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	40	95% UTL with95% Coverage	235
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
Approximate Sample Size needed to achieve specified CC	59	95% UPL	134.1
95% USL	235	95% KM Chebyshev UPL	196.8

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.

report_result_value (lithium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	27.1	Minimum Non-Detect	20
Maximum Detect	68.6	Maximum Non-Detect	20
Variance Detected	861.1	Percent Non-Detects	75%
Mean Detected	47.85	SD Detected	29.34
Mean of Detected Logged Data	3.764	SD of Detected Logged Data	0.657

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	26.96	KM SD	15.91
95% UTL95% Coverage	77.66	95% KM UPL (t)	58.93
90% KM Percentile (z)	47.35	95% KM Percentile (z)	53.13
99% KM Percentile (z)	63.97	95% KM USL	59.28

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	19.46	SD	20.74
95% UTL95% Coverage	85.55	95% UPL (t)	61.13
90% Percentile (z)	46.04	95% Percentile (z)	53.57
99% Percentile (z)	67.7	95% USL	61.59

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)	4.961	k star (bias corrected MLE)	N/A
Theta hat (MLE)	9.645	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	19.84	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)	26.96	SD (KM)	15.91
Variance (KM)	253.1	SE of Mean (KM)	7.954
k hat (KM)	2.873	k star (KM)	1.879
nu hat (KM)	45.96	nu star (KM)	30.06
theta hat (KM)	9.386	theta star (KM)	14.35
80% gamma percentile (KM)	40.66	90% gamma percentile (KM)	53.22
95% gamma percentile (KM)	65.24	99% gamma percentile (KM)	92

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	83.17	84.23	95% Approx. Gamma UPL	56.28	55.91
95% KM Gamma Percentile	49.32	48.8	95% Gamma USL	56.72	56.37

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

Mean in Original Scale	13.81	Mean in Log Scale	1.173
SD in Original Scale	23.86	SD in Log Scale	1.964
95% UTL95% Coverage	1689	95% BCA UTL95% Coverage	68.6
95% Bootstrap (%) UTL95% Coverage	68.6	95% UPL (t)	167.3
90% Percentile (z)	40.05	95% Percentile (z)	81.75
99% Percentile (z)	311.7	95% USL	174.7

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.188	95% KM UTL (Lognormal)95% Coverage	88.29
KM SD of Logged Data	0.406	95% KM UPL (Lognormal)	54.76
95% KM Percentile Lognormal (z)	47.23	95% KM USL (Lognormal)	55.25

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	19.46	Mean in Log Scale	2.668
SD in Original Scale	20.74	SD in Log Scale	0.721
95% UTL95% Coverage	143.2	95% UPL (t)	61.31
90% Percentile (z)	36.28	95% Percentile (z)	47.14
99% Percentile (z)	77.03	95% USL	62.29

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	8	95% UTL with95% Coverage	68.6
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	68.6
95% USL	68.6	95% KM Chebyshev UPL	100.5

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.

report_result_value (lithium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	31.3	Minimum Non-Detect	20
Maximum Detect	100	Maximum Non-Detect	20
Variance Detected	757.9	Percent Non-Detects	37.5%
Mean Detected	51.72	SD Detected	27.53
Mean of Detected Logged Data	3.857	SD of Detected Logged Data	0.442

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.738	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.377	**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) Background Statistics Assuming Normal Distribution

KM Mean	39.83	KM SD	24.79
95% UTL95% Coverage	118.8	95% KM UPL (t)	89.65
90% KM Percentile (z)	71.6	95% KM Percentile (z)	80.61
99% KM Percentile (z)	97.51	95% KM USL	90.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	36.08	SD	29.99
95% UTL95% Coverage	131.6	95% UPL (t)	96.34
90% Percentile (z)	74.51	95% Percentile (z)	85.4
99% Percentile (z)	105.8	95% USL	97

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	0.624	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.346	**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)	5.799	k star (bias corrected MLE)	2.453
Theta hat (MLE)	8.918	Theta star (bias corrected MLE)	21.08
nu hat (MLE)	57.99	nu star (bias corrected)	24.53
MLE Mean (bias corrected)	51.72		
MLE Sd (bias corrected)	33.02	95% Percentile of Chisquare (2kstar)	10.92

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	32.9
Maximum	100	Median	35.45
SD	33.32	CV	1.013
k hat (MLE)	0.332	k star (bias corrected MLE)	0.291
Theta hat (MLE)	99.15	Theta star (bias corrected MLE)	113.2
nu hat (MLE)	5.309	nu star (bias corrected)	4.651
MLE Mean (bias corrected)	32.9	MLE Sd (bias corrected)	61.01
95% Percentile of Chisquare (2kstar)	2.687	90% Percentile	97.38
95% Percentile	152	99% Percentile	294.5

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	475.3	837.1	95% Approx. Gamma UPL	201.2	281.7
95% Gamma USL	205	288.4			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	39.83	SD (KM)	24.79
Variance (KM)	614.8	SE of Mean (KM)	9.801
k hat (KM)	2.58	k star (KM)	1.696
nu hat (KM)	41.28	nu star (KM)	27.13
theta hat (KM)	15.44	theta star (KM)	23.49
80% gamma percentile (KM)	60.78	90% gamma percentile (KM)	80.56
95% gamma percentile (KM)	99.62	99% gamma percentile (KM)	142.3

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	144.1	150.4	95% Approx. Gamma UPL	92.61	93.54
95% KM Gamma Percentile	79.62	79.76	95% Gamma USL	93.45	94.43

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.318	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	37.95	Mean in Log Scale	3.415
SD in Original Scale	28.28	SD in Log Scale	0.713
95% UTL95% Coverage	295.6	95% BCA UTL95% Coverage	100
95% Bootstrap (%) UTL95% Coverage	100	95% UPL (t)	127.6
90% Percentile (z)	75.9	95% Percentile (z)	98.36
99% Percentile (z)	159.9	95% USL	129.6

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.534	95% KM UTL (Lognormal)95% Coverage	180.4
KM SD of Logged Data	0.521	95% KM UPL (Lognormal)	97.65
95% KM Percentile Lognormal (z)	80.75	95% KM USL (Lognormal)	98.78

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	36.08	Mean in Log Scale	3.274
SD in Original Scale	29.99	SD in Log Scale	0.871
95% UTL95% Coverage	424.4	95% UPL (t)	152.1
90% Percentile (z)	80.69	95% Percentile (z)	110.7
99% Percentile (z)	200.5	95% USL	155.1

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	8	95% UTL with95% Coverage	100
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	100
95% USL	100	95% KM Chebyshev UPL	154.5

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.

report_result_value (lithium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	21.3	Minimum Non-Detect	20
Maximum Detect	21.3	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	21.3	SD Detected	N/A
Mean of Detected Logged Data	3.059	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 report_result_value (lithium [ug/l]_intrawell_mw-15) was not processed!

report_result_value (lithium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	21.9	Minimum Non-Detect	20
Maximum Detect	50.1	Maximum Non-Detect	20
Variance Detected	242.1	Percent Non-Detects	62.5%
Mean Detected	32.2	SD Detected	15.56
Mean of Detected Logged Data	3.401	SD of Detected Logged Data	0.448

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.354	**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) Background Statistics Assuming Normal Distribution

KM Mean	24.58	KM SD	9.768
95% UTL95% Coverage	55.71	95% KM UPL (t)	44.2
90% KM Percentile (z)	37.09	95% KM Percentile (z)	40.64
99% KM Percentile (z)	47.3	95% KM USL	44.42

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	18.33	SD	14.18
95% UTL95% Coverage	63.53	95% UPL (t)	46.83
90% Percentile (z)	36.5	95% Percentile (z)	41.66
99% Percentile (z)	51.32	95% USL	47.14

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	0.476	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.381	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.433	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.217	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.462	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	43.3	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

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	12.14
Maximum	50.1	Median	0.229
SD	18.58	CV	1.531
k hat (MLE)	0.203	k star (bias corrected MLE)	0.21
Theta hat (MLE)	59.88	Theta star (bias corrected MLE)	57.79
nu hat (MLE)	3.243	nu star (bias corrected)	3.36
MLE Mean (bias corrected)	12.14	MLE Sd (bias corrected)	26.48
95% Percentile of Chisquare (2kstar)	2.136	90% Percentile	36.7
95% Percentile	61.73	99% Percentile	130.1

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	228.7	378	95% Approx. Gamma UPL	83.15	105.1
95% Gamma USL	85.04	108.1			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	24.58	SD (KM)	9.768
Variance (KM)	95.42	SE of Mean (KM)	4.23
k hat (KM)	6.329	k star (KM)	4.039
nu hat (KM)	101.3	nu star (KM)	64.63
theta hat (KM)	3.883	theta star (KM)	6.084
80% gamma percentile (KM)	33.84	90% gamma percentile (KM)	40.96
95% gamma percentile (KM)	47.51	99% gamma percentile (KM)	61.5

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	58.18	58.61	95% Approx. Gamma UPL	43.01	42.85
95% KM Gamma Percentile	38.92	38.69	95% Gamma USL	43.27	43.12

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.338	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	15.98	Mean in Log Scale	2.34
SD in Original Scale	16	SD in Log Scale	1.015
95% UTL95% Coverage	263.5	95% BCA UTL95% Coverage	50.1
95% Bootstrap (%) UTL95% Coverage	50.1	95% UPL (t)	79.76
90% Percentile (z)	38.1	95% Percentile (z)	55.09
99% Percentile (z)	110	95% USL	81.57

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.148	95% KM UTL (Lognormal)95% Coverage	60.15
KM SD of Logged Data	0.298	95% KM UPL (Lognormal)	42.36
95% KM Percentile Lognormal (z)	38	95% KM USL (Lognormal)	42.64

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	18.33	Mean in Log Scale	2.715
SD in Original Scale	14.18	SD in Log Scale	0.617
95% UTL95% Coverage	107.8	95% UPL (t)	52.15
90% Percentile (z)	33.29	95% Percentile (z)	41.65
99% Percentile (z)	63.41	95% USL	52.87

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	8	95% UTL with95% Coverage	50.1
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	50.1
95% USL	50.1	95% KM Chebyshev UPL	69.74

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.

report_result_value (mercury [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	32
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.219	Minimum Non-Detect	0.2
Maximum Detect	0.313	Maximum Non-Detect	0.2
Variance Detected	0.00179	Percent Non-Detects	88.89%
Mean Detected	0.251	SD Detected	0.0423
Mean of Detected Logged Data	-1.391	SD of Detected Logged Data	0.159

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.83	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	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	0.206	KM SD	0.0202
95% UTL95% Coverage	0.249	95% KM UPL (t)	0.24
90% KM Percentile (z)	0.232	95% KM Percentile (z)	0.239
99% KM Percentile (z)	0.253	95% KM USL	0.263

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.117	SD	0.0498
95% UTL95% Coverage	0.224	95% UPL (t)	0.202
90% Percentile (z)	0.181	95% Percentile (z)	0.199
99% Percentile (z)	0.233	95% USL	0.257

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	0.473	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.325	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	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)	50.96	k star (bias corrected MLE)	12.91
Theta hat (MLE)	0.00493	Theta star (bias corrected MLE)	0.0195
nu hat (MLE)	407.6	nu star (bias corrected)	103.2
MLE Mean (bias corrected)	0.251		
MLE Sd (bias corrected)	0.0699	95% Percentile of Chisquare (2kstar)	38.65

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	0.0728
Maximum	0.313	Median	0.0347
SD	0.0817	CV	1.123
k hat (MLE)	0.835	k star (bias corrected MLE)	0.784
Theta hat (MLE)	0.0872	Theta star (bias corrected MLE)	0.0928
nu hat (MLE)	60.12	nu star (bias corrected)	56.44
MLE Mean (bias corrected)	0.0728	MLE Sd (bias corrected)	0.0822
95% Percentile of Chisquare (2kstar)	5.123	90% Percentile	0.178
95% Percentile	0.238	99% Percentile	0.38

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	0.326	0.353	95% Approx. Gamma UPL	0.24	0.25
95% Gamma USL	0.495	0.572			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.206	SD (KM)	0.0202
Variance (KM)	4.0866E-4	SE of Mean (KM)	0.00389
k hat (KM)	103.5	k star (KM)	94.93
nu hat (KM)	7455	nu star (KM)	6835
theta hat (KM)	0.00199	theta star (KM)	0.00217
80% gamma percentile (KM)	0.223	90% gamma percentile (KM)	0.233
95% gamma percentile (KM)	0.242	99% gamma percentile (KM)	0.258

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	0.246	0.246	95% Approx. Gamma UPL	0.237	0.237
95% KM Gamma Percentile	0.236	0.236	95% Gamma USL	0.26	0.26

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	0.309	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.117	Mean in Log Scale	-2.268
SD in Original Scale	0.0621	SD in Log Scale	0.507
95% UTL95% Coverage	0.308	95% BCA UTL95% Coverage	0.313
95% Bootstrap (%) UTL95% Coverage	0.313	95% UPL (t)	0.247
90% Percentile (z)	0.198	95% Percentile (z)	0.238
99% Percentile (z)	0.337	95% USL	0.434

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.585	95% KM UTL (Lognormal)95% Coverage	0.245
KM SD of Logged Data	0.0825	95% KM UPL (Lognormal)	0.236
95% KM Percentile Lognormal (z)	0.235	95% KM USL (Lognormal)	0.259

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.117	Mean in Log Scale	-2.201
SD in Original Scale	0.0498	SD in Log Scale	0.294
95% UTL95% Coverage	0.208	95% UPL (t)	0.183
90% Percentile (z)	0.161	95% Percentile (z)	0.18
99% Percentile (z)	0.219	95% USL	0.254

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	36	95% UTL with95% Coverage	0.313
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	0.254
95% USL	0.313	95% KM Chebyshev UPL	0.295

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.

report_result_value (mercury [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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 report_result_value (mercury [ug/l]_intrawell_mw-13) was not processed!

report_result_value (mercury [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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 report_result_value (mercury [ug/l]_intrawell_mw-14) was not processed!

report_result_value (mercury [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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 report_result_value (mercury [ug/l]_intrawell_mw-15) was not processed!

report_result_value (mercury [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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 report_result_value (mercury [ug/l]_intrawell_mw-17) was not processed!

report_result_value (molybdenum [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (molybdenum [ug/l]_interwell_pooled-upgradient) was not processed!

report_result_value (molybdenum [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (molybdenum [ug/l]_intrawell_mw-13) was not processed!

report_result_value (molybdenum [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (molybdenum [ug/l]_intrawell_mw-14) was not processed!

report_result_value (molybdenum [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (molybdenum [ug/l]_intrawell_mw-15) was not processed!

report_result_value (molybdenum [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (molybdenum [ug/l]_intrawell_mw-17) was not processed!

report_result_value (radium-226/228 [pci/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	39	Number of Distinct Observations	39
Minimum	0.276	First Quartile	1.625
Second Largest	6.16	Median	2.47
Maximum	9.85	Third Quartile	4.33
Mean	3.093	SD	2.014
Coefficient of Variation	0.651	Skewness	1.152
Mean of logged Data	0.892	SD of logged Data	0.767

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.124	d2max (for USL)	2.857

Normal GOF Test

Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.917	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.163	Data appear Normal at 1% Significance Level	

Data appear Approximate Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	7.371	90% Percentile (z)	5.673
95% UPL (t)	6.531	95% Percentile (z)	6.405
95% USL	8.846	99% Percentile (z)	7.777

Gamma GOF Test

A-D Test Statistic	0.259	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0878	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.143	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.263	k star (bias corrected MLE)	2.106
Theta hat (MLE)	1.367	Theta star (bias corrected MLE)	1.469
nu hat (MLE)	176.5	nu star (bias corrected)	164.3
MLE Mean (bias corrected)	3.093	MLE Sd (bias corrected)	2.131

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	7.323	90% Percentile	5.942
95% Hawkins Wixley (HW) Approx. Gamma UPL	7.589	95% Percentile	7.217
95% WH Approx. Gamma UTL with 95% Coverage	8.966	99% Percentile	10.04
95% HW Approx. Gamma UTL with 95% Coverage	9.48		
95% WH USL	12.42	95% HW USL	13.63

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.948	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.118	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.129	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	12.44	90% Percentile (z)	6.52
95% UPL (t)	9.038	95% Percentile (z)	8.615
95% USL	21.83	99% Percentile (z)	14.53

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	39	95% UTL with 95% Coverage	9.85
Approx, f used to compute achieved CC	2.053	Approximate Actual Confidence Coefficient achieved by UTL	0.865
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	9.85	95% BCA Bootstrap UTL with 95% Coverage	9.85
95% UPL	6.16	90% Percentile	5.982
90% Chebyshev UPL	9.211	95% Percentile	6.142
95% Chebyshev UPL	11.98	99% Percentile	8.448
95% USL	9.85		

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.

report_result_value (radium-226/228 [pci/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	1.07	First Quartile	2.613
Second Largest	4.77	Median	4.215
Maximum	5.67	Third Quartile	4.538
Mean	3.684	SD	1.504
Coefficient of Variation	0.408	Skewness	-0.624
Mean of logged Data	1.199	SD of logged Data	0.542

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	8.476	90% Percentile (z)	5.611
95% UPL (t)	6.706	95% Percentile (z)	6.157
95% USL	6.739	99% Percentile (z)	7.182

Gamma GOF Test

A-D Test Statistic	0.502	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.281	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	4.936	k star (bias corrected MLE)	3.168
Theta hat (MLE)	0.746	Theta star (bias corrected MLE)	1.163
nu hat (MLE)	78.97	nu star (bias corrected)	50.69
MLE Mean (bias corrected)	3.684	MLE Sd (bias corrected)	2.07

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	8.099	90% Percentile	6.459
95% Hawkins Wixley (HW) Approx. Gamma UPL	8.422	95% Percentile	7.611
95% WH Approx. Gamma UTL with 95% Coverage	12.16	99% Percentile	10.1
95% HW Approx. Gamma UTL with 95% Coverage	13.17		
95% WH USL	8.166	95% HW USL	8.497

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	18.67	90% Percentile (z)	6.645
95% UPL (t)	9.86	95% Percentile (z)	8.092
95% USL	9.979	99% Percentile (z)	11.71

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	5.67
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	5.67	95% BCA Bootstrap UTL with 95% Coverage	5.67
95% UPL	5.67	90% Percentile	5.04
90% Chebyshev UPL	8.469	95% Percentile	5.355
95% Chebyshev UPL	10.64	99% Percentile	5.607
95% USL	5.67		

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.

report_result_value (radium-226/228 [pci/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.17	First Quartile	2.633
Second Largest	5.13	Median	2.929
Maximum	5.92	Third Quartile	4.005
Mean	3.49	SD	1.341
Coefficient of Variation	0.384	Skewness	1.159
Mean of logged Data	1.192	SD of logged Data	0.352

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.254	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	7.763	90% Percentile (z)	5.208
95% UPL (t)	6.184	95% Percentile (z)	5.695
95% USL	6.214	99% Percentile (z)	6.609

Gamma GOF Test

A-D Test Statistic	0.496	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.236	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.294	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)	8.875	k star (bias corrected MLE)	5.63
Theta hat (MLE)	0.393	Theta star (bias corrected MLE)	0.62
nu hat (MLE)	142	nu star (bias corrected)	90.08
MLE Mean (bias corrected)	3.49	MLE Sd (bias corrected)	1.471

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	6.457	90% Percentile	5.457
95% Hawkins Wixley (HW) Approx. Gamma UPL	6.506	95% Percentile	6.207
95% WH Approx. Gamma UTL with 95% Coverage	8.947	99% Percentile	7.784
95% HW Approx. Gamma UTL with 95% Coverage	9.181		
95% WH USL	6.499	95% HW USL	6.55

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	10.11	90% Percentile (z)	5.172
95% UPL (t)	6.681	95% Percentile (z)	5.877
95% USL	6.733	99% Percentile (z)	7.469

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	5.92
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	5.92	95% BCA Bootstrap UTL with 95% Coverage	5.92
95% UPL	5.92	90% Percentile	5.367
90% Chebyshev UPL	7.757	95% Percentile	5.644
95% Chebyshev UPL	9.689	99% Percentile	5.865
95% USL	5.92		

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.

report_result_value (radium-226/228 [pci/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	0.551	First Quartile	1.233
Second Largest	2.81	Median	2.065
Maximum	3.53	Third Quartile	2.6
Mean	1.99	SD	0.983
Coefficient of Variation	0.494	Skewness	0.0601
Mean of logged Data	0.551	SD of logged Data	0.606

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	5.123	90% Percentile (z)	3.25
95% UPL (t)	3.965	95% Percentile (z)	3.607
95% USL	3.987	99% Percentile (z)	4.277

Gamma GOF Test

A-D Test Statistic	0.226	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.174	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.296	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)	3.797	k star (bias corrected MLE)	2.457
Theta hat (MLE)	0.524	Theta star (bias corrected MLE)	0.81
nu hat (MLE)	60.76	nu star (bias corrected)	39.31
MLE Mean (bias corrected)	1.99	MLE Sd (bias corrected)	1.27

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	4.776	90% Percentile	3.691
95% Hawkins Wixley (HW) Approx. Gamma UPL	4.971	95% Percentile	4.43
95% WH Approx. Gamma UTL with 95% Coverage	7.469	99% Percentile	6.049
95% HW Approx. Gamma UTL with 95% Coverage	8.14		
95% WH USL	4.82	95% HW USL	5.02

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	11.96	90% Percentile (z)	3.771
95% UPL (t)	5.862	95% Percentile (z)	4.7
95% USL	5.941	99% Percentile (z)	7.102

Nonparametric Distribution Free Background Statistics
Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	3.53
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	3.53	95% BCA Bootstrap UTL with 95% Coverage	3.53
95% UPL	3.53	90% Percentile	3.026
90% Chebyshev UPL	5.118	95% Percentile	3.278
95% Chebyshev UPL	6.534	99% Percentile	3.48
95% USL	3.53		

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.

report_result_value (radium-226/228 [pci/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	3.46	First Quartile	3.635
Second Largest	6.05	Median	4.72
Maximum	10.46	Third Quartile	5.705
Mean	5.273	SD	2.34
Coefficient of Variation	0.444	Skewness	1.82
Mean of logged Data	1.593	SD of logged Data	0.38

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.778	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.245	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.333	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	12.73	90% Percentile (z)	8.271
95% UPL (t)	9.974	95% Percentile (z)	9.121
95% USL	10.03	99% Percentile (z)	10.72

Gamma GOF Test

A-D Test Statistic	0.577	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.229	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.295	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)	7.351	k star (bias corrected MLE)	4.678
Theta hat (MLE)	0.717	Theta star (bias corrected MLE)	1.127
nu hat (MLE)	117.6	nu star (bias corrected)	74.84
MLE Mean (bias corrected)	5.273	MLE Sd (bias corrected)	2.438

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	10.26	90% Percentile	8.538
95% Hawkins Wixley (HW) Approx. Gamma UPL	10.32	95% Percentile	9.815
95% WH Approx. Gamma UTL with 95% Coverage	14.56	99% Percentile	12.52
95% HW Approx. Gamma UTL with 95% Coverage	14.94		
95% WH USL	10.33	95% HW USL	10.39

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.863	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.214	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.265	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	16.5	90% Percentile (z)	8.001
95% UPL (t)	10.55	95% Percentile (z)	9.185
95% USL	10.64	99% Percentile (z)	11.9

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	10.46
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	10.46	95% BCA Bootstrap UTL with 95% Coverage	10.46
95% UPL	10.46	90% Percentile	7.373
90% Chebyshev UPL	12.72	95% Percentile	8.917
95% Chebyshev UPL	16.09	99% Percentile	10.15
95% USL	10.46		

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.

report_result_value (selenium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	40	Number of Missing Observations	0
Number of Distinct Observations	10		
Number of Detects	9	Number of Non-Detects	31
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	1.68	Minimum Non-Detect	2
Maximum Detect	3.84	Maximum Non-Detect	2
Variance Detected	0.516	Percent Non-Detects	77.5%
Mean Detected	2.842	SD Detected	0.719
Mean of Detected Logged Data	1.014	SD of Detected Logged Data	0.269

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.13	**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

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.942	KM SD	0.582
95% UTL95% Coverage	3.174	95% KM UPL (t)	2.934
90% KM Percentile (z)	2.687	95% KM Percentile (z)	2.899
99% KM Percentile (z)	3.296	95% KM USL	3.611

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.415	SD	0.844
95% UTL95% Coverage	3.202	95% UPL (t)	2.855
90% Percentile (z)	2.497	95% Percentile (z)	2.803
99% Percentile (z)	3.379	95% USL	3.836

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	0.23	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**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

Gamma Statistics on Detected Data Only

k hat (MLE)	16.45	k star (bias corrected MLE)	11.04
Theta hat (MLE)	0.173	Theta star (bias corrected MLE)	0.257
nu hat (MLE)	296.1	nu star (bias corrected)	198.7
MLE Mean (bias corrected)	2.842		
MLE Sd (bias corrected)	0.855	95% Percentile of Chisquare (2kstar)	34.03

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	0.0799	Mean	1.687
Maximum	3.84	Median	1.644
SD	0.89	CV	0.527
k hat (MLE)	2.788	k star (bias corrected MLE)	2.595
Theta hat (MLE)	0.605	Theta star (bias corrected MLE)	0.65
nu hat (MLE)	223	nu star (bias corrected)	207.6
MLE Mean (bias corrected)	1.687	MLE Sd (bias corrected)	1.047
95% Percentile of Chisquare (2kstar)	11.37	90% Percentile	3.091
95% Percentile	3.694	99% Percentile	5.013

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	4.487	4.783	95% Approx. Gamma UPL	3.736	3.906
95% Gamma USL	6.104	6.752			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.942	SD (KM)	0.582
Variance (KM)	0.339	SE of Mean (KM)	0.0976
k hat (KM)	11.12	k star (KM)	10.31
nu hat (KM)	890	nu star (KM)	824.6
theta hat (KM)	0.175	theta star (KM)	0.188
80% gamma percentile (KM)	2.424	90% gamma percentile (KM)	2.746
95% gamma percentile (KM)	3.031	99% gamma percentile (KM)	3.617

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	3.135	3.13	95% Approx. Gamma UPL	2.861	2.852
95% KM Gamma Percentile	2.822	2.812	95% Gamma USL	3.677	3.688

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.151	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.849	Mean in Log Scale	0.543
SD in Original Scale	0.733	SD in Log Scale	0.38
95% UTL95% Coverage	3.849	95% BCA UTL95% Coverage	3.84
95% Bootstrap (%) UTL95% Coverage	3.84	95% UPL (t)	3.292
90% Percentile (z)	2.802	95% Percentile (z)	3.217
99% Percentile (z)	4.167	95% USL	5.119

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.63	95% KM UTL (Lognormal)95% Coverage	3.116
KM SD of Logged Data	0.239	95% KM UPL (Lognormal)	2.824
95% KM Percentile Lognormal (z)	2.783	95% KM USL (Lognormal)	3.728

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.415	Mean in Log Scale	0.228
SD in Original Scale	0.844	SD in Log Scale	0.446
95% UTL95% Coverage	3.228	95% UPL (t)	2.687
90% Percentile (z)	2.224	95% Percentile (z)	2.615
99% Percentile (z)	3.543	95% USL	4.51

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	40	95% UTL with95% Coverage	3.84
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.6
95% USL	3.84	95% KM Chebyshev UPL	4.51

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.

report_result_value (selenium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.65	Minimum Non-Detect	2
Maximum Detect	21.3	Maximum Non-Detect	2
Variance Detected	68.82	Percent Non-Detects	50%
Mean Detected	14.06	SD Detected	8.296
Mean of Detected Logged Data	2.392	SD of Detected Logged Data	0.965

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution

KM Mean	8.031	KM SD	7.886
95% UTL95% Coverage	33.16	95% KM UPL (t)	23.88
90% KM Percentile (z)	18.14	95% KM Percentile (z)	21
99% KM Percentile (z)	26.38	95% KM USL	24.05

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	7.531	SD	8.846
95% UTL95% Coverage	35.72	95% UPL (t)	25.31
90% Percentile (z)	18.87	95% Percentile (z)	22.08
99% Percentile (z)	28.11	95% USL	25.5

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	0.499	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.398	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)	2.139	k star (bias corrected MLE)	0.701
Theta hat (MLE)	6.574	Theta star (bias corrected MLE)	20.05
nu hat (MLE)	17.11	nu star (bias corrected)	5.612
MLE Mean (bias corrected)	14.06		
MLE Sd (bias corrected)	16.79	95% Percentile of Chisquare (2kstar)	4.772

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	7.105
Maximum	21.3	Median	1.606
SD	9.211	CV	1.296
k hat (MLE)	0.273	k star (bias corrected MLE)	0.254
Theta hat (MLE)	26.02	Theta star (bias corrected MLE)	27.97
nu hat (MLE)	4.37	nu star (bias corrected)	4.064
MLE Mean (bias corrected)	7.105	MLE Sd (bias corrected)	14.1
95% Percentile of Chisquare (2kstar)	2.447	90% Percentile	21.3
95% Percentile	34.23	99% Percentile	68.56

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	120.1	197.4	95% Approx. Gamma UPL	46.8	60.58
95% Gamma USL	47.78	62.16			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.031	SD (KM)	7.886
Variance (KM)	62.18	SE of Mean (KM)	3.219
k hat (KM)	1.037	k star (KM)	0.732
nu hat (KM)	16.6	nu star (KM)	11.71
theta hat (KM)	7.743	theta star (KM)	10.98
80% gamma percentile (KM)	13.18	90% gamma percentile (KM)	19.95
95% gamma percentile (KM)	26.9	99% gamma percentile (KM)	43.44

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	56.81	64.99	95% Approx. Gamma UPL	29.25	30.64
95% KM Gamma Percentile	23.03	23.51	95% Gamma USL	29.66	31.12

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.333	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	7.521	Mean in Log Scale	1.077
SD in Original Scale	8.866	SD in Log Scale	1.628
95% UTL95% Coverage	526.2	95% BCA UTL95% Coverage	21.3
95% Bootstrap (%) UTL95% Coverage	21.3	95% UPL (t)	77.37
90% Percentile (z)	23.65	95% Percentile (z)	42.73
99% Percentile (z)	129.6	95% USL	80.21

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.543	95% KM UTL (Lognormal)95% Coverage	126.5
KM SD of Logged Data	1.035	95% KM UPL (Lognormal)	37.41
95% KM Percentile Lognormal (z)	25.65	95% KM USL (Lognormal)	38.28

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	7.531	Mean in Log Scale	1.196
SD in Original Scale	8.846	SD in Log Scale	1.426
95% UTL95% Coverage	311.4	95% UPL (t)	58.08
90% Percentile (z)	20.57	95% Percentile (z)	34.53
99% Percentile (z)	91.25	95% USL	59.94

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	8	95% UTL with95% Coverage	21.3
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	21.3
95% USL	21.3	95% KM Chebyshev UPL	44.49

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.

report_result_value (selenium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.09	First Quartile	3.645
Second Largest	8.48	Median	5
Maximum	20.5	Third Quartile	8.3
Mean	6.994	SD	5.931
Coefficient of Variation	0.848	Skewness	2.031
Mean of logged Data	1.697	SD of logged Data	0.725

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	25.9	90% Percentile (z)	14.59
95% UPL (t)	18.91	95% Percentile (z)	16.75
95% USL	19.04	99% Percentile (z)	20.79

Gamma GOF Test

A-D Test Statistic	0.342	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov Gamma GOF Test**
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

k hat (MLE)	2.171	k star (bias corrected MLE)	1.44
Theta hat (MLE)	3.221	Theta star (bias corrected MLE)	4.856
nu hat (MLE)	34.74	nu star (bias corrected)	23.04
MLE Mean (bias corrected)	6.994	MLE Sd (bias corrected)	5.828

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	20.47	90% Percentile	14.72
95% Hawkins Wixley (HW) Approx. Gamma UPL	20.97	95% Percentile	18.47
95% WH Approx. Gamma UTL with 95% Coverage	35.26	99% Percentile	26.96
95% HW Approx. Gamma UTL with 95% Coverage	38.12		
95% WH USL	20.7	95% HW USL	21.22

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	54.96	90% Percentile (z)	13.82
95% UPL (t)	23.42	95% Percentile (z)	17.98
95% USL	23.8	99% Percentile (z)	29.46

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	20.5
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	20.5	95% BCA Bootstrap UTL with 95% Coverage	20.5
95% UPL	20.5	90% Percentile	12.09
90% Chebyshev UPL	25.87	95% Percentile	16.29
95% Chebyshev UPL	34.42	99% Percentile	19.66
95% USL	20.5		

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.

report_result_value (selenium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.31	First Quartile	2.693
Second Largest	3.13	Median	2.81
Maximum	3.34	Third Quartile	3.115
Mean	2.843	SD	0.347
Coefficient of Variation	0.122	Skewness	-0.19
Mean of logged Data	1.038	SD of logged Data	0.124

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	3.947	90% Percentile (z)	3.287
95% UPL (t)	3.539	95% Percentile (z)	3.413
95% USL	3.547	99% Percentile (z)	3.649

Gamma GOF Test

A-D Test Statistic	0.27	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.293	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)	75.17	k star (bias corrected MLE)	47.06
Theta hat (MLE)	0.0378	Theta star (bias corrected MLE)	0.0604
nu hat (MLE)	1203	nu star (bias corrected)	753
MLE Mean (bias corrected)	2.843	MLE Sd (bias corrected)	0.414

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	3.592	90% Percentile	3.385
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.6	95% Percentile	3.557
95% WH Approx. Gamma UTL with 95% Coverage	4.096	99% Percentile	3.894
95% HW Approx. Gamma UTL with 95% Coverage	4.119		
95% WH USL	3.601	95% HW USL	3.609

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.189	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	4.196	90% Percentile (z)	3.311
95% UPL (t)	3.625	95% Percentile (z)	3.464
95% USL	3.635	99% Percentile (z)	3.77

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	3.34
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	3.34	95% BCA Bootstrap UTL with 95% Coverage	3.34
95% UPL	3.34	90% Percentile	3.193
90% Chebyshev UPL	3.945	95% Percentile	3.267
95% Chebyshev UPL	4.445	99% Percentile	3.325
95% USL	3.34		

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.

report_result_value (selenium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	5.28	First Quartile	6.93
Second Largest	9.35	Median	7.87
Maximum	11.2	Third Quartile	9.23
Mean	8.075	SD	1.886
Coefficient of Variation	0.234	Skewness	0.227
Mean of logged Data	2.064	SD of logged Data	0.239

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	14.08	90% Percentile (z)	10.49
95% UPL (t)	11.86	95% Percentile (z)	11.18
95% USL	11.91	99% Percentile (z)	12.46

Gamma GOF Test

A-D Test Statistic	0.348	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.222	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.294	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)	20.61	k star (bias corrected MLE)	12.96
Theta hat (MLE)	0.392	Theta star (bias corrected MLE)	0.623
nu hat (MLE)	329.7	nu star (bias corrected)	207.4
MLE Mean (bias corrected)	8.075	MLE Sd (bias corrected)	2.243

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	12.36	90% Percentile	11.05
95% Hawkins Wixley (HW) Approx. Gamma UPL	12.44	95% Percentile	12.08
95% WH Approx. Gamma UTL with 95% Coverage	15.58	99% Percentile	14.19
95% HW Approx. Gamma UTL with 95% Coverage	15.85		
95% WH USL	12.41	95% HW USL	12.5

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	16.85	90% Percentile (z)	10.7
95% UPL (t)	12.73	95% Percentile (z)	11.67
95% USL	12.79	99% Percentile (z)	13.73

Nonparametric Distribution Free Background Statistics
Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	11.2
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	11.2	95% BCA Bootstrap UTL with 95% Coverage	11.2
95% UPL	11.2	90% Percentile	9.905
90% Chebyshev UPL	14.08	95% Percentile	10.55
95% Chebyshev UPL	16.79	99% Percentile	11.07
95% USL	11.2		

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.

report_result_value (thallium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (thallium [ug/l]_interwell_pooled-upgradient) was not processed!

report_result_value (thallium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (thallium [ug/l]_intrawell_mw-13) was not processed!

report_result_value (thallium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (thallium [ug/l]_intrawell_mw-14) was not processed!

report_result_value (thallium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (thallium [ug/l]_intrawell_mw-15) was not processed!

report_result_value (thallium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 report_result_value (thallium [ug/l]_intrawell_mw-17) was not processed!

group	D_report_result_value	report_result_value
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	17.6
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	91.3
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.29
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	9.18
Barium [ug/L]_Interwell_POOLED-Upgradient	1	140
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.3
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.85
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.85
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	5.99
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	256
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	42.6
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Intrawell_MW-15	1	298
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	1	2.36
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	89.9
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	0	4
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	3.34
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	252
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20

group	D_report_result_value	report_result_value
Lead [ug/L]_Interwell_POOLED-Upgradient	1	8.56
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	14.2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	180
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.59
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.73
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	7.94
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.84
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	1	255
Lithium [ug/L]_Intrawell_MW-17	1	21.9
Lead [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	0	2
Barium [ug/L]_Intrawell_MW-17	1	320
Beryllium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	0	4
Cobalt [ug/L]_Intrawell_MW-17	1	4.07
Selenium [ug/L]_Intrawell_MW-17	1	8.79
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	272
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.99
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	11.9
Barium [ug/L]_Interwell_POOLED-Upgradient	1	164
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.91
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.96
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	8.7
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.4
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Intrawell_MW-15	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Intrawell_MW-17	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.81
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	5.98
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.68
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	5.47
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.97
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.5
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	5.59
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	10.46
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.82
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.08
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.22

group	D_report_result_value	report_result_value
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.888
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.63
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	325
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.276
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	16.6
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	1.8
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	47.6
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.61
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	142
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	5.38
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-13	0	500
Lithium [ug/L]_Intrawell_MW-13	0	20
Lead [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	0	2
Barium [ug/L]_Intrawell_MW-13	1	156
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	0	4
Cobalt [ug/L]_Intrawell_MW-13	1	2.07
Selenium [ug/L]_Intrawell_MW-13	1	21.3
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	0	500
Lithium [ug/L]_Intrawell_MW-14	1	31.3
Lead [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2

group	D_report_result_value	report_result_value
Barium [ug/L]_Intrawell_MW-14	1	158
Beryllium [ug/L]_Intrawell_MW-14	0	2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	12.7
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	20.6
Barium [ug/L]_Interwell_POOLED-Upgradient	1	199
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.67
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	10.7
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	10.5
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.61
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	500
Lithium [ug/L]_Intrawell_MW-17	1	24.6
Lead [ug/L]_Intrawell_MW-17	1	7.58
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	3.54
Barium [ug/L]_Intrawell_MW-17	1	544
Beryllium [ug/L]_Intrawell_MW-17	1	2.01
Cadmium [ug/L]_Intrawell_MW-17	1	2.58
Chromium [ug/L]_Intrawell_MW-17	1	10.7
Cobalt [ug/L]_Intrawell_MW-17	1	6.26
Selenium [ug/L]_Intrawell_MW-17	1	9.35
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	0	2
Selenium [ug/L]_Intrawell_MW-14	1	4.65
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	500
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	74.9
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	0	4
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	3.11
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.99
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	88.4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.96
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	130
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	8.77
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2

group	D_report_result_value	report_result_value
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	14.3
Barium [ug/L]_Interwell_POOLED-Upgradient	1	243
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	3.39
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	9.98
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	11.6
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.23
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Intrawell_MW-13	0	500
Fluoride [ug/L]_Intrawell_MW-14	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.58
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	47.5
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	1.68
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	14.4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	1.02
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	2.29
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	4.6
Barium [ug/L]_Interwell_POOLED-Upgradient	1	166
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.32
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	500
Lithium [ug/L]_Intrawell_MW-17	0	20
Lead [ug/L]_Intrawell_MW-17	1	2.57
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	0	2
Barium [ug/L]_Intrawell_MW-17	1	164
Beryllium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	1	4.03
Cobalt [ug/L]_Intrawell_MW-17	1	2.39
Selenium [ug/L]_Intrawell_MW-17	1	9.19
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	3.39
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2

group	D_report_result_value	report_result_value
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	3.32
Barium [ug/L]_Interwell_POOLED-Upgradient	1	89.3
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.83
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.68
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.59
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	142
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.32
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.53
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Lithium [ug/L]_Intrawell_MW-13	0	20
Fluoride [ug/L]_Intrawell_MW-13	1	285
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	3.17
Barium [ug/L]_Interwell_POOLED-Upgradient	1	58.1
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.07
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	47.9
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.58
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2

group	D_report_result_value	report_result_value
Barium [ug/L]_Interwell_POOLED-Upgradient	1	133
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	5.07
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-13	0	500
Lithium [ug/L]_Intrawell_MW-13	0	20
Lead [ug/L]_Intrawell_MW-13	1	2.11
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	2.04
Barium [ug/L]_Intrawell_MW-13	1	128
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	0	4
Cobalt [ug/L]_Intrawell_MW-13	1	3.26
Selenium [ug/L]_Intrawell_MW-13	0	2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	0	500
Lithium [ug/L]_Intrawell_MW-14	0	20
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lead [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	0	2
Barium [ug/L]_Intrawell_MW-13	1	159
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Lead [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Barium [ug/L]_Intrawell_MW-14	1	130
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	0	2
Selenium [ug/L]_Intrawell_MW-14	1	2.09
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	500
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	1	2.21
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	84.4
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	1	4.51
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	3.13
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20

group	D_report_result_value	report_result_value
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.06
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	12
Barium [ug/L]_Interwell_POOLED-Upgradient	1	172
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.25
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	5.58
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.5
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	500
Lithium [ug/L]_Intrawell_MW-17	0	20
Lead [ug/L]_Intrawell_MW-17	1	4.73
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	2.37
Barium [ug/L]_Intrawell_MW-17	1	272
Beryllium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	1	8.13
Cobalt [ug/L]_Intrawell_MW-17	1	4.59
Selenium [ug/L]_Intrawell_MW-17	1	6.94
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Chromium [ug/L]_Intrawell_MW-13	0	4
Cobalt [ug/L]_Intrawell_MW-13	0	2
Selenium [ug/L]_Intrawell_MW-13	0	2
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.12
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	1	280
Lithium [ug/L]_Intrawell_MW-14	1	46.4
Lead [ug/L]_Intrawell_MW-14	1	3.97
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	1	2.59
Barium [ug/L]_Intrawell_MW-14	1	293
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	1	4.07
Cobalt [ug/L]_Intrawell_MW-14	1	2.93
Selenium [ug/L]_Intrawell_MW-14	1	2.67
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	5.13
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	200
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	1	8.59
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	1	2.22
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	165
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	1	8.71
Cobalt [ug/L]_Intrawell_MW-15	1	4.27
Selenium [ug/L]_Intrawell_MW-15	1	2.84
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	2.81
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2

group	D_report_result_value	report_result_value
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	14
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	23.2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	217
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	3.96
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	10.4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	11.6
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.81
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.34
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	200
Lithium [ug/L]_Intrawell_MW-17	0	20
Lead [ug/L]_Intrawell_MW-17	1	7.64
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	3.44
Lead [ug/L]_Interwell_POOLED-Upgradient	1	7.98
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	12.3
Barium [ug/L]_Interwell_POOLED-Upgradient	1	204
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.74
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	9.2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	9.76
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	36.8
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.06
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	131
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.57
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-13	0	500

group	D_report_result_value	report_result_value
Lithium [ug/L]_Intrawell_MW-13	1	68.6
Lead [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	0	2
Barium [ug/L]_Intrawell_MW-13	1	133
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	0	4
Cobalt [ug/L]_Intrawell_MW-13	0	2
Selenium [ug/L]_Intrawell_MW-13	0	2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	0	500
Lithium [ug/L]_Intrawell_MW-14	0	20
Barium [ug/L]_Intrawell_MW-17	1	234
Beryllium [ug/L]_Intrawell_MW-17	0	2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lead [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Barium [ug/L]_Intrawell_MW-14	1	120
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	0	2
Selenium [ug/L]_Intrawell_MW-14	1	8.48
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	500
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	75.4
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	0	4
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	2.78
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	2.94
Barium [ug/L]_Interwell_POOLED-Upgradient	1	148
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.31
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	500

group	D_report_result_value	report_result_value
Lithium [ug/L]_Intrawell_MW-17	0	20
Lead [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	0	2
Barium [ug/L]_Intrawell_MW-17	1	173
Beryllium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	0	4
Cobalt [ug/L]_Intrawell_MW-17	1	2.54
Selenium [ug/L]_Intrawell_MW-17	1	6.9
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	1	12.1
Cobalt [ug/L]_Intrawell_MW-17	1	7.96
Selenium [ug/L]_Intrawell_MW-17	1	6.95
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.46
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Lead [ug/L]_Interwell_POOLED-Upgradient	1	3.85
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	6.87
Barium [ug/L]_Interwell_POOLED-Upgradient	1	109
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.22
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.76
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	139
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	448
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	80.2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.93
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.75
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	34.3
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	484
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	157
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4

group	D_report_result_value	report_result_value
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.78
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.44
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Lead [ug/L]_Interwell_POOLED-Upgradient	1	4.98
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	7.65
Barium [ug/L]_Interwell_POOLED-Upgradient	1	148
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.36
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.38
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.243
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	2.47
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	2.12
Barium [ug/L]_Interwell_POOLED-Upgradient	1	72.5
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	4.03
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.02
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	125
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.53
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-13	0	500
Lithium [ug/L]_Intrawell_MW-13	0	20
Lead [ug/L]_Intrawell_MW-13	1	2.36
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	3.64
Barium [ug/L]_Intrawell_MW-13	1	136
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	0	4
Cobalt [ug/L]_Intrawell_MW-13	1	2.76
Selenium [ug/L]_Intrawell_MW-13	1	18.9
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	0	500
Lithium [ug/L]_Intrawell_MW-14	0	20
Lithium [ug/L]_Intrawell_MW-13	1	27.1
Fluoride [ug/L]_Intrawell_MW-13	1	584
Lead [ug/L]_Intrawell_MW-13	1	2.55

group	D_report_result_value	report_result_value
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	2.86
Barium [ug/L]_Intrawell_MW-13	1	164
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	0	4
Cobalt [ug/L]_Intrawell_MW-13	1	2.34
Selenium [ug/L]_Intrawell_MW-13	0	2
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.31
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lead [ug/L]_Intrawell_MW-14	1	2.54
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	1	2.04
Barium [ug/L]_Intrawell_MW-14	1	123
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	1	2.71
Selenium [ug/L]_Intrawell_MW-14	1	3.97
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	500
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	83.6
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	0	4
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	2.46
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	1	7.92
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	10.4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	180
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	7.19
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.6
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.19
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	500
Lithium [ug/L]_Intrawell_MW-17	0	20
Lead [ug/L]_Intrawell_MW-17	1	14
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	6.4

group	D_report_result_value	report_result_value
Barium [ug/L]_Intrawell_MW-17	1	382
Beryllium [ug/L]_Intrawell_MW-17	1	2.92
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	1	16.8
Cobalt [ug/L]_Intrawell_MW-17	1	11.4
Selenium [ug/L]_Intrawell_MW-17	1	11.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Intrawell_MW-14	1	100
Fluoride [ug/L]_Intrawell_MW-14	1	682
Lead [ug/L]_Intrawell_MW-14	1	5.23
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	1	4.75
Barium [ug/L]_Intrawell_MW-14	1	289
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	1	5.04
Cobalt [ug/L]_Intrawell_MW-14	1	3.87
Selenium [ug/L]_Intrawell_MW-14	1	5.35
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	5.92
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Lithium [ug/L]_Intrawell_MW-15	1	21.3
Fluoride [ug/L]_Intrawell_MW-15	1	486
Lead [ug/L]_Intrawell_MW-15	1	2.91
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	1	2.3
Barium [ug/L]_Intrawell_MW-15	1	111
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	1	4.42
Cobalt [ug/L]_Intrawell_MW-15	1	2.05
Selenium [ug/L]_Intrawell_MW-15	1	2.77
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	3.53
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	41.5
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	441
Lead [ug/L]_Interwell_POOLED-Upgradient	1	9.51
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.53
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	8.39
Barium [ug/L]_Interwell_POOLED-Upgradient	1	166
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.17
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.59
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.37
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.313
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2

group	D_report_result_value	report_result_value
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	30.4
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	123
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.83
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Intrawell_MW-13	0	500
Lithium [ug/L]_Intrawell_MW-13	0	20
Lead [ug/L]_Intrawell_MW-13	1	4.08
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	4.55
Barium [ug/L]_Intrawell_MW-13	1	136
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	1	5.66
Cobalt [ug/L]_Intrawell_MW-13	1	3.35
Selenium [ug/L]_Intrawell_MW-13	1	2.65
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	0	500
Lithium [ug/L]_Intrawell_MW-14	1	39.6
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	13.7
Barium [ug/L]_Interwell_POOLED-Upgradient	1	207
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.48
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.8
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	8.41
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.24
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.72
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Lithium [ug/L]_Intrawell_MW-17	1	50.1
Fluoride [ug/L]_Intrawell_MW-17	1	441
Lead [ug/L]_Intrawell_MW-17	1	6.37
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	3.08
Barium [ug/L]_Intrawell_MW-17	1	359
Beryllium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Chromium [ug/L]_Intrawell_MW-17	1	10.2
Cobalt [ug/L]_Intrawell_MW-17	1	7.94
Selenium [ug/L]_Intrawell_MW-17	1	5.28
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	6.05

group	D_report_result_value	report_result_value
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.219
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	235
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	459
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.42
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.62
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Lead [ug/L]_Intrawell_MW-14	1	3.06
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Barium [ug/L]_Intrawell_MW-14	1	101
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	1	2.26
Selenium [ug/L]_Intrawell_MW-14	1	20.5
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	500
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	87.2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	0	4
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	2.31
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.31
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.23
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	290
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Barium [ug/L]_Interwell_POOLED-Upgradient	1	148
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.31
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Fluoride [ug/L]_Intrawell_MW-13	1	410
Lithium [ug/L]_Intrawell_MW-13	0	20
Lead [ug/L]_Intrawell_MW-13	1	2.06
Molybdenum [ug/L]_Intrawell_MW-13	0	2

group	D_report_result_value	report_result_value
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	2.53
Barium [ug/L]_Intrawell_MW-13	1	197
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	1	4.99
Cobalt [ug/L]_Intrawell_MW-13	1	2.36
Selenium [ug/L]_Intrawell_MW-13	1	13.4
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	1	533
Lithium [ug/L]_Intrawell_MW-14	1	41.3
Lead [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Barium [ug/L]_Intrawell_MW-14	1	195
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	0	2
Selenium [ug/L]_Intrawell_MW-14	1	8.24
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.5
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	52.4
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	16.6
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.38
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	5.69
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.04
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.45
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.397
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.53
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.47
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.32
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.09
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.29

group	D_report_result_value	report_result_value
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.9
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	5.67
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.46
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	2.69
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	2.38
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.77
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	1.07
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.81
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	3.63
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.55
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.17
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	3.048
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.66
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	2.19
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	2.53
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	1.28
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	1.09
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	0.551
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	1.94
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.44
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	9.85
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	6.16
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	6.14
Mercury [ug/L]_Intrawell_MW-14	0	0.2

Background Statistics for Data Sets with Non-Detects

User Selected Options

Date/Time of Computation	ProUCL 5.2 12/6/2023 12:28:43 PM
From File	file111244c7f338b.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	40	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	40
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (antimony [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (antimony [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (antimony [ug/l]_intrawell_mw-13) was not processed!

x_ols (antimony [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (antimony [ug/l]_intrawell_mw-14) was not processed!

x_ols (antimony [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	2.22	Minimum Non-Detect	2
Maximum Detect	2.22	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	2.22	SD Detected	N/A
Mean of Detected Logged Data	0.798	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]_intrawell_mw-15) was not processed!

x_ols (antimony [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (antimony [ug/l]_intrawell_mw-17) was not processed!

x_ols (arsenic [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	20		
Number of Detects	18	Number of Non-Detects	18
Number of Distinct Detects	18	Number of Distinct Non-Detects	2
Minimum Detect	2.12	Minimum Non-Detect	2
Maximum Detect	23.2	Maximum Non-Detect	4
Variance Detected	35.32	Percent Non-Detects	50%
Mean Detected	10.05	SD Detected	5.943
Mean of Detected Logged Data	2.107	SD of Detected Logged Data	0.699

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.858	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.126	**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) Background Statistics Assuming Normal Distribution

KM Mean	6.045	KM SD	5.72
95% UTL95% Coverage	18.33	95% KM UPL (t)	15.84
90% KM Percentile (z)	13.38	95% KM Percentile (z)	15.45
99% KM Percentile (z)	19.35	95% KM USL	22.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	5.634	SD	6.105
95% UTL95% Coverage	18.75	95% UPL (t)	16.09
90% Percentile (z)	13.46	95% Percentile (z)	15.68
99% Percentile (z)	19.84	95% USL	22.87

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	0.373	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.131	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.205	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)	2.654	k star (bias corrected MLE)	2.248
Theta hat (MLE)	3.786	Theta star (bias corrected MLE)	4.468
nu hat (MLE)	95.53	nu star (bias corrected)	80.94
MLE Mean (bias corrected)	10.05		
MLE Sd (bias corrected)	6.7	95% Percentile of Chisquare (2kstar)	10.28

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	5.241
Maximum	23.2	Median	2.419
SD	6.42	CV	1.225
k hat (MLE)	0.319	k star (bias corrected MLE)	0.311
Theta hat (MLE)	16.41	Theta star (bias corrected MLE)	16.84
nu hat (MLE)	22.99	nu star (bias corrected)	22.41
MLE Mean (bias corrected)	5.241	MLE Sd (bias corrected)	9.393
95% Percentile of Chisquare (2kstar)	2.814	90% Percentile	15.39
95% Percentile	23.69	99% Percentile	45.17

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	33.85	44.21	95% Approx. Gamma UPL	22.86	27.3
95% Gamma USL	57.06	84.6			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.045	SD (KM)	5.72
Variance (KM)	32.71	SE of Mean (KM)	0.981
k hat (KM)	1.117	k star (KM)	1.043
nu hat (KM)	80.43	nu star (KM)	75.07
theta hat (KM)	5.411	theta star (KM)	5.798
80% gamma percentile (KM)	9.696	90% gamma percentile (KM)	13.78
95% gamma percentile (KM)	17.85	99% gamma percentile (KM)	27.26

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	21.04	21.79	95% Approx. Gamma UPL	16.37	16.57
95% KM Gamma Percentile	15.71	15.85	95% Gamma USL	29.9	32.19

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.146	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	5.821	Mean in Log Scale	1.213
SD in Original Scale	5.987	SD in Log Scale	1.11
95% UTL95% Coverage	36.52	95% BCA UTL95% Coverage	23.2
95% Bootstrap (%) UTL95% Coverage	23.2	95% UPL (t)	22.52
90% Percentile (z)	13.95	95% Percentile (z)	20.88
99% Percentile (z)	44.5	95% USL	77.3

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.409	95% KM UTL (Lognormal)95% Coverage	25.38
KM SD of Logged Data	0.85	95% KM UPL (Lognormal)	17.53
95% KM Percentile Lognormal (z)	16.55	95% KM USL (Lognormal)	45.05

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	5.634	Mean in Log Scale	1.131
SD in Original Scale	6.105	SD in Log Scale	1.123
95% UTL95% Coverage	34.56	95% UPL (t)	21.2
90% Percentile (z)	13.06	95% Percentile (z)	19.64
99% Percentile (z)	42.21	95% USL	73.77

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	36	95% UTL with95% Coverage	23.2
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	20.99
95% USL	23.2	95% KM Chebyshev UPL	31.32

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 (arsenic [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1

Minimum Detect	2.04	Minimum Non-Detect	2
Maximum Detect	4.55	Maximum Non-Detect	2
Variance Detected	0.974	Percent Non-Detects	37.5%
Mean Detected	3.124	SD Detected	0.987
Mean of Detected Logged Data	1.1	SD of Detected Logged Data	0.313

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.962	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.205	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) Background Statistics Assuming Normal Distribution

KM Mean	2.703	KM SD	0.885
95% UTL95% Coverage	5.523	95% KM UPL (t)	4.481
90% KM Percentile (z)	3.837	95% KM Percentile (z)	4.158
99% KM Percentile (z)	4.761	95% KM USL	4.501

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.328	SD	1.329
95% UTL95% Coverage	6.562	95% UPL (t)	4.997
90% Percentile (z)	4.03	95% Percentile (z)	4.513
99% Percentile (z)	5.418	95% USL	5.027

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	0.198	Anderson-Darling GOF Test
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	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)	12.89	k star (bias corrected MLE)	5.289
Theta hat (MLE)	0.242	Theta star (bias corrected MLE)	0.591
nu hat (MLE)	128.9	nu star (bias corrected)	52.89
MLE Mean (bias corrected)	3.124		
MLE Sd (bias corrected)	1.358	95% Percentile of Chisquare (2kstar)	19.1

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	0.116	Mean	2.201
Maximum	4.55	Median	2.285
SD	1.503	CV	0.683
k hat (MLE)	1.409	k star (bias corrected MLE)	0.964
Theta hat (MLE)	1.562	Theta star (bias corrected MLE)	2.283
nu hat (MLE)	22.55	nu star (bias corrected)	15.43
MLE Mean (bias corrected)	2.201	MLE Sd (bias corrected)	2.242
95% Percentile of Chisquare (2kstar)	5.852	90% Percentile	5.115
95% Percentile	6.68	99% Percentile	10.33

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	14.35	17.83	95% Approx. Gamma UPL	7.752	8.705
95% Gamma USL	7.853	8.834			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.703	SD (KM)	0.885
Variance (KM)	0.783	SE of Mean (KM)	0.35
k hat (KM)	9.324	k star (KM)	5.911
nu hat (KM)	149.2	nu star (KM)	94.58
theta hat (KM)	0.29	theta star (KM)	0.457
80% gamma percentile (KM)	3.567	90% gamma percentile (KM)	4.189
95% gamma percentile (KM)	4.752	99% gamma percentile (KM)	5.933

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	6.109	6.217	95% Approx. Gamma UPL	4.589	4.608
95% KM Gamma Percentile	4.176	4.18	95% Gamma USL	4.615	4.635

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.162	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.421	Mean in Log Scale	0.765
SD in Original Scale	1.233	SD in Log Scale	0.533
95% UTL95% Coverage	11.75	95% BCA UTL95% Coverage	4.55
95% Bootstrap (%) UTL95% Coverage	4.55	95% UPL (t)	6.272
90% Percentile (z)	4.255	95% Percentile (z)	5.164
99% Percentile (z)	7.427	95% USL	6.347

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.947	95% KM UTL (Lognormal)95% Coverage	6.624
KM SD of Logged Data	0.296	95% KM UPL (Lognormal)	4.675
95% KM Percentile Lognormal (z)	4.196	95% KM USL (Lognormal)	4.705

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.328	Mean in Log Scale	0.687
SD in Original Scale	1.329	SD in Log Scale	0.616
95% UTL95% Coverage	14.18	95% UPL (t)	6.861
90% Percentile (z)	4.381	95% Percentile (z)	5.48
99% Percentile (z)	8.341	95% USL	6.955

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	8	95% UTL with95% Coverage	4.55
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.55
95% USL	4.55	95% KM Chebyshev UPL	6.794

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 (arsenic [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	2.04	Minimum Non-Detect	2
Maximum Detect	4.75	Maximum Non-Detect	2
Variance Detected	2.052	Percent Non-Detects	62.5%
Mean Detected	3.127	SD Detected	1.432
Mean of Detected Logged Data	1.074	SD of Detected Logged Data	0.436

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.895	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.313	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) Background Statistics Assuming Normal Distribution

KM Mean	2.423	KM SD	0.9
95% UTL95% Coverage	5.292	95% KM UPL (t)	4.232
90% KM Percentile (z)	3.576	95% KM Percentile (z)	3.903
99% KM Percentile (z)	4.517	95% KM USL	4.252

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.798	SD	1.341
95% UTL95% Coverage	6.071	95% UPL (t)	4.492
90% Percentile (z)	3.516	95% Percentile (z)	4.003
99% Percentile (z)	4.917	95% USL	4.522

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	0.351	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.317	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.433	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.771	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.402	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	46.63	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

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	1.191
Maximum	4.75	Median	0.0594
SD	1.777	CV	1.492
k hat (MLE)	0.294	k star (bias corrected MLE)	0.267
Theta hat (MLE)	4.05	Theta star (bias corrected MLE)	4.458
nu hat (MLE)	4.706	nu star (bias corrected)	4.275
MLE Mean (bias corrected)	1.191	MLE Sd (bias corrected)	2.304
95% Percentile of Chisquare (2kstar)	2.535	90% Percentile	3.556
95% Percentile	5.651	99% Percentile	11.18

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	19.61	29.27	95% Approx. Gamma UPL	7.552	9.029
95% Gamma USL	7.713	9.263			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.423	SD (KM)	0.9
Variance (KM)	0.811	SE of Mean (KM)	0.39
k hat (KM)	7.24	k star (KM)	4.609
nu hat (KM)	115.8	nu star (KM)	73.74
theta hat (KM)	0.335	theta star (KM)	0.526
80% gamma percentile (KM)	3.286	90% gamma percentile (KM)	3.934
95% gamma percentile (KM)	4.526	99% gamma percentile (KM)	5.783

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	5.537	5.579	95% Approx. Gamma UPL	4.142	4.131
95% KM Gamma Percentile	3.764	3.746	95% Gamma USL	4.166	4.155

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.277	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.551	Mean in Log Scale	0.00665
SD in Original Scale	1.533	SD in Log Scale	1.019
95% UTL95% Coverage	25.89	95% BCA UTL95% Coverage	4.75
95% Bootstrap (%) UTL95% Coverage	4.75	95% UPL (t)	7.801
90% Percentile (z)	3.715	95% Percentile (z)	5.38
99% Percentile (z)	10.77	95% USL	7.979

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.836	95% KM UTL (Lognormal)95% Coverage	5.731
KM SD of Logged Data	0.285	95% KM UPL (Lognormal)	4.095
95% KM Percentile Lognormal (z)	3.69	95% KM USL (Lognormal)	4.121

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.798	Mean in Log Scale	0.403
SD in Original Scale	1.341	SD in Log Scale	0.603
95% UTL95% Coverage	10.22	95% UPL (t)	5.024
90% Percentile (z)	3.239	95% Percentile (z)	4.032
99% Percentile (z)	6.081	95% USL	5.091

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	8	95% UTL with95% Coverage	4.75
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.75
95% USL	4.75	95% KM Chebyshev UPL	6.585

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 (arsenic [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	2.3	Minimum Non-Detect	2
Maximum Detect	2.3	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	2.3	SD Detected	N/A
Mean of Detected Logged Data	0.833	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 (arsenic [ug/l]_intrawell_mw-15) was not processed!

x_ols (arsenic [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	2.37	Minimum Non-Detect	2
Maximum Detect	6.4	Maximum Non-Detect	2
Variance Detected	2.379	Percent Non-Detects	37.5%
Mean Detected	3.766	SD Detected	1.542
Mean of Detected Logged Data	1.269	SD of Detected Logged Data	0.365

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.358	**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) Background Statistics Assuming Normal Distribution

KM Mean	3.104	KM SD	1.386
95% UTL95% Coverage	7.52	95% KM UPL (t)	5.888
90% KM Percentile (z)	4.88	95% KM Percentile (z)	5.383
99% KM Percentile (z)	6.327	95% KM USL	5.919

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.729	SD	1.846
95% UTL95% Coverage	8.613	95% UPL (t)	6.439
90% Percentile (z)	5.095	95% Percentile (z)	5.766
99% Percentile (z)	7.024	95% USL	6.48

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	0.457	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.328	**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)	8.894	k star (bias corrected MLE)	3.691
Theta hat (MLE)	0.423	Theta star (bias corrected MLE)	1.02
nu hat (MLE)	88.94	nu star (bias corrected)	36.91
MLE Mean (bias corrected)	3.766		
MLE Sd (bias corrected)	1.96	95% Percentile of Chisquare (2kstar)	14.62

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	2.519
Maximum	6.4	Median	2.725
SD	2.095	CV	0.831
k hat (MLE)	0.714	k star (bias corrected MLE)	0.53
Theta hat (MLE)	3.529	Theta star (bias corrected MLE)	4.757
nu hat (MLE)	11.42	nu star (bias corrected)	8.473
MLE Mean (bias corrected)	2.519	MLE Sd (bias corrected)	3.462
95% Percentile of Chisquare (2kstar)	3.986	90% Percentile	6.734
95% Percentile	9.482	99% Percentile	16.2

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	24.19	35.06	95% Approx. Gamma UPL	11.64	14.41
95% Gamma USL	11.82	14.68			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.104	SD (KM)	1.386
Variance (KM)	1.92	SE of Mean (KM)	0.548
k hat (KM)	5.017	k star (KM)	3.219
nu hat (KM)	80.26	nu star (KM)	51.5
theta hat (KM)	0.619	theta star (KM)	0.964
80% gamma percentile (KM)	4.39	90% gamma percentile (KM)	5.424
95% gamma percentile (KM)	6.385	99% gamma percentile (KM)	8.46

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	8.529	8.742	95% Approx. Gamma UPL	6.003	6.032
95% KM Gamma Percentile	5.337	5.338	95% Gamma USL	6.045	6.076

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.305	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.858	Mean in Log Scale	0.896
SD in Original Scale	1.721	SD in Log Scale	0.599
95% UTL95% Coverage	16.51	95% BCA UTL95% Coverage	6.4
95% Bootstrap (%) UTL95% Coverage	6.4	95% UPL (t)	8.159
90% Percentile (z)	5.277	95% Percentile (z)	6.559
99% Percentile (z)	9.862	95% USL	8.267

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.053	95% KM UTL (Lognormal)95% Coverage	9.61
KM SD of Logged Data	0.38	95% KM UPL (Lognormal)	6.146
95% KM Percentile Lognormal (z)	5.351	95% KM USL (Lognormal)	6.198

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.729	Mean in Log Scale	0.793
SD in Original Scale	1.846	SD in Log Scale	0.712
95% UTL95% Coverage	21.38	95% UPL (t)	9.244
90% Percentile (z)	5.505	95% Percentile (z)	7.13
99% Percentile (z)	11.58	95% USL	9.391

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	8	95% UTL with95% Coverage	6.4
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	6.4
95% USL	6.4	95% KM Chebyshev UPL	9.51

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	40	Number of Distinct Observations	38
Minimum	4	First Quartile	24.5
Second Largest	204	Median	59.54
Maximum	243	Third Quartile	89.36
Mean	69.17	SD	57.08
Coefficient of Variation	0.825	Skewness	1.171
Mean of logged Data	3.779	SD of logged Data	1.135

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.162	Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	190	90% Percentile (z)	142.3
95% UPL (t)	166.5	95% Percentile (z)	163.1
95% USL	232.8	99% Percentile (z)	202

Gamma GOF Test

A-D Test Statistic	0.472	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.773	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	0.143	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.232	k star (bias corrected MLE)	1.157
Theta hat (MLE)	56.12	Theta star (bias corrected MLE)	59.8
nu hat (MLE)	98.6	nu star (bias corrected)	92.53
MLE Mean (bias corrected)	69.17	MLE Sd (bias corrected)	64.31

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	200.3	90% Percentile	153.6
95% Hawkins Wixley (HW) Approx. Gamma UPL	213.8	95% Percentile	196.9
95% WH Approx. Gamma UTL with 95% Coverage	257	99% Percentile	296.3
95% HW Approx. Gamma UTL with 95% Coverage	283.4		
95% WH USL	386	95% HW USL	452.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	484.3	90% Percentile (z)	187.5
95% UPL (t)	303.6	95% Percentile (z)	283.3
95% USL	1135	99% Percentile (z)	614.1

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	40	95% UTL with 95% Coverage	243
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	243	95% BCA Bootstrap UTL with 95% Coverage	243
95% UPL	202.1	90% Percentile	149.6
90% Chebyshev UPL	242.5	95% Percentile	167.9
95% Chebyshev UPL	321.1	99% Percentile	227.8
95% USL	243		

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Minimum	128	First Quartile	135.3
Second Largest	164	Median	146
Maximum	197	Third Quartile	160.3
Mean	151.1	SD	22.92
Coefficient of Variation	0.152	Skewness	1.172
Mean of logged Data	5.009	SD of logged Data	0.144

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	224.2	90% Percentile (z)	180.5
95% UPL (t)	197.2	95% Percentile (z)	188.8
95% USL	197.7	99% Percentile (z)	204.4

Gamma GOF Test

A-D Test Statistic	0.458	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.261	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.293	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)	53.26	k star (bias corrected MLE)	33.37
Theta hat (MLE)	2.838	Theta star (bias corrected MLE)	4.529
nu hat (MLE)	852.2	nu star (bias corrected)	533.9
MLE Mean (bias corrected)	151.1	MLE Sd (bias corrected)	26.16

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	199	90% Percentile	185.5
95% Hawkins Wixley (HW) Approx. Gamma UPL	199.2	95% Percentile	196.6
95% WH Approx. Gamma UTL with 95% Coverage	232	99% Percentile	218.5
95% HW Approx. Gamma UTL with 95% Coverage	233.2		
95% WH USL	199.6	95% HW USL	199.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.247	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.265	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	237.2	90% Percentile (z)	180.1
95% UPL (t)	200.1	95% Percentile (z)	189.8
95% USL	200.8	99% Percentile (z)	209.5

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	197
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	197	95% BCA Bootstrap UTL with 95% Coverage	197
95% UPL	197	90% Percentile	173.9
90% Chebyshev UPL	224.1	95% Percentile	185.5
95% Chebyshev UPL	257.1	99% Percentile	194.7
95% USL	197		

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	37.89	First Quartile	46.79
Second Largest	101	Median	77.49
Maximum	114.3	Third Quartile	99.69
Mean	74.6	SD	31.52
Coefficient of Variation	0.422	Skewness	-0.0152
Mean of logged Data	4.225	SD of logged Data	0.457

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.333	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	175	90% Percentile (z)	115
95% UPL (t)	137.9	95% Percentile (z)	126.4
95% USL	138.6	99% Percentile (z)	147.9

Gamma GOF Test

A-D Test Statistic	0.676	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.3	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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

k hat (MLE)	5.905	k star (bias corrected MLE)	3.774
Theta hat (MLE)	12.63	Theta star (bias corrected MLE)	19.77
nu hat (MLE)	94.48	nu star (bias corrected)	60.38
MLE Mean (bias corrected)	74.6	MLE Sd (bias corrected)	38.4

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	155.2	90% Percentile	126.1
95% Hawkins Wixley (HW) Approx. Gamma UPL	158.5	95% Percentile	146.9
95% WH Approx. Gamma UTL with 95% Coverage	227.2	99% Percentile	191.4
95% HW Approx. Gamma UTL with 95% Coverage	239.2		
95% WH USL	156.4	95% HW USL	159.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.288	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	293.2	90% Percentile (z)	122.8
95% UPL (t)	171.2	95% Percentile (z)	145
95% USL	173	99% Percentile (z)	197.9

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	114.3
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	114.3	95% BCA Bootstrap UTL with 95% Coverage	114.3
95% UPL	114.3	90% Percentile	105
90% Chebyshev UPL	174.9	95% Percentile	109.6
95% Chebyshev UPL	220.3	99% Percentile	113.4
95% USL	114.3		

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 (barium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	74.9	First Quartile	81.55
Second Largest	111	Median	85.8
Maximum	165	Third Quartile	95.18
Mean	96.43	SD	29.9
Coefficient of Variation	0.31	Skewness	2.148
Mean of logged Data	4.535	SD of logged Data	0.261

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.718	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	191.7	90% Percentile (z)	134.7
95% UPL (t)	156.5	95% Percentile (z)	145.6
95% USL	157.2	99% Percentile (z)	166

Gamma GOF Test

A-D Test Statistic	0.859	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.323	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.294	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	15.14	k star (bias corrected MLE)	9.544
Theta hat (MLE)	6.37	Theta star (bias corrected MLE)	10.1
nu hat (MLE)	242.2	nu star (bias corrected)	152.7
MLE Mean (bias corrected)	96.43	MLE Sd (bias corrected)	31.21

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	156.9	90% Percentile	138
95% Hawkins Wixley (HW) Approx. Gamma UPL	157.1	95% Percentile	152.8
95% WH Approx. Gamma UTL with 95% Coverage	204.2	99% Percentile	183.4
95% HW Approx. Gamma UTL with 95% Coverage	206.4		
95% WH USL	157.8	95% HW USL	157.9

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.793	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.306	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	214.3	90% Percentile (z)	130.3
95% UPL (t)	157.6	95% Percentile (z)	143.3
95% USL	158.5	99% Percentile (z)	171.2

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	165
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	165	95% BCA Bootstrap UTL with 95% Coverage	165
95% UPL	165	90% Percentile	127.2
90% Chebyshev UPL	191.6	95% Percentile	146.1
95% Chebyshev UPL	234.7	99% Percentile	161.2
95% USL	165		

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]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	164	First Quartile	218.8

Second Largest	382	Median	296
Maximum	544	Third Quartile	364.8
Mean	306	SD	125.1
Coefficient of Variation	0.409	Skewness	0.821
Mean of logged Data	5.651	SD of logged Data	0.408

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	704.8	90% Percentile (z)	466.4
95% UPL (t)	557.5	95% Percentile (z)	511.8
95% USL	560.2	99% Percentile (z)	597.1

Gamma GOF Test

A-D Test Statistic	0.199	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.145	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	7.078	k star (bias corrected MLE)	4.507
Theta hat (MLE)	43.23	Theta star (bias corrected MLE)	67.89
nu hat (MLE)	113.3	nu star (bias corrected)	72.12
MLE Mean (bias corrected)	306	MLE Sd (bias corrected)	144.1

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	602.7	90% Percentile	499.1
95% Hawkins Wixley (HW) Approx. Gamma UPL	611.7	95% Percentile	575
95% WH Approx. Gamma UTL with 95% Coverage	860.3	99% Percentile	736.2
95% HW Approx. Gamma UTL with 95% Coverage	894.9		
95% WH USL	607	95% HW USL	616.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	1045	90% Percentile (z)	480.3
95% UPL (t)	646.4	95% Percentile (z)	557
95% USL	652.3	99% Percentile (z)	735.7

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	544
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	544	95% BCA Bootstrap UTL with 95% Coverage	544
95% UPL	544	90% Percentile	430.6
90% Chebyshev UPL	704.2	95% Percentile	487.3
95% Chebyshev UPL	884.6	99% Percentile	532.7
95% USL	544		

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	36	Number of Missing Observations	0
Number of Distinct Observations	10		
Number of Detects	9	Number of Non-Detects	27
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	2.17	Minimum Non-Detect	2
Maximum Detect	3.96	Maximum Non-Detect	2
Variance Detected	0.315	Percent Non-Detects	75%
Mean Detected	2.801	SD Detected	0.561
Mean of Detected Logged Data	1.014	SD of Detected Logged Data	0.188

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.21	**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

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	2.2	KM SD	0.436
95% UTL95% Coverage	3.138	95% KM UPL (t)	2.948
90% KM Percentile (z)	2.759	95% KM Percentile (z)	2.918
99% KM Percentile (z)	3.215	95% KM USL	3.432

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.45	SD	0.835
95% UTL95% Coverage	3.245	95% UPL (t)	2.881
90% Percentile (z)	2.521	95% Percentile (z)	2.824
99% Percentile (z)	3.393	95% USL	3.809

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	0.335	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.191	**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

Gamma Statistics on Detected Data Only

k hat (MLE)	30.71	k star (bias corrected MLE)	20.55
Theta hat (MLE)	0.0912	Theta star (bias corrected MLE)	0.136
nu hat (MLE)	552.8	nu star (bias corrected)	369.8
MLE Mean (bias corrected)	2.801		
MLE Sd (bias corrected)	0.618	95% Percentile of Chisquare (2kstar)	57.05

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	1.335
Maximum	3.96	Median	1.201
SD	1.055	CV	0.791
k hat (MLE)	0.765	k star (bias corrected MLE)	0.72
Theta hat (MLE)	1.746	Theta star (bias corrected MLE)	1.855
nu hat (MLE)	55.06	nu star (bias corrected)	51.81
MLE Mean (bias corrected)	1.335	MLE Sd (bias corrected)	1.574
95% Percentile of Chisquare (2kstar)	4.85	90% Percentile	3.329
95% Percentile	4.499	99% Percentile	7.284

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	6.147	7.534	95% Approx. Gamma UPL	4.558	5.278
95% Gamma USL	9.28	12.37			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.2	SD (KM)	0.436
Variance (KM)	0.19	SE of Mean (KM)	0.0771
k hat (KM)	25.44	k star (KM)	23.34
nu hat (KM)	1831	nu star (KM)	1680
theta hat (KM)	0.0865	theta star (KM)	0.0943
80% gamma percentile (KM)	2.572	90% gamma percentile (KM)	2.8
95% gamma percentile (KM)	2.999	99% gamma percentile (KM)	3.396

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	3.102	3.098	95% Approx. Gamma UPL	2.897	2.891
95% KM Gamma Percentile	2.866	2.859	95% Gamma USL	3.44	3.442

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.179	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.707	Mean in Log Scale	0.44
SD in Original Scale	0.774	SD in Log Scale	0.443
95% UTL95% Coverage	4.02	95% BCA UTL95% Coverage	3.96
95% Bootstrap (%) UTL95% Coverage	3.96	95% UPL (t)	3.315
90% Percentile (z)	2.738	95% Percentile (z)	3.216
99% Percentile (z)	4.35	95% USL	5.422

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.773	95% KM UTL (Lognormal)95% Coverage	3.087
KM SD of Logged Data	0.165	95% KM UPL (Lognormal)	2.873
95% KM Percentile Lognormal (z)	2.841	95% KM USL (Lognormal)	3.45

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.45	Mean in Log Scale	0.253
SD in Original Scale	0.835	SD in Log Scale	0.454
95% UTL95% Coverage	3.418	95% UPL (t)	2.805
90% Percentile (z)	2.306	95% Percentile (z)	2.719
99% Percentile (z)	3.706	95% USL	4.645

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	36	95% UTL with95% Coverage	3.96
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.476
95% USL	3.96	95% KM Chebyshev UPL	4.128

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (beryllium [ug/l]_intrawell_mw-13) was not processed!

x_ols (beryllium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (beryllium [ug/l]_intrawell_mw-14) was not processed!

x_ols (beryllium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (beryllium [ug/l]_intrawell_mw-15) was not processed!

x_ols (beryllium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	2.01	Minimum Non-Detect	2
Maximum Detect	2.92	Maximum Non-Detect	2
Variance Detected	0.414	Percent Non-Detects	75%
Mean Detected	2.465	SD Detected	0.643
Mean of Detected Logged Data	0.885	SD of Detected Logged Data	0.264

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	2.116	KM SD	0.304
95% UTL95% Coverage	3.084	95% KM UPL (t)	2.727
90% KM Percentile (z)	2.506	95% KM Percentile (z)	2.616
99% KM Percentile (z)	2.823	95% KM USL	2.733

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.366	SD	0.72
95% UTL95% Coverage	3.662	95% UPL (t)	2.814
90% Percentile (z)	2.29	95% Percentile (z)	2.551
99% Percentile (z)	3.042	95% USL	2.83

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)	29.01	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.085	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	116.1	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)	2.116	SD (KM)	0.304
Variance (KM)	0.0923	SE of Mean (KM)	0.152
k hat (KM)	48.52	k star (KM)	30.41
nu hat (KM)	776.4	nu star (KM)	486.6
theta hat (KM)	0.0436	theta star (KM)	0.0696
80% gamma percentile (KM)	2.431	90% gamma percentile (KM)	2.621
95% gamma percentile (KM)	2.785	99% gamma percentile (KM)	3.11

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	3.11	3.113	95% Approx. Gamma UPL	2.707	2.705
95% KM Gamma Percentile	2.59	2.587	95% Gamma USL	2.715	2.712

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

Mean in Original Scale	1.122	Mean in Log Scale	-0.157
SD in Original Scale	0.908	SD in Log Scale	0.79
95% UTL95% Coverage	10.59	95% BCA UTL95% Coverage	2.92
95% Bootstrap (%) UTL95% Coverage	2.92	95% UPL (t)	4.179
90% Percentile (z)	2.352	95% Percentile (z)	3.133
99% Percentile (z)	5.367	95% USL	4.253

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.741	95% KM UTL (Lognormal)95% Coverage	3.124
KM SD of Logged Data	0.125	95% KM UPL (Lognormal)	2.697
95% KM Percentile Lognormal (z)	2.577	95% KM USL (Lognormal)	2.704

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.366	Mean in Log Scale	0.221
SD in Original Scale	0.72	SD in Log Scale	0.422
95% UTL95% Coverage	4.782	95% UPL (t)	2.911
90% Percentile (z)	2.142	95% Percentile (z)	2.496
99% Percentile (z)	3.327	95% USL	2.938

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	8	95% UTL with95% Coverage	2.92
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	2.92
95% USL	2.92	95% KM Chebyshev UPL	3.521

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 (cadmium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (cadmium [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (cadmium [ug/l]_intrawell_mw-13)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (cadmium [ug/l]_intrawell_mw-13) was not processed!

x_ols (cadmium [ug/l]_intrawell_mw-14)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (cadmium [ug/l]_intrawell_mw-14) was not processed!

x_ols (cadmium [ug/l]_intrawell_mw-15)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (cadmium [ug/l]_intrawell_mw-15) was not processed!

x_ols (cadmium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	2.58	Minimum Non-Detect	2
Maximum Detect	2.58	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	2.58	SD Detected	N/A
Mean of Detected Logged Data	0.948	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 (cadmium [ug/l]_intrawell_mw-17) was not processed!

x_ols (chromium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	15		
Number of Detects	14	Number of Non-Detects	22
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	4.03	Minimum Non-Detect	4
Maximum Detect	10.7	Maximum Non-Detect	4
Variance Detected	4.253	Percent Non-Detects	61.11%
Mean Detected	7.205	SD Detected	2.062
Mean of Detected Logged Data	1.937	SD of Detected Logged Data	0.283

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.217	**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	5.246	KM SD	1.994
95% UTL95% Coverage	9.531	95% KM UPL (t)	8.662
90% KM Percentile (z)	7.802	95% KM Percentile (z)	8.527
99% KM Percentile (z)	9.886	95% KM USL	10.88

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	4.024	SD	2.864
95% UTL95% Coverage	10.18	95% UPL (t)	8.93
90% Percentile (z)	7.694	95% Percentile (z)	8.735
99% Percentile (z)	10.69	95% USL	12.11

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	0.488	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.181	**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)	13.55	k star (bias corrected MLE)	10.7
Theta hat (MLE)	0.532	Theta star (bias corrected MLE)	0.674
nu hat (MLE)	379.4	nu star (bias corrected)	299.5
MLE Mean (bias corrected)	7.205		
MLE Sd (bias corrected)	2.203	95% Percentile of Chisquare (2kstar)	33.16

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	3.952
Maximum	10.7	Median	3.481
SD	3.131	CV	0.792
k hat (MLE)	0.704	k star (bias corrected MLE)	0.664
Theta hat (MLE)	5.609	Theta star (bias corrected MLE)	5.949
nu hat (MLE)	50.72	nu star (bias corrected)	47.83
MLE Mean (bias corrected)	3.952	MLE Sd (bias corrected)	4.848
95% Percentile of Chisquare (2kstar)	4.608	90% Percentile	10.04
95% Percentile	13.71	99% Percentile	22.49

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	18.55	23.26	95% Approx. Gamma UPL	13.71	16.18
95% Gamma USL	28.11	38.54			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.246	SD (KM)	1.994
Variance (KM)	3.977	SE of Mean (KM)	0.345
k hat (KM)	6.921	k star (KM)	6.363
nu hat (KM)	498.3	nu star (KM)	458.1
theta hat (KM)	0.758	theta star (KM)	0.825
80% gamma percentile (KM)	6.87	90% gamma percentile (KM)	8.025
95% gamma percentile (KM)	9.069	99% gamma percentile (KM)	11.25

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	9.676	9.706	95% Approx. Gamma UPL	8.572	8.564
95% KM Gamma Percentile	8.408	8.396	95% Gamma USL	11.57	11.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.165	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	4.65	Mean in Log Scale	1.399
SD in Original Scale	2.524	SD in Log Scale	0.537
95% UTL95% Coverage	12.83	95% BCA UTL95% Coverage	10.7
95% Bootstrap (%) UTL95% Coverage	10.7	95% UPL (t)	10.16
90% Percentile (z)	8.058	95% Percentile (z)	9.794
99% Percentile (z)	14.12	95% USL	18.44

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.601	95% KM UTL (Lognormal)95% Coverage	9.817
KM SD of Logged Data	0.318	95% KM UPL (Lognormal)	8.547
95% KM Percentile Lognormal (z)	8.364	95% KM USL (Lognormal)	12.17

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	4.024	Mean in Log Scale	1.177
SD in Original Scale	2.864	SD in Log Scale	0.639
95% UTL95% Coverage	12.8	95% UPL (t)	9.694
90% Percentile (z)	7.359	95% Percentile (z)	9.282
99% Percentile (z)	14.35	95% USL	19.71

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	36	95% UTL with95% Coverage	10.7
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	10.45
95% USL	10.7	95% KM Chebyshev UPL	14.06

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	4.99	Minimum Non-Detect	4
Maximum Detect	5.66	Maximum Non-Detect	4
Variance Detected	0.224	Percent Non-Detects	75%
Mean Detected	5.325	SD Detected	0.474
Mean of Detected Logged Data	1.67	SD of Detected Logged Data	0.0891

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	4.331	KM SD	0.598
95% UTL95% Coverage	6.236	95% KM UPL (t)	5.532
90% KM Percentile (z)	5.097	95% KM Percentile (z)	5.314
99% KM Percentile (z)	5.722	95% KM USL	5.546

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.831	SD	1.55
95% UTL95% Coverage	7.77	95% UPL (t)	5.945
90% Percentile (z)	4.817	95% Percentile (z)	5.38
99% Percentile (z)	6.436	95% USL	5.979

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)	252.3	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0211	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1009	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)	4.331	SD (KM)	0.598
Variance (KM)	0.357	SE of Mean (KM)	0.299
k hat (KM)	52.51	k star (KM)	32.9
nu hat (KM)	840.2	nu star (KM)	526.5
theta hat (KM)	0.0825	theta star (KM)	0.132
80% gamma percentile (KM)	4.951	90% gamma percentile (KM)	5.323
95% gamma percentile (KM)	5.643	99% gamma percentile (KM)	6.279

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	6.36	6.378	95% Approx. Gamma UPL	5.539	5.54
95% KM Gamma Percentile	5.3	5.298	95% Gamma USL	5.554	5.555

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

Mean in Original Scale	3.859	Mean in Log Scale	1.319
SD in Original Scale	1.048	SD in Log Scale	0.266
95% UTL95% Coverage	8.741	95% BCA UTL95% Coverage	5.66
95% Bootstrap (%) UTL95% Coverage	5.66	95% UPL (t)	6.388
90% Percentile (z)	5.262	95% Percentile (z)	5.796
99% Percentile (z)	6.95	95% USL	6.425

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.457	95% KM UTL (Lognormal)95% Coverage	6.437
KM SD of Logged Data	0.127	95% KM UPL (Lognormal)	5.543
95% KM Percentile Lognormal (z)	5.292	95% KM USL (Lognormal)	5.559

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.831	Mean in Log Scale	0.937
SD in Original Scale	1.55	SD in Log Scale	0.454
95% UTL95% Coverage	10.84	95% UPL (t)	6.354
90% Percentile (z)	4.567	95% Percentile (z)	5.385
99% Percentile (z)	7.336	95% USL	6.418

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	8	95% UTL with95% Coverage	5.66
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	5.66
95% USL	5.66	95% KM Chebyshev UPL	7.095

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	4.07	Minimum Non-Detect	4
Maximum Detect	5.04	Maximum Non-Detect	4
Variance Detected	0.47	Percent Non-Detects	75%
Mean Detected	4.555	SD Detected	0.686
Mean of Detected Logged Data	1.511	SD of Detected Logged Data	0.151

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	4.139	KM SD	0.341
95% UTL95% Coverage	5.227	95% KM UPL (t)	4.825
90% KM Percentile (z)	4.576	95% KM Percentile (z)	4.7
99% KM Percentile (z)	4.933	95% KM USL	4.832

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.639	SD	1.211
95% UTL95% Coverage	6.498	95% UPL (t)	5.072
90% Percentile (z)	4.19	95% Percentile (z)	4.63
99% Percentile (z)	5.456	95% USL	5.099

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)	87.87	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0518	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	351.5	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)	4.139	SD (KM)	0.341
Variance (KM)	0.117	SE of Mean (KM)	0.171
k hat (KM)	147	k star (KM)	91.93
nu hat (KM)	2351	nu star (KM)	1471
theta hat (KM)	0.0282	theta star (KM)	0.045
80% gamma percentile (KM)	4.497	90% gamma percentile (KM)	4.701
95% gamma percentile (KM)	4.873	99% gamma percentile (KM)	5.209

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	5.244	5.247	95% Approx. Gamma UPL	4.812	4.81
95% KM Gamma Percentile	4.683	4.681	95% Gamma USL	4.82	4.818

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

Mean in Original Scale	2.731	Mean in Log Scale	0.914
SD in Original Scale	1.268	SD in Log Scale	0.452
95% UTL95% Coverage	10.54	95% BCA UTL95% Coverage	5.04
95% Bootstrap (%) UTL95% Coverage	5.04	95% UPL (t)	6.188
90% Percentile (z)	4.453	95% Percentile (z)	5.248
99% Percentile (z)	7.141	95% USL	6.25

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.417	95% KM UTL (Lognormal)95% Coverage	5.254
KM SD of Logged Data	0.0758	95% KM UPL (Lognormal)	4.805
95% KM Percentile Lognormal (z)	4.674	95% KM USL (Lognormal)	4.813

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.639	Mean in Log Scale	0.897
SD in Original Scale	1.211	SD in Log Scale	0.383
95% UTL95% Coverage	8.306	95% UPL (t)	5.293
90% Percentile (z)	4.006	95% Percentile (z)	4.604
99% Percentile (z)	5.976	95% USL	5.338

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	8	95% UTL with95% Coverage	5.04
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	5.04
95% USL	5.04	95% KM Chebyshev UPL	5.717

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]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	4.42	Minimum Non-Detect	4
Maximum Detect	8.71	Maximum Non-Detect	4
Variance Detected	6.009	Percent Non-Detects	62.5%
Mean Detected	5.88	SD Detected	2.451
Mean of Detected Logged Data	1.719	SD of Detected Logged Data	0.386

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.766	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.379	**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) Background Statistics Assuming Normal Distribution

KM Mean	4.705	KM SD	1.527
95% UTL95% Coverage	9.57	95% KM UPL (t)	7.773
90% KM Percentile (z)	6.661	95% KM Percentile (z)	7.216
99% KM Percentile (z)	8.256	95% KM USL	7.807

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	3.455	SD	2.398
95% UTL95% Coverage	11.1	95% UPL (t)	8.273
90% Percentile (z)	6.528	95% Percentile (z)	7.399
99% Percentile (z)	9.033	95% USL	8.326

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	0.588	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.419	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.432	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.672	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.608	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	58.03	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

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	2.329
Maximum	8.71	Median	0.48
SD	3.235	CV	1.389
k hat (MLE)	0.278	k star (bias corrected MLE)	0.257
Theta hat (MLE)	8.372	Theta star (bias corrected MLE)	9.055
nu hat (MLE)	4.451	nu star (bias corrected)	4.115
MLE Mean (bias corrected)	2.329	MLE Sd (bias corrected)	4.592
95% Percentile of Chisquare (2kstar)	2.469	90% Percentile	6.975
95% Percentile	11.18	99% Percentile	22.32

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	39.57	62.95	95% Approx. Gamma UPL	15.27	19.22
95% Gamma USL	15.6	19.72			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.705	SD (KM)	1.527
Variance (KM)	2.331	SE of Mean (KM)	0.661
k hat (KM)	9.499	k star (KM)	6.02
nu hat (KM)	152	nu star (KM)	96.32
theta hat (KM)	0.495	theta star (KM)	0.782
80% gamma percentile (KM)	6.197	90% gamma percentile (KM)	7.269
95% gamma percentile (KM)	8.238	99% gamma percentile (KM)	10.27

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	9.874	9.923	95% Approx. Gamma UPL	7.603	7.58
95% KM Gamma Percentile	6.978	6.947	95% Gamma USL	7.642	7.62

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.772	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.376	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	3.139	Mean in Log Scale	0.839
SD in Original Scale	2.671	SD in Log Scale	0.844
95% UTL95% Coverage	34.02	95% BCA UTL95% Coverage	8.71
95% Bootstrap (%) UTL95% Coverage	8.71	95% UPL (t)	12.6
90% Percentile (z)	6.819	95% Percentile (z)	9.264
99% Percentile (z)	16.46	95% USL	12.84

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.511	95% KM UTL (Lognormal)95% Coverage	10.1
KM SD of Logged Data	0.251	95% KM UPL (Lognormal)	7.509
95% KM Percentile Lognormal (z)	6.852	95% KM USL (Lognormal)	7.551

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	3.455	Mean in Log Scale	1.078
SD in Original Scale	2.398	SD in Log Scale	0.57
95% UTL95% Coverage	18.05	95% UPL (t)	9.23
90% Percentile (z)	6.097	95% Percentile (z)	7.499
99% Percentile (z)	11.06	95% USL	9.347

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	8	95% UTL with95% Coverage	8.71
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	8.71
95% USL	8.71	95% KM Chebyshev UPL	11.76

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]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	7		
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	4.03	Minimum Non-Detect	4
Maximum Detect	16.8	Maximum Non-Detect	4
Variance Detected	17.94	Percent Non-Detects	25%
Mean Detected	10.33	SD Detected	4.235
Mean of Detected Logged Data	2.249	SD of Detected Logged Data	0.482

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.171	**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) Background Statistics Assuming Normal Distribution

KM Mean	8.745	KM SD	4.326
95% UTL95% Coverage	22.53	95% KM UPL (t)	17.44
90% KM Percentile (z)	14.29	95% KM Percentile (z)	15.86
99% KM Percentile (z)	18.81	95% KM USL	17.53

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	8.245	SD	5.26
95% UTL95% Coverage	25.01	95% UPL (t)	18.82
90% Percentile (z)	14.99	95% Percentile (z)	16.9
99% Percentile (z)	20.48	95% USL	18.93

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	0.282	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.209	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.333	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)	6.023	k star (bias corrected MLE)	3.123
Theta hat (MLE)	1.715	Theta star (bias corrected MLE)	3.307
nu hat (MLE)	72.28	nu star (bias corrected)	37.47
MLE Mean (bias corrected)	10.33		
MLE Sd (bias corrected)	5.844	95% Percentile of Chisquare (2kstar)	12.96

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	0.742	Mean	8.152
Maximum	16.8	Median	9.165
SD	5.409	CV	0.663
k hat (MLE)	1.647	k star (bias corrected MLE)	1.113
Theta hat (MLE)	4.95	Theta star (bias corrected MLE)	7.327
nu hat (MLE)	26.35	nu star (bias corrected)	17.8
MLE Mean (bias corrected)	8.152	MLE Sd (bias corrected)	7.728
95% Percentile of Chisquare (2kstar)	6.421	90% Percentile	18.28
95% Percentile	23.52	99% Percentile	35.59

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	48.69	58.37	95% Approx. Gamma UPL	26.99	29.62
95% Gamma USL	27.32	30.03			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.745	SD (KM)	4.326
Variance (KM)	18.71	SE of Mean (KM)	1.675
k hat (KM)	4.086	k star (KM)	2.637
nu hat (KM)	65.38	nu star (KM)	42.2
theta hat (KM)	2.14	theta star (KM)	3.316
80% gamma percentile (KM)	12.67	90% gamma percentile (KM)	15.96
95% gamma percentile (KM)	19.06	99% gamma percentile (KM)	25.81

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	30.26	32.22	95% Approx. Gamma UPL	19.77	20.27
95% KM Gamma Percentile	17.1	17.36	95% Gamma USL	19.94	20.46

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.227	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	8.499	Mean in Log Scale	1.96
SD in Original Scale	4.932	SD in Log Scale	0.678
95% UTL95% Coverage	61.63	95% BCA UTL95% Coverage	16.8
95% Bootstrap (%) UTL95% Coverage	16.8	95% UPL (t)	27.74
90% Percentile (z)	16.93	95% Percentile (z)	21.66
99% Percentile (z)	34.38	95% USL	28.16

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	2.034	95% KM UTL (Lognormal)95% Coverage	41.89
KM SD of Logged Data	0.534	95% KM UPL (Lognormal)	22.34
95% KM Percentile Lognormal (z)	18.39	95% KM USL (Lognormal)	22.61

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	8.245	Mean in Log Scale	1.86
SD in Original Scale	5.26	SD in Log Scale	0.828
95% UTL95% Coverage	89.85	95% UPL (t)	33.91
90% Percentile (z)	18.56	95% Percentile (z)	25.07
99% Percentile (z)	44.07	95% USL	34.53

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	8	95% UTL with95% Coverage	16.8
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	16.8
95% USL	16.8	95% KM Chebyshev UPL	28.75

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	40	Number of Missing Observations	0
Number of Distinct Observations	25		
Number of Detects	34	Number of Non-Detects	6
Number of Distinct Detects	25	Number of Distinct Non-Detects	1
Minimum Detect	1.02	Minimum Non-Detect	2
Maximum Detect	11.6	Maximum Non-Detect	2
Variance Detected	6.229	Percent Non-Detects	15%
Mean Detected	3.896	SD Detected	2.496
Mean of Detected Logged Data	1.194	SD of Detected Logged Data	0.567

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.908	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.175	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	3.465	KM SD	2.489
95% UTL95% Coverage	8.734	95% KM UPL (t)	7.71
90% KM Percentile (z)	6.654	95% KM Percentile (z)	7.558
99% KM Percentile (z)	9.254	95% KM USL	10.6

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	3.462	SD	2.523
95% UTL95% Coverage	8.804	95% UPL (t)	7.766
90% Percentile (z)	6.696	95% Percentile (z)	7.612
99% Percentile (z)	9.332	95% USL	10.7

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	1.334	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.162	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.152	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)	3.173	k star (bias corrected MLE)	2.912
Theta hat (MLE)	1.228	Theta star (bias corrected MLE)	1.338
nu hat (MLE)	215.7	nu star (bias corrected)	198
MLE Mean (bias corrected)	3.896		
MLE Sd (bias corrected)	2.283	95% Percentile of Chisquare (2kstar)	12.33

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	3.345
Maximum	11.6	Median	2.687
SD	2.654	CV	0.793
k hat (MLE)	0.972	k star (bias corrected MLE)	0.916
Theta hat (MLE)	3.442	Theta star (bias corrected MLE)	3.654
nu hat (MLE)	77.74	nu star (bias corrected)	73.25
MLE Mean (bias corrected)	3.345	MLE Sd (bias corrected)	3.496
95% Percentile of Chisquare (2kstar)	5.66	90% Percentile	7.872
95% Percentile	10.34	99% Percentile	16.11

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	13.25	15.77	95% Approx. Gamma UPL	10.23	11.63
95% Gamma USL	20.19	26.04			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.465	SD (KM)	2.489
Variance (KM)	6.193	SE of Mean (KM)	0.399
k hat (KM)	1.938	k star (KM)	1.81
nu hat (KM)	155.1	nu star (KM)	144.8
theta hat (KM)	1.787	theta star (KM)	1.915
80% gamma percentile (KM)	5.248	90% gamma percentile (KM)	6.9
95% gamma percentile (KM)	8.485	99% gamma percentile (KM)	12.02

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	9.677	9.955	95% Approx. Gamma UPL	7.959	8.067
95% KM Gamma Percentile	7.724	7.812	95% Gamma USL	13.42	14.23

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.943	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.137	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	3.465	Mean in Log Scale	1.015
SD in Original Scale	2.521	SD in Log Scale	0.683
95% UTL95% Coverage	11.72	95% BCA UTL95% Coverage	11.6
95% Bootstrap (%) UTL95% Coverage	11.6	95% UPL (t)	8.85
90% Percentile (z)	6.623	95% Percentile (z)	8.489
99% Percentile (z)	13.52	95% USL	19.57

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.018	95% KM UTL (Lognormal)95% Coverage	11.3
KM SD of Logged Data	0.664	95% KM UPL (Lognormal)	8.597
95% KM Percentile Lognormal (z)	8.255	95% KM USL (Lognormal)	18.6

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	3.462	Mean in Log Scale	1.015
SD in Original Scale	2.523	SD in Log Scale	0.677
95% UTL95% Coverage	11.58	95% UPL (t)	8.763
90% Percentile (z)	6.574	95% Percentile (z)	8.409
99% Percentile (z)	13.34	95% USL	19.25

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	40	95% UTL with95% Coverage	11.6
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
Approximate Sample Size needed to achieve specified CC	59	95% UPL	9.707
95% USL	11.6	95% KM Chebyshev UPL	14.45

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	7		
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	2.07	Minimum Non-Detect	2
Maximum Detect	3.35	Maximum Non-Detect	2
Variance Detected	0.276	Percent Non-Detects	25%
Mean Detected	2.69	SD Detected	0.526
Mean of Detected Logged Data	0.974	SD of Detected Logged Data	0.195

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.235	**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) Background Statistics Assuming Normal Distribution

KM Mean	2.518	KM SD	0.512
95% UTL95% Coverage	4.149	95% KM UPL (t)	3.546
90% KM Percentile (z)	3.173	95% KM Percentile (z)	3.359
99% KM Percentile (z)	3.708	95% KM USL	3.557

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.268	SD	0.9
95% UTL95% Coverage	5.135	95% UPL (t)	4.075
90% Percentile (z)	3.42	95% Percentile (z)	3.747
99% Percentile (z)	4.36	95% USL	4.095

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	0.369	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.332	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)	31.76	k star (bias corrected MLE)	15.99
Theta hat (MLE)	0.0847	Theta star (bias corrected MLE)	0.168
nu hat (MLE)	381.1	nu star (bias corrected)	191.9
MLE Mean (bias corrected)	2.69		
MLE Sd (bias corrected)	0.673	95% Percentile of Chisquare (2kstar)	46.17

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	1.322	Mean	2.385
Maximum	3.35	Median	2.35
SD	0.723	CV	0.303
k hat (MLE)	11.55	k star (bias corrected MLE)	7.301
Theta hat (MLE)	0.207	Theta star (bias corrected MLE)	0.327
nu hat (MLE)	184.8	nu star (bias corrected)	116.8
MLE Mean (bias corrected)	2.385	MLE Sd (bias corrected)	0.883
95% Percentile of Chisquare (2kstar)	24.47	90% Percentile	3.563
95% Percentile	3.997	99% Percentile	4.901

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	5.546	5.72	95% Approx. Gamma UPL	4.134	4.188
95% Gamma USL	4.158	4.214			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.518	SD (KM)	0.512
Variance (KM)	0.262	SE of Mean (KM)	0.198
k hat (KM)	24.2	k star (KM)	15.21
nu hat (KM)	387.2	nu star (KM)	243.3
theta hat (KM)	0.104	theta star (KM)	0.166
80% gamma percentile (KM)	3.039	90% gamma percentile (KM)	3.372
95% gamma percentile (KM)	3.665	99% gamma percentile (KM)	4.257

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	4.414	4.458	95% Approx. Gamma UPL	3.615	3.625
95% KM Gamma Percentile	3.389	3.393	95% Gamma USL	3.629	3.64

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.223	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.422	Mean in Log Scale	0.85
SD in Original Scale	0.669	SD in Log Scale	0.284
95% UTL95% Coverage	5.792	95% BCA UTL95% Coverage	3.35
95% Bootstrap (%) UTL95% Coverage	3.35	95% UPL (t)	4.144
90% Percentile (z)	3.368	95% Percentile (z)	3.735
99% Percentile (z)	4.534	95% USL	4.17

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.904	95% KM UTL (Lognormal)95% Coverage	4.611
KM SD of Logged Data	0.196	95% KM UPL (Lognormal)	3.66
95% KM Percentile Lognormal (z)	3.408	95% KM USL (Lognormal)	3.676

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.268	Mean in Log Scale	0.73
SD in Original Scale	0.9	SD in Log Scale	0.48
95% UTL95% Coverage	9.578	95% UPL (t)	5.444
90% Percentile (z)	3.839	95% Percentile (z)	4.57
99% Percentile (z)	6.338	95% USL	5.502

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	8	95% UTL with95% Coverage	3.35
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.35
95% USL	3.35	95% KM Chebyshev UPL	4.884

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.26	Minimum Non-Detect	2
Maximum Detect	3.87	Maximum Non-Detect	2
Variance Detected	0.46	Percent Non-Detects	50%
Mean Detected	2.943	SD Detected	0.678
Mean of Detected Logged Data	1.06	SD of Detected Logged Data	0.224

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution

KM Mean	2.471	KM SD	0.628
95% UTL95% Coverage	4.473	95% KM UPL (t)	3.734
90% KM Percentile (z)	3.276	95% KM Percentile (z)	3.505
99% KM Percentile (z)	3.933	95% KM USL	3.747

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.971	SD	1.129
95% UTL95% Coverage	5.57	95% UPL (t)	4.241
90% Percentile (z)	3.418	95% Percentile (z)	3.829
99% Percentile (z)	4.598	95% USL	4.266

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	0.257	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.233	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	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)	26.32	k star (bias corrected MLE)	6.747
Theta hat (MLE)	0.112	Theta star (bias corrected MLE)	0.436
nu hat (MLE)	210.6	nu star (bias corrected)	53.97
MLE Mean (bias corrected)	2.943		
MLE Sd (bias corrected)	1.133	95% Percentile of Chisquare (2kstar)	23.02

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	0.279	Mean	1.949
Maximum	3.87	Median	1.904
SD	1.205	CV	0.618
k hat (MLE)	2.17	k star (bias corrected MLE)	1.44
Theta hat (MLE)	0.898	Theta star (bias corrected MLE)	1.354
nu hat (MLE)	34.72	nu star (bias corrected)	23.04
MLE Mean (bias corrected)	1.949	MLE Sd (bias corrected)	1.624
95% Percentile of Chisquare (2kstar)	7.605	90% Percentile	4.102
95% Percentile	5.148	99% Percentile	7.514

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	9.894	11.38	95% Approx. Gamma UPL	5.762	6.173
95% Gamma USL	5.826	6.25			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.471	SD (KM)	0.628
Variance (KM)	0.395	SE of Mean (KM)	0.256
k hat (KM)	15.48	k star (KM)	9.756
nu hat (KM)	247.6	nu star (KM)	156.1
theta hat (KM)	0.16	theta star (KM)	0.253
80% gamma percentile (KM)	3.101	90% gamma percentile (KM)	3.524
95% gamma percentile (KM)	3.9	99% gamma percentile (KM)	4.673

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	4.761	4.81	95% Approx. Gamma UPL	3.775	3.782
95% KM Gamma Percentile	3.5	3.5	95% Gamma USL	3.792	3.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.224	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.183	Mean in Log Scale	0.698
SD in Original Scale	0.947	SD in Log Scale	0.439
95% UTL95% Coverage	8.135	95% BCA UTL95% Coverage	3.87
95% Bootstrap (%) UTL95% Coverage	3.87	95% UPL (t)	4.852
90% Percentile (z)	3.525	95% Percentile (z)	4.135
99% Percentile (z)	5.576	95% USL	4.9

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean of Logged Data	0.877	95% KM UTL (Lognormal)95% Coverage	4.985
KM SD of Logged Data	0.229	95% KM UPL (Lognormal)	3.807
95% KM Percentile Lognormal (z)	3.502	95% KM USL (Lognormal)	3.826

Background DL/2 Statistics Assuming Lognormal Distribution			
Mean in Original Scale	1.971	Mean in Log Scale	0.53
SD in Original Scale	1.129	SD in Log Scale	0.585
95% UTL95% Coverage	10.97	95% UPL (t)	5.508
90% Percentile (z)	3.597	95% Percentile (z)	4.449
99% Percentile (z)	6.63	95% USL	5.58

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	8	95% UTL with95% Coverage	3.87
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.87
95% USL	3.87	95% KM Chebyshev UPL	5.376

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]_intrawell_mw-15)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	2.05	Minimum Non-Detect	2
Maximum Detect	4.27	Maximum Non-Detect	2
Variance Detected	2.464	Percent Non-Detects	75%
Mean Detected	3.16	SD Detected	1.57
Mean of Detected Logged Data	1.085	SD of Detected Logged Data	0.519

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution			
KM Mean	2.29	KM SD	0.749
95% UTL95% Coverage	4.676	95% KM UPL (t)	3.794
90% KM Percentile (z)	3.249	95% KM Percentile (z)	3.521
99% KM Percentile (z)	4.031	95% KM USL	3.811

DL/2 Substitution Background Statistics Assuming Normal Distribution			
Mean	1.54	SD	1.163
95% UTL95% Coverage	5.245	95% UPL (t)	3.876
90% Percentile (z)	3.03	95% Percentile (z)	3.452
99% Percentile (z)	4.245	95% USL	3.902

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)	7.756	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.407	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	31.03	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)	2.29	SD (KM)	0.749
Variance (KM)	0.56	SE of Mean (KM)	0.374
k hat (KM)	9.359	k star (KM)	5.933
nu hat (KM)	149.7	nu star (KM)	94.92
theta hat (KM)	0.245	theta star (KM)	0.386
80% gamma percentile (KM)	3.021	90% gamma percentile (KM)	3.547
95% gamma percentile (KM)	4.023	99% gamma percentile (KM)	5.021

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	4.802	4.822	95% Approx. Gamma UPL	3.699	3.685
95% KM Gamma Percentile	3.395	3.378	95% Gamma USL	3.718	3.705

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

Mean in Original Scale	1.004	Mean in Log Scale	-0.962
SD in Original Scale	1.472	SD in Log Scale	1.552
95% UTL95% Coverage	53.67	95% BCA UTL95% Coverage	4.27
95% Bootstrap (%) UTL95% Coverage	4.27	95% UPL (t)	8.636
90% Percentile (z)	2.791	95% Percentile (z)	4.905
99% Percentile (z)	14.12	95% USL	8.938

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.791	95% KM UTL (Lognormal)95% Coverage	4.89
KM SD of Logged Data	0.25	95% KM UPL (Lognormal)	3.644
95% KM Percentile Lognormal (z)	3.327	95% KM USL (Lognormal)	3.664

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.54	Mean in Log Scale	0.271
SD in Original Scale	1.163	SD in Log Scale	0.539
95% UTL95% Coverage	7.31	95% UPL (t)	3.875
90% Percentile (z)	2.617	95% Percentile (z)	3.183
99% Percentile (z)	4.596	95% USL	3.921

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	8	95% UTL with95% Coverage	4.27
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.27
95% USL	4.27	95% KM Chebyshev UPL	5.751

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]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.39	First Quartile	3.688
Second Largest	7.96	Median	5.425
Maximum	11.4	Third Quartile	7.945
Mean	5.894	SD	3.104
Coefficient of Variation	0.527	Skewness	0.607
Mean of logged Data	1.643	SD of logged Data	0.561

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	15.79	90% Percentile (z)	9.872
95% UPL (t)	12.13	95% Percentile (z)	11
95% USL	12.2	99% Percentile (z)	13.12

Gamma GOF Test

A-D Test Statistic	0.255	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.16	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	3.983	k star (bias corrected MLE)	2.573
Theta hat (MLE)	1.48	Theta star (bias corrected MLE)	2.291
nu hat (MLE)	63.73	nu star (bias corrected)	41.16
MLE Mean (bias corrected)	5.894	MLE Sd (bias corrected)	3.674

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	13.91	90% Percentile	10.82
95% Hawkins Wixley (HW) Approx. Gamma UPL	14.3	95% Percentile	12.94
95% WH Approx. Gamma UTL with 95% Coverage	21.6	99% Percentile	17.57
95% HW Approx. Gamma UTL with 95% Coverage	23.13		
95% WH USL	14.03	95% HW USL	14.44

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.153	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	30.92	90% Percentile (z)	10.61
95% UPL (t)	15.97	95% Percentile (z)	13.02
95% USL	16.17	99% Percentile (z)	19.08

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	11.4
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	11.4	95% BCA Bootstrap UTL with 95% Coverage	11.4
95% UPL	11.4	90% Percentile	8.992
90% Chebyshev UPL	15.77	95% Percentile	10.2
95% Chebyshev UPL	20.25	99% Percentile	11.16
95% USL	11.4		

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 [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	84	Number of Missing Observations	0
Number of Distinct Observations	12		
Number of Detects	10	Number of Non-Detects	74
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	130	Minimum Non-Detect	200
Maximum Detect	484	Maximum Non-Detect	500
Variance Detected	13647	Percent Non-Detects	88.1%
Mean Detected	335.7	SD Detected	116.8
Mean of Detected Logged Data	5.751	SD of Detected Logged Data	0.404

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	1.952	d2max (for USL)	3.149

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.781	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.304	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	276.9	KM SD	131.9
95% UTL95% Coverage	534.5	95% KM UPL (t)	497.7
90% KM Percentile (z)	446	95% KM Percentile (z)	494
99% KM Percentile (z)	583.9	95% KM USL	692.4

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	253.1	SD	58.65
95% UTL95% Coverage	367.5	95% UPL (t)	351.2
90% Percentile (z)	328.2	95% Percentile (z)	349.5
99% Percentile (z)	389.5	95% USL	437.8

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	0.48	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.267	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)	7.79	k star (bias corrected MLE)	5.52
Theta hat (MLE)	43.09	Theta star (bias corrected MLE)	60.82
nu hat (MLE)	155.8	nu star (bias corrected)	110.4
MLE Mean (bias corrected)	335.7		
MLE Sd (bias corrected)	142.9	95% Percentile of Chisquare (2kstar)	19.73

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	27.18	Mean	283.4
Maximum	679	Median	268
SD	139.8	CV	0.493
k hat (MLE)	3.593	k star (bias corrected MLE)	3.473
Theta hat (MLE)	78.88	Theta star (bias corrected MLE)	81.61
nu hat (MLE)	603.7	nu star (bias corrected)	583.4
MLE Mean (bias corrected)	283.4	MLE Sd (bias corrected)	152.1
95% Percentile of Chisquare (2kstar)	13.99	90% Percentile	487.3
95% Percentile	570.8	99% Percentile	750.3

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	643	665.9	95% Approx. Gamma UPL	573.6	588.5
95% Gamma USL	1005	1088			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	276.9	SD (KM)	131.9
Variance (KM)	17408	SE of Mean (KM)	37.17
k hat (KM)	4.405	k star (KM)	4.256
nu hat (KM)	740.1	nu star (KM)	715
theta hat (KM)	62.86	theta star (KM)	65.07
80% gamma percentile (KM)	379.1	90% gamma percentile (KM)	456.8
95% gamma percentile (KM)	528.1	99% gamma percentile (KM)	680

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	599.1	612.5	95% Approx. Gamma UPL	537.8	545.9
95% KM Gamma Percentile	531.8	539.4	95% Gamma USL	915.7	970.3

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.199	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	289.1	Mean in Log Scale	5.536
SD in Original Scale	152.6	SD in Log Scale	0.518
95% UTL95% Coverage	696.9	95% BCA UTL95% Coverage	701.5
95% Bootstrap (%) UTL95% Coverage	655.2	95% UPL (t)	603.3
90% Percentile (z)	492.6	95% Percentile (z)	594.5
99% Percentile (z)	845.9	95% USL	1295

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.498	95% KM UTL (Lognormal)95% Coverage	666.1
KM SD of Logged Data	0.514	95% KM UPL (Lognormal)	577.2
95% KM Percentile Lognormal (z)	568.9	95% KM USL (Lognormal)	1232

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	253.1	Mean in Log Scale	5.505
SD in Original Scale	58.65	SD in Log Scale	0.253
95% UTL95% Coverage	403.3	95% UPL (t)	375.8
90% Percentile (z)	340.3	95% Percentile (z)	373.1
99% Percentile (z)	443.5	95% USL	546.3

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	83	95% UTL with95% Coverage	500
Approx, f used to compute achieved CC	2.184	Approximate Actual Confidence Coefficient achieved by UTL	0.927
Approximate Sample Size needed to achieve specified CC	59	95% UPL	500
95% USL	500	95% KM Chebyshev UPL	855.5

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 [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	6
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	285	Minimum Non-Detect	500
Maximum Detect	584	Maximum Non-Detect	500
Variance Detected	22550	Percent Non-Detects	66.67%
Mean Detected	426.3	SD Detected	150.2
Mean of Detected Logged Data	6.013	SD of Detected Logged Data	0.359

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.21	**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) Background Statistics Assuming Normal Distribution

KM Mean	373.8	KM SD	94.85
95% UTL95% Coverage	661.3	95% KM UPL (t)	559.7
90% KM Percentile (z)	495.3	95% KM Percentile (z)	529.8
99% KM Percentile (z)	594.4	95% KM USL	573.9

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	308.8	SD	115.8
95% UTL95% Coverage	659.8	95% UPL (t)	535.8
90% Percentile (z)	457.2	95% Percentile (z)	499.3
99% Percentile (z)	578.2	95% USL	553.1

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	0.246	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.226	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.432	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.96	k star (bias corrected MLE)	N/A
Theta hat (MLE)	35.63	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	71.79	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

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	235.1	Mean	371.9
Maximum	584	Median	363.5
SD	106.5	CV	0.286
k hat (MLE)	14.44	k star (bias corrected MLE)	9.702
Theta hat (MLE)	25.75	Theta star (bias corrected MLE)	38.33
nu hat (MLE)	259.9	nu star (bias corrected)	174.6
MLE Mean (bias corrected)	371.9	MLE Sd (bias corrected)	119.4
95% Percentile of Chisquare (2kstar)	30.66	90% Percentile	530.8
95% Percentile	587.6	99% Percentile	704.3

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	769.6	783.6	95% Approx. Gamma UPL	602.8	606.7
95% Gamma USL	624.4	629.4			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	373.8	SD (KM)	94.85
Variance (KM)	8996	SE of Mean (KM)	56.88
k hat (KM)	15.53	k star (KM)	10.43
nu hat (KM)	279.5	nu star (KM)	187.7
theta hat (KM)	24.07	theta star (KM)	35.85
80% gamma percentile (KM)	466.1	90% gamma percentile (KM)	527.7
95% gamma percentile (KM)	582.3	99% gamma percentile (KM)	694.2

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	710.9	719.7	95% Approx. Gamma UPL	571.7	573.8
95% KM Gamma Percentile	534.5	535.4	95% Gamma USL	589.9	592.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.176	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	370.2	Mean in Log Scale	5.881
SD in Original Scale	104.3	SD in Log Scale	0.27
95% UTL95% Coverage	810.9	95% BCA UTL95% Coverage	584
95% Bootstrap (%) UTL95% Coverage	584	95% UPL (t)	607.6
90% Percentile (z)	506	95% Percentile (z)	558.1
99% Percentile (z)	670.6	95% USL	632.6

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.894	95% KM UTL (Lognormal)95% Coverage	751.5
KM SD of Logged Data	0.24	95% KM UPL (Lognormal)	581
95% KM Percentile Lognormal (z)	538.6	95% KM USL (Lognormal)	602.2

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	308.8	Mean in Log Scale	5.685
SD in Original Scale	115.8	SD in Log Scale	0.304
95% UTL95% Coverage	740.5	95% UPL (t)	534.6
90% Percentile (z)	434.9	95% Percentile (z)	485.7
99% Percentile (z)	597.6	95% USL	559.5

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	9	95% UTL with95% Coverage	584
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	584

95% USL	584	95% KM Chebyshev UPL	809.6

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 [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	6
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	280	Minimum Non-Detect	500
Maximum Detect	682	Maximum Non-Detect	500
Variance Detected	41302	Percent Non-Detects	66.67%
Mean Detected	498.3	SD Detected	203.2
Mean of Detected Logged Data	6.146	SD of Detected Logged Data	0.46

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.234	**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) Background Statistics Assuming Normal Distribution

KM Mean	352.8	KM SD	140.6
95% UTL95% Coverage	779	95% KM UPL (t)	628.4
90% KM Percentile (z)	533	95% KM Percentile (z)	584.1
99% KM Percentile (z)	679.9	95% KM USL	649.4

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	332.8	SD	160.4
95% UTL95% Coverage	819.1	95% UPL (t)	647.3
90% Percentile (z)	538.4	95% Percentile (z)	596.7
99% Percentile (z)	706	95% USL	671.2

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	0.313	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.288	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.433	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.837	k star (bias corrected MLE)	N/A
Theta hat (MLE)	63.59	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	47.02	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

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	121	Mean	346.9
Maximum	682	Median	299.7
SD	174.7	CV	0.504
k hat (MLE)	4.443	k star (bias corrected MLE)	3.036
Theta hat (MLE)	78.09	Theta star (bias corrected MLE)	114.3
nu hat (MLE)	79.97	nu star (bias corrected)	54.65
MLE Mean (bias corrected)	346.9	MLE Sd (bias corrected)	199.1
95% Percentile of Chisquare (2kstar)	12.7	90% Percentile	613.9
95% Percentile	725.6	99% Percentile	967.6

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	1132	1198	95% Approx. Gamma UPL	768.8	787
95% Gamma USL	814	836.8			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	352.8	SD (KM)	140.6
Variance (KM)	19772	SE of Mean (KM)	57.4
k hat (KM)	6.295	k star (KM)	4.27
nu hat (KM)	113.3	nu star (KM)	76.87
theta hat (KM)	56.05	theta star (KM)	82.61
80% gamma percentile (KM)	482.7	90% gamma percentile (KM)	581.5
95% gamma percentile (KM)	672.2	99% gamma percentile (KM)	865.2

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	838.1	848.6	95% Approx. Gamma UPL	627	626.9
95% KM Gamma Percentile	572.4	570.8	95% Gamma USL	654	654.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.28	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	354.2	Mean in Log Scale	5.785
SD in Original Scale	162.3	SD in Log Scale	0.43
95% UTL95% Coverage	1199	95% BCA UTL95% Coverage	682
95% Bootstrap (%) UTL95% Coverage	682	95% UPL (t)	756.1
90% Percentile (z)	564.7	95% Percentile (z)	660.2
99% Percentile (z)	885.1	95% USL	806.3

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.805	95% KM UTL (Lognormal)95% Coverage	886.8
KM SD of Logged Data	0.324	95% KM UPL (Lognormal)	626.7
95% KM Percentile Lognormal (z)	565.9	95% KM USL (Lognormal)	657.8

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	332.8	Mean in Log Scale	5.73
SD in Original Scale	160.4	SD in Log Scale	0.388
95% UTL95% Coverage	997.3	95% UPL (t)	658.4
90% Percentile (z)	506	95% Percentile (z)	582.6
99% Percentile (z)	758.8	95% USL	697.6

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	9	95% UTL with95% Coverage	682
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	682
95% USL	682	95% KM Chebyshev UPL	998.8

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.

x_ols (fluoride [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	298	Minimum Non-Detect	200
Maximum Detect	486	Maximum Non-Detect	500
Variance Detected	17672	Percent Non-Detects	77.78%
Mean Detected	392	SD Detected	132.9
Mean of Detected Logged Data	5.942	SD of Detected Logged Data	0.346

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	328	KM SD	118.7
95% UTL95% Coverage	687.7	95% KM UPL (t)	560.6
90% KM Percentile (z)	480.1	95% KM Percentile (z)	523.2
99% KM Percentile (z)	604.1	95% KM USL	578.3

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	264.9	SD	99.06
95% UTL95% Coverage	565.1	95% UPL (t)	459.1
90% Percentile (z)	391.8	95% Percentile (z)	427.8
99% Percentile (z)	495.3	95% USL	473.9

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)	17.05	k star (bias corrected MLE)	N/A
Theta hat (MLE)	22.99	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	68.2	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)	328	SD (KM)	118.7
Variance (KM)	14083	SE of Mean (KM)	96.89
k hat (KM)	7.639	k star (KM)	5.167
nu hat (KM)	137.5	nu star (KM)	93.01
theta hat (KM)	42.93	theta star (KM)	63.48
80% gamma percentile (KM)	439.3	90% gamma percentile (KM)	521.1
95% gamma percentile (KM)	595.6	99% gamma percentile (KM)	752.8

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	804.8	828.4	95% Approx. Gamma UPL	596.2	602.6
95% KM Gamma Percentile	542.5	545.9	95% Gamma USL	622.8	630.9

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

Mean in Original Scale	307.6	Mean in Log Scale	5.582
SD in Original Scale	170.7	SD in Log Scale	0.589
95% UTL95% Coverage	1582	95% BCA UTL95% Coverage	616
95% Bootstrap (%) UTL95% Coverage	616	95% UPL (t)	842.1
90% Percentile (z)	564.8	95% Percentile (z)	699.5
99% Percentile (z)	1045	95% USL	919.5

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.727	95% KM UTL (Lognormal)95% Coverage	923.1
KM SD of Logged Data	0.363	95% KM UPL (Lognormal)	625.7
95% KM Percentile Lognormal (z)	558.1	95% KM USL (Lognormal)	660.6

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	264.9	Mean in Log Scale	5.513
SD in Original Scale	99.06	SD in Log Scale	0.405
95% UTL95% Coverage	845.8	95% UPL (t)	548.2
90% Percentile (z)	416.5	95% Percentile (z)	482.5
99% Percentile (z)	635.9	95% USL	582.4

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	9	95% UTL with95% Coverage	500
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	500
95% USL	500	95% KM Chebyshev UPL	873.3

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 (fluoride [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	9	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	255	Minimum Non-Detect	200
Maximum Detect	441	Maximum Non-Detect	500
Variance Detected	17298	Percent Non-Detects	77.78%
Mean Detected	348	SD Detected	131.5
Mean of Detected Logged Data	5.815	SD of Detected Logged Data	0.387

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.031	d2max (for USL)	2.11

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	298.7	KM SD	103.1
95% UTL95% Coverage	611.2	95% KM UPL (t)	500.8
90% KM Percentile (z)	430.8	95% KM Percentile (z)	468.3
99% KM Percentile (z)	538.6	95% KM USL	516.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	255.1	SD	85.71
95% UTL95% Coverage	514.9	95% UPL (t)	423.1

90% Percentile (z)	365	95% Percentile (z)	396.1
99% Percentile (z)	454.5	95% USL	435.9

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)	13.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	25.47	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	54.64	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)	298.7	SD (KM)	103.1
Variance (KM)	10634	SE of Mean (KM)	84.2
k hat (KM)	8.389	k star (KM)	5.667
nu hat (KM)	151	nu star (KM)	102
theta hat (KM)	35.6	theta star (KM)	52.71
80% gamma percentile (KM)	396	90% gamma percentile (KM)	466.5
95% gamma percentile (KM)	530.4	99% gamma percentile (KM)	664.8

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	693.7	709.3	95% Approx. Gamma UPL	522.9	526.7
95% KM Gamma Percentile	478.6	480.4	95% Gamma USL	544.9	549.8

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

Mean in Original Scale	269	Mean in Log Scale	5.413
SD in Original Scale	165.5	SD in Log Scale	0.659
95% UTL95% Coverage	1653	95% BCA UTL95% Coverage	575.1
95% Bootstrap (%) UTL95% Coverage	575.1	95% UPL (t)	816.2
90% Percentile (z)	521.9	95% Percentile (z)	663.1
99% Percentile (z)	1039	95% USL	900.7

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	5.643	95% KM UTL (Lognormal)95% Coverage	769.1
KM SD of Logged Data	0.331	95% KM UPL (Lognormal)	539.8
95% KM Percentile Lognormal (z)	486.3	95% KM USL (Lognormal)	567.1

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	255.1	Mean in Log Scale	5.485
SD in Original Scale	85.71	SD in Log Scale	0.379
95% UTL95% Coverage	760.6	95% UPL (t)	506.8
90% Percentile (z)	391.8	95% Percentile (z)	449.7
99% Percentile (z)	582.3	95% USL	536.3

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	9	95% UTL with95% Coverage	500
Approx, f used to compute achieved CC	0.474	Approximate Actual Confidence Coefficient achieved by UTL	0.37
Approximate Sample Size needed to achieve specified CC	59	95% UPL	500
95% USL	500	95% KM Chebyshev UPL	772.5

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	36	Number of Missing Observations	0
Number of Distinct Observations	17		
Number of Detects	16	Number of Non-Detects	20
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	2.29	Minimum Non-Detect	2
Maximum Detect	14	Maximum Non-Detect	2
Variance Detected	11.09	Percent Non-Detects	55.56%
Mean Detected	7.026	SD Detected	3.33
Mean of Detected Logged Data	1.83	SD of Detected Logged Data	0.529

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.844	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.113	**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) Background Statistics Assuming Normal Distribution

KM Mean	4.234	KM SD	3.295
95% UTL95% Coverage	11.31	95% KM UPL (t)	9.878
90% KM Percentile (z)	8.457	95% KM Percentile (z)	9.654
99% KM Percentile (z)	11.9	95% KM USL	13.54

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	3.678	SD	3.738
95% UTL95% Coverage	11.71	95% UPL (t)	10.08
90% Percentile (z)	8.469	95% Percentile (z)	9.827
99% Percentile (z)	12.38	95% USL	14.23

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	0.269	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.132	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.216	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)	4.354	k star (bias corrected MLE)	3.579
Theta hat (MLE)	1.614	Theta star (bias corrected MLE)	1.963
nu hat (MLE)	139.3	nu star (bias corrected)	114.5
MLE Mean (bias corrected)	7.026		
MLE Sd (bias corrected)	3.714	95% Percentile of Chisquare (2kstar)	14.3

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	3.452
Maximum	14	Median	2.054
SD	3.957	CV	1.146
k hat (MLE)	0.363	k star (bias corrected MLE)	0.351
Theta hat (MLE)	9.514	Theta star (bias corrected MLE)	9.832
nu hat (MLE)	26.12	nu star (bias corrected)	25.28
MLE Mean (bias corrected)	3.452	MLE Sd (bias corrected)	5.826
95% Percentile of Chisquare (2kstar)	3.05	90% Percentile	9.964
95% Percentile	15	99% Percentile	27.83

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	21.53	27.92	95% Approx. Gamma UPL	14.74	17.57
95% Gamma USL	35.73	52.25			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.234	SD (KM)	3.295
Variance (KM)	10.86	SE of Mean (KM)	0.567
k hat (KM)	1.651	k star (KM)	1.532
nu hat (KM)	118.9	nu star (KM)	110.3
theta hat (KM)	2.565	theta star (KM)	2.764
80% gamma percentile (KM)	6.536	90% gamma percentile (KM)	8.778
95% gamma percentile (KM)	10.95	99% gamma percentile (KM)	15.85

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	12.36	12.61	95% Approx. Gamma UPL	9.986	10.04
95% KM Gamma Percentile	9.645	9.675	95% Gamma USL	16.74	17.55

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.906	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.166	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	4.008	Mean in Log Scale	1.003
SD in Original Scale	3.543	SD in Log Scale	0.92
95% UTL95% Coverage	19.66	95% BCA UTL95% Coverage	14
95% Bootstrap (%) UTL95% Coverage	14	95% UPL (t)	13.17
90% Percentile (z)	8.858	95% Percentile (z)	12.37
99% Percentile (z)	23.16	95% USL	36.59

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.199	95% KM UTL (Lognormal)95% Coverage	13.7
KM SD of Logged Data	0.66	95% KM UPL (Lognormal)	10.28
95% KM Percentile Lognormal (z)	9.825	95% KM USL (Lognormal)	21.4

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	3.678	Mean in Log Scale	0.814
SD in Original Scale	3.738	SD in Log Scale	0.985
95% UTL95% Coverage	18.74	95% UPL (t)	12.2
90% Percentile (z)	7.976	95% Percentile (z)	11.41
99% Percentile (z)	22.33	95% USL	36.45

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	36	95% UTL with95% Coverage	14
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	12.9
95% USL	14	95% KM Chebyshev UPL	18.8

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.

x_ols (lead [ug/l]_intrawell_mw-13)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	2.06	Minimum Non-Detect	2
Maximum Detect	4.08	Maximum Non-Detect	2
Variance Detected	0.694	Percent Non-Detects	37.5%
Mean Detected	2.632	SD Detected	0.833
Mean of Detected Logged Data	0.934	SD of Detected Logged Data	0.278

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.339	**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) Background Statistics Assuming Normal Distribution			
KM Mean	2.395	KM SD	0.664
95% UTL95% Coverage	4.511	95% KM UPL (t)	3.729
90% KM Percentile (z)	3.246	95% KM Percentile (z)	3.487
99% KM Percentile (z)	3.939	95% KM USL	3.744

DL/2 Substitution Background Statistics Assuming Normal Distribution			
Mean	2.02	SD	1.054
95% UTL95% Coverage	5.378	95% UPL (t)	4.137
90% Percentile (z)	3.37	95% Percentile (z)	3.753
99% Percentile (z)	4.471	95% USL	4.161

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	0.609	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**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)	15	k star (bias corrected MLE)	6.135
Theta hat (MLE)	0.175	Theta star (bias corrected MLE)	0.429
nu hat (MLE)	150	nu star (bias corrected)	61.35
MLE Mean (bias corrected)	2.632		
MLE Sd (bias corrected)	1.063	95% Percentile of Chisquare (2kstar)	21.39

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	0.273	Mean	1.91
Maximum	4.08	Median	2.085
SD	1.199	CV	0.628
k hat (MLE)	2.15	k star (bias corrected MLE)	1.427
Theta hat (MLE)	0.888	Theta star (bias corrected MLE)	1.338
nu hat (MLE)	34.41	nu star (bias corrected)	22.84
MLE Mean (bias corrected)	1.91	MLE Sd (bias corrected)	1.599
95% Percentile of Chisquare (2kstar)	7.561	90% Percentile	4.029
95% Percentile	5.06	99% Percentile	7.395

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	9.744	11.22	95% Approx. Gamma UPL	5.666	6.072
95% Gamma USL	5.729	6.148			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.395	SD (KM)	0.664
Variance (KM)	0.441	SE of Mean (KM)	0.262
k hat (KM)	13.01	k star (KM)	8.217
nu hat (KM)	208.2	nu star (KM)	131.5
theta hat (KM)	0.184	theta star (KM)	0.291
80% gamma percentile (KM)	3.055	90% gamma percentile (KM)	3.509
95% gamma percentile (KM)	3.914	99% gamma percentile (KM)	4.753

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	4.683	4.712	95% Approx. Gamma UPL	3.694	3.69
95% KM Gamma Percentile	3.419	3.41	95% Gamma USL	3.711	3.708

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.297	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.105	Mean in Log Scale	0.656
SD in Original Scale	0.97	SD in Log Scale	0.449
95% UTL95% Coverage	8.056	95% BCA UTL95% Coverage	4.08
95% Bootstrap (%) UTL95% Coverage	4.08	95% UPL (t)	4.749
90% Percentile (z)	3.425	95% Percentile (z)	4.032
99% Percentile (z)	5.475	95% USL	4.796

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.844	95% KM UTL (Lognormal)95% Coverage	4.813
KM SD of Logged Data	0.228	95% KM UPL (Lognormal)	3.679
95% KM Percentile Lognormal (z)	3.385	95% KM USL (Lognormal)	3.697

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.02	Mean in Log Scale	0.584
SD in Original Scale	1.054	SD in Log Scale	0.527
95% UTL95% Coverage	9.615	95% UPL (t)	5.17
90% Percentile (z)	3.522	95% Percentile (z)	4.266
99% Percentile (z)	6.109	95% USL	5.23

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	8	95% UTL with95% Coverage	4.08
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.08
95% USL	4.08	95% KM Chebyshev UPL	5.464

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.54	Minimum Non-Detect	2
Maximum Detect	5.23	Maximum Non-Detect	2
Variance Detected	1.39	Percent Non-Detects	50%
Mean Detected	3.7	SD Detected	1.179
Mean of Detected Logged Data	1.271	SD of Detected Logged Data	0.314

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution

KM Mean	2.85	KM SD	1.115
95% UTL95% Coverage	6.404	95% KM UPL (t)	5.091
90% KM Percentile (z)	4.279	95% KM Percentile (z)	4.684
99% KM Percentile (z)	5.444	95% KM USL	5.116

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.35	SD	1.637
95% UTL95% Coverage	7.566	95% UPL (t)	5.639
90% Percentile (z)	4.447	95% Percentile (z)	5.042
99% Percentile (z)	6.157	95% USL	5.675

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	0.229	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.221	**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)	13.54	k star (bias corrected MLE)	3.551
Theta hat (MLE)	0.273	Theta star (bias corrected MLE)	1.042
nu hat (MLE)	108.3	nu star (bias corrected)	28.4
MLE Mean (bias corrected)	3.7		
MLE Sd (bias corrected)	1.964	95% Percentile of Chisquare (2kstar)	14.21

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	2.11
Maximum	5.23	Median	1.918
SD	1.909	CV	0.905
k hat (MLE)	0.594	k star (bias corrected MLE)	0.455
Theta hat (MLE)	3.551	Theta star (bias corrected MLE)	4.641
nu hat (MLE)	9.506	nu star (bias corrected)	7.274
MLE Mean (bias corrected)	2.11	MLE Sd (bias corrected)	3.129
95% Percentile of Chisquare (2kstar)	3.613	90% Percentile	5.819
95% Percentile	8.383	99% Percentile	14.75

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	23.32	34.43	95% Approx. Gamma UPL	10.72	13.34
95% Gamma USL	10.9	13.62			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.85	SD (KM)	1.115
Variance (KM)	1.244	SE of Mean (KM)	0.455
k hat (KM)	6.531	k star (KM)	4.165
nu hat (KM)	104.5	nu star (KM)	66.65
theta hat (KM)	0.436	theta star (KM)	0.684
80% gamma percentile (KM)	3.911	90% gamma percentile (KM)	4.721
95% gamma percentile (KM)	5.466	99% gamma percentile (KM)	7.053

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	7.254	7.421	95% Approx. Gamma UPL	5.238	5.265
95% KM Gamma Percentile	4.7	4.705	95% Gamma USL	5.272	5.301

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.186	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.509	Mean in Log Scale	0.756
SD in Original Scale	1.511	SD in Log Scale	0.623
95% UTL95% Coverage	15.5	95% BCA UTL95% Coverage	5.23
95% Bootstrap (%) UTL95% Coverage	5.23	95% UPL (t)	7.445
90% Percentile (z)	4.73	95% Percentile (z)	5.932
99% Percentile (z)	9.069	95% USL	7.548

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.982	95% KM UTL (Lognormal)95% Coverage	8.073
KM SD of Logged Data	0.347	95% KM UPL (Lognormal)	5.364
95% KM Percentile Lognormal (z)	4.726	95% KM USL (Lognormal)	5.406

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.35	Mean in Log Scale	0.635
SD in Original Scale	1.637	SD in Log Scale	0.71
95% UTL95% Coverage	18.13	95% UPL (t)	7.861
90% Percentile (z)	4.689	95% Percentile (z)	6.068
99% Percentile (z)	9.844	95% USL	7.986

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	8	95% UTL with95% Coverage	5.23
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	5.23
95% USL	5.23	95% KM Chebyshev UPL	8.006

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]_intrawell_mw-15)

General Statistics			
Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.21	Minimum Non-Detect	2
Maximum Detect	8.59	Maximum Non-Detect	2
Variance Detected	9.383	Percent Non-Detects	50%
Mean Detected	4.018	SD Detected	3.063
Mean of Detected Logged Data	1.218	SD of Detected Logged Data	0.633

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.712	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution			
KM Mean	3.009	KM SD	2.13
95% UTL95% Coverage	9.797	95% KM UPL (t)	7.289
90% KM Percentile (z)	5.738	95% KM Percentile (z)	6.512
99% KM Percentile (z)	7.963	95% KM USL	7.336

DL/2 Substitution Background Statistics Assuming Normal Distribution			
Mean	2.509	SD	2.573
95% UTL95% Coverage	10.71	95% UPL (t)	7.68
90% Percentile (z)	5.807	95% Percentile (z)	6.742
99% Percentile (z)	8.496	95% USL	7.737

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	0.662	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.382	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.397	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)	3.046	k star (bias corrected MLE)	0.928
Theta hat (MLE)	1.319	Theta star (bias corrected MLE)	4.329
nu hat (MLE)	24.37	nu star (bias corrected)	7.425
MLE Mean (bias corrected)	4.018		
MLE Sd (bias corrected)	4.17	95% Percentile of Chisquare (2kstar)	5.71

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	2.014
Maximum	8.59	Median	1.11
SD	2.934	CV	1.457
k hat (MLE)	0.29	k star (bias corrected MLE)	0.264
Theta hat (MLE)	6.951	Theta star (bias corrected MLE)	7.616
nu hat (MLE)	4.635	nu star (bias corrected)	4.23
MLE Mean (bias corrected)	2.014	MLE Sd (bias corrected)	3.916
95% Percentile of Chisquare (2kstar)	2.517	90% Percentile	6.018
95% Percentile	9.584	99% Percentile	19.01

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	33.49	53.17	95% Approx. Gamma UPL	13.05	16.45
95% Gamma USL	13.33	16.88			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.009	SD (KM)	2.13
Variance (KM)	4.536	SE of Mean (KM)	0.869
k hat (KM)	1.996	k star (KM)	1.331
nu hat (KM)	31.93	nu star (KM)	21.29
theta hat (KM)	1.508	theta star (KM)	2.261
80% gamma percentile (KM)	4.715	90% gamma percentile (KM)	6.456
95% gamma percentile (KM)	8.161	99% gamma percentile (KM)	12.04

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	10.66	10.84	95% Approx. Gamma UPL	6.887	6.831
95% KM Gamma Percentile	5.932	5.853	95% Gamma USL	6.948	6.894

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.78	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.343	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.289	Mean in Log Scale	0.26
SD in Original Scale	2.734	SD in Log Scale	1.169
95% UTL95% Coverage	53.8	95% BCA UTL95% Coverage	8.59
95% Bootstrap (%) UTL95% Coverage	8.59	95% UPL (t)	13.58
90% Percentile (z)	5.8	95% Percentile (z)	8.868
99% Percentile (z)	19.67	95% USL	13.94

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.955	95% KM UTL (Lognormal)95% Coverage	11.55
KM SD of Logged Data	0.468	95% KM UPL (Lognormal)	6.658
95% KM Percentile Lognormal (z)	5.613	95% KM USL (Lognormal)	6.727

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.509	Mean in Log Scale	0.609
SD in Original Scale	2.573	SD in Log Scale	0.772
95% UTL95% Coverage	21.49	95% UPL (t)	8.665
90% Percentile (z)	4.941	95% Percentile (z)	6.54
99% Percentile (z)	11.06	95% USL	8.814

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	8	95% UTL with95% Coverage	8.59
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	8.59
95% USL	8.59	95% KM Chebyshev UPL	12.86

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]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	7		
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	2.57	Minimum Non-Detect	2
Maximum Detect	14	Maximum Non-Detect	2
Variance Detected	14.96	Percent Non-Detects	25%
Mean Detected	7.148	SD Detected	3.868
Mean of Detected Logged Data	1.841	SD of Detected Logged Data	0.565

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.283	**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) Background Statistics Assuming Normal Distribution

KM Mean	5.861	KM SD	3.784
95% UTL95% Coverage	17.92	95% KM UPL (t)	13.47
90% KM Percentile (z)	10.71	95% KM Percentile (z)	12.09
99% KM Percentile (z)	14.66	95% KM USL	13.55

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	5.611	SD	4.334
95% UTL95% Coverage	19.42	95% UPL (t)	14.32
90% Percentile (z)	11.17	95% Percentile (z)	12.74
99% Percentile (z)	15.69	95% USL	14.42

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	0.252	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.7	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.333	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)	4.139	k star (bias corrected MLE)	2.18
Theta hat (MLE)	1.727	Theta star (bias corrected MLE)	3.278
nu hat (MLE)	49.67	nu star (bias corrected)	26.17
MLE Mean (bias corrected)	7.148		
MLE Sd (bias corrected)	4.841	95% Percentile of Chisquare (2kstar)	10.07

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	5.4
Maximum	14	Median	5.55
SD	4.602	CV	0.852
k hat (MLE)	0.599	k star (bias corrected MLE)	0.457
Theta hat (MLE)	9.022	Theta star (bias corrected MLE)	11.81
nu hat (MLE)	9.576	nu star (bias corrected)	7.318
MLE Mean (bias corrected)	5.4	MLE Sd (bias corrected)	7.984
95% Percentile of Chisquare (2kstar)	3.627	90% Percentile	14.87
95% Percentile	21.41	99% Percentile	37.62

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	57.42	87.26	95% Approx. Gamma UPL	26.81	34.22
95% Gamma USL	27.24	34.9			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.861	SD (KM)	3.784
Variance (KM)	14.32	SE of Mean (KM)	1.466
k hat (KM)	2.399	k star (KM)	1.583
nu hat (KM)	38.39	nu star (KM)	25.33
theta hat (KM)	2.443	theta star (KM)	3.703
80% gamma percentile (KM)	9.015	90% gamma percentile (KM)	12.05
95% gamma percentile (KM)	15	99% gamma percentile (KM)	21.62

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	25.32	27.48	95% Approx. Gamma UPL	15.39	15.88
95% KM Gamma Percentile	12.95	13.18	95% Gamma USL	15.54	16.06

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.2	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	5.753	Mean in Log Scale	1.489
SD in Original Scale	4.17	SD in Log Scale	0.815
95% UTL95% Coverage	59.54	95% BCA UTL95% Coverage	14
95% Bootstrap (%) UTL95% Coverage	14	95% UPL (t)	22.8
90% Percentile (z)	12.6	95% Percentile (z)	16.94
99% Percentile (z)	29.52	95% USL	23.22

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.554	95% KM UTL (Lognormal)95% Coverage	39.8
KM SD of Logged Data	0.668	95% KM UPL (Lognormal)	18.12
95% KM Percentile Lognormal (z)	14.2	95% KM USL (Lognormal)	18.39

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	5.611	Mean in Log Scale	1.381
SD in Original Scale	4.334	SD in Log Scale	0.977
95% UTL95% Coverage	89.51	95% UPL (t)	28.33
90% Percentile (z)	13.91	95% Percentile (z)	19.84
99% Percentile (z)	38.61	95% USL	28.95

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	8	95% UTL with95% Coverage	14
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	14
95% USL	14	95% KM Chebyshev UPL	23.36

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	40	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	4	Number of Non-Detects	36
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	34.3	Minimum Non-Detect	20
Maximum Detect	235	Maximum Non-Detect	40
Variance Detected	8955	Percent Non-Detects	90%
Mean Detected	112.5	SD Detected	94.63
Mean of Detected Logged Data	4.414	SD of Detected Logged Data	0.933

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.886	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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	29.34	KM SD	37.95
95% UTL95% Coverage	109.7	95% KM UPL (t)	94.08
90% KM Percentile (z)	77.98	95% KM Percentile (z)	91.77
99% KM Percentile (z)	117.6	95% KM USL	138.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	22.25	SD	40.4
95% UTL95% Coverage	107.8	95% UPL (t)	91.16
90% Percentile (z)	74.02	95% Percentile (z)	88.7
99% Percentile (z)	116.2	95% USL	138.1

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	0.383	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.661	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.308	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.399	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)	1.768	k star (bias corrected MLE)	0.609
Theta hat (MLE)	63.62	Theta star (bias corrected MLE)	184.8
nu hat (MLE)	14.14	nu star (bias corrected)	4.869
MLE Mean (bias corrected)	112.5		
MLE Sd (bias corrected)	144.1	95% Percentile of Chisquare (2kstar)	4.357

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	11.25
Maximum	235	Median	0.01
SD	43.08	CV	3.828
k hat (MLE)	0.128	k star (bias corrected MLE)	0.135
Theta hat (MLE)	87.71	Theta star (bias corrected MLE)	83.14
nu hat (MLE)	10.27	nu star (bias corrected)	10.83
MLE Mean (bias corrected)	11.25	MLE Sd (bias corrected)	30.59
95% Percentile of Chisquare (2kstar)	1.518	90% Percentile	32.8
95% Percentile	63.1	99% Percentile	153

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	44.04	34.16	95% Approx. Gamma UPL	26.22	18.11
95% Gamma USL	94.46	88.19			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	29.34	SD (KM)	37.95
Variance (KM)	1440	SE of Mean (KM)	6.933
k hat (KM)	0.598	k star (KM)	0.57
nu hat (KM)	47.82	nu star (KM)	45.57
theta hat (KM)	49.09	theta star (KM)	51.52
80% gamma percentile (KM)	48.36	90% gamma percentile (KM)	77.21
95% gamma percentile (KM)	107.6	99% gamma percentile (KM)	181.4

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	79.65	76.1	95% Approx. Gamma UPL	65.44	62.32
95% KM Gamma Percentile	63.49	60.45	95% Gamma USL	110.6	107

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.27	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	13.09	Mean in Log Scale	-0.335
SD in Original Scale	42.71	SD in Log Scale	2.602
95% UTL95% Coverage	176.6	95% BCA UTL95% Coverage	235
95% Bootstrap (%) UTL95% Coverage	235	95% UPL (t)	60.55
90% Percentile (z)	20.08	95% Percentile (z)	51.67
99% Percentile (z)	304.3	95% USL	1244

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.141	95% KM UTL (Lognormal)95% Coverage	66.28
KM SD of Logged Data	0.497	95% KM UPL (Lognormal)	54.02
95% KM Percentile Lognormal (z)	52.4	95% KM USL (Lognormal)	96.24

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	22.25	Mean in Log Scale	2.652
SD in Original Scale	40.4	SD in Log Scale	0.705
95% UTL95% Coverage	63.13	95% UPL (t)	47.23
90% Percentile (z)	35.02	95% Percentile (z)	45.25
99% Percentile (z)	73.16	95% USL	107.1

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	40	95% UTL with95% Coverage	235
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
Approximate Sample Size needed to achieve specified CC	59	95% UPL	134.1
95% USL	235	95% KM Chebyshev UPL	196.8

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.

x_ols (lithium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	27.1	Minimum Non-Detect	20
Maximum Detect	68.6	Maximum Non-Detect	20
Variance Detected	861.1	Percent Non-Detects	75%
Mean Detected	47.85	SD Detected	29.34
Mean of Detected Logged Data	3.764	SD of Detected Logged Data	0.657

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	26.96	KM SD	15.91
95% UTL95% Coverage	77.66	95% KM UPL (t)	58.93
90% KM Percentile (z)	47.35	95% KM Percentile (z)	53.13
99% KM Percentile (z)	63.97	95% KM USL	59.28

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	19.46	SD	20.74
95% UTL95% Coverage	85.55	95% UPL (t)	61.13
90% Percentile (z)	46.04	95% Percentile (z)	53.57
99% Percentile (z)	67.7	95% USL	61.59

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)	4.961	k star (bias corrected MLE)	N/A
Theta hat (MLE)	9.645	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	19.84	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)	26.96	SD (KM)	15.91
Variance (KM)	253.1	SE of Mean (KM)	7.954
k hat (KM)	2.873	k star (KM)	1.879
nu hat (KM)	45.96	nu star (KM)	30.06
theta hat (KM)	9.386	theta star (KM)	14.35
80% gamma percentile (KM)	40.66	90% gamma percentile (KM)	53.22
95% gamma percentile (KM)	65.24	99% gamma percentile (KM)	92

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	83.17	84.23	95% Approx. Gamma UPL	56.28	55.91
95% KM Gamma Percentile	49.32	48.8	95% Gamma USL	56.72	56.37

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

Mean in Original Scale	13.81	Mean in Log Scale	1.173
SD in Original Scale	23.86	SD in Log Scale	1.964
95% UTL95% Coverage	1689	95% BCA UTL95% Coverage	68.6
95% Bootstrap (%) UTL95% Coverage	68.6	95% UPL (t)	167.3
90% Percentile (z)	40.05	95% Percentile (z)	81.75
99% Percentile (z)	311.7	95% USL	174.7

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.188	95% KM UTL (Lognormal)95% Coverage	88.29
KM SD of Logged Data	0.406	95% KM UPL (Lognormal)	54.76
95% KM Percentile Lognormal (z)	47.23	95% KM USL (Lognormal)	55.25

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	19.46	Mean in Log Scale	2.668
SD in Original Scale	20.74	SD in Log Scale	0.721
95% UTL95% Coverage	143.2	95% UPL (t)	61.31
90% Percentile (z)	36.28	95% Percentile (z)	47.14
99% Percentile (z)	77.03	95% USL	62.29

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	8	95% UTL with95% Coverage	68.6
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	68.6
95% USL	68.6	95% KM Chebyshev UPL	100.5

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	31.3	Minimum Non-Detect	20
Maximum Detect	100	Maximum Non-Detect	20
Variance Detected	757.9	Percent Non-Detects	37.5%
Mean Detected	51.72	SD Detected	27.53
Mean of Detected Logged Data	3.857	SD of Detected Logged Data	0.442

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.738	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.377	**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) Background Statistics Assuming Normal Distribution

KM Mean	39.83	KM SD	24.79
95% UTL95% Coverage	118.8	95% KM UPL (t)	89.65
90% KM Percentile (z)	71.6	95% KM Percentile (z)	80.61
99% KM Percentile (z)	97.51	95% KM USL	90.2

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	36.08	SD	29.99
95% UTL95% Coverage	131.6	95% UPL (t)	96.34
90% Percentile (z)	74.51	95% Percentile (z)	85.4
99% Percentile (z)	105.8	95% USL	97

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	0.624	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.346	**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)	5.799	k star (bias corrected MLE)	2.453
Theta hat (MLE)	8.918	Theta star (bias corrected MLE)	21.08
nu hat (MLE)	57.99	nu star (bias corrected)	24.53
MLE Mean (bias corrected)	51.72		
MLE Sd (bias corrected)	33.02	95% Percentile of Chisquare (2kstar)	10.92

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	32.9
Maximum	100	Median	35.45
SD	33.32	CV	1.013
k hat (MLE)	0.332	k star (bias corrected MLE)	0.291
Theta hat (MLE)	99.15	Theta star (bias corrected MLE)	113.2
nu hat (MLE)	5.309	nu star (bias corrected)	4.651
MLE Mean (bias corrected)	32.9	MLE Sd (bias corrected)	61.01
95% Percentile of Chisquare (2kstar)	2.687	90% Percentile	97.38
95% Percentile	152	99% Percentile	294.5

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	475.3	837.1	95% Approx. Gamma UPL	201.2	281.7
95% Gamma USL	205	288.4			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	39.83	SD (KM)	24.79
Variance (KM)	614.8	SE of Mean (KM)	9.801
k hat (KM)	2.58	k star (KM)	1.696
nu hat (KM)	41.28	nu star (KM)	27.13
theta hat (KM)	15.44	theta star (KM)	23.49
80% gamma percentile (KM)	60.78	90% gamma percentile (KM)	80.56
95% gamma percentile (KM)	99.62	99% gamma percentile (KM)	142.3

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	144.1	150.4	95% Approx. Gamma UPL	92.61	93.54
95% KM Gamma Percentile	79.62	79.76	95% Gamma USL	93.45	94.43

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.318	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	37.95	Mean in Log Scale	3.415
SD in Original Scale	28.28	SD in Log Scale	0.713
95% UTL95% Coverage	295.6	95% BCA UTL95% Coverage	100
95% Bootstrap (%) UTL95% Coverage	100	95% UPL (t)	127.6
90% Percentile (z)	75.9	95% Percentile (z)	98.36
99% Percentile (z)	159.9	95% USL	129.6

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.534	95% KM UTL (Lognormal)95% Coverage	180.4
KM SD of Logged Data	0.521	95% KM UPL (Lognormal)	97.65
95% KM Percentile Lognormal (z)	80.75	95% KM USL (Lognormal)	98.78

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	36.08	Mean in Log Scale	3.274
SD in Original Scale	29.99	SD in Log Scale	0.871
95% UTL95% Coverage	424.4	95% UPL (t)	152.1
90% Percentile (z)	80.69	95% Percentile (z)	110.7
99% Percentile (z)	200.5	95% USL	155.1

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	8	95% UTL with95% Coverage	100
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	100
95% USL	100	95% KM Chebyshev UPL	154.5

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]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	21.3	Minimum Non-Detect	20
Maximum Detect	21.3	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	87.5%
Mean Detected	21.3	SD Detected	N/A
Mean of Detected Logged Data	3.059	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 (lithium [ug/l]_intrawell_mw-15) was not processed!

x_ols (lithium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	4		
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	21.9	Minimum Non-Detect	20
Maximum Detect	50.1	Maximum Non-Detect	20
Variance Detected	242.1	Percent Non-Detects	62.5%
Mean Detected	32.2	SD Detected	15.56
Mean of Detected Logged Data	3.401	SD of Detected Logged Data	0.448

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.354	**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) Background Statistics Assuming Normal Distribution

KM Mean	24.58	KM SD	9.768
95% UTL95% Coverage	55.71	95% KM UPL (t)	44.2
90% KM Percentile (z)	37.09	95% KM Percentile (z)	40.64
99% KM Percentile (z)	47.3	95% KM USL	44.42

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	18.33	SD	14.18
95% UTL95% Coverage	63.53	95% UPL (t)	46.83
90% Percentile (z)	36.5	95% Percentile (z)	41.66
99% Percentile (z)	51.32	95% USL	47.14

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	0.476	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.381	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.433	Detected data appear Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.217	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.462	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	43.3	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

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	12.14
Maximum	50.1	Median	0.229
SD	18.58	CV	1.531
k hat (MLE)	0.203	k star (bias corrected MLE)	0.21
Theta hat (MLE)	59.88	Theta star (bias corrected MLE)	57.79
nu hat (MLE)	3.243	nu star (bias corrected)	3.36
MLE Mean (bias corrected)	12.14	MLE Sd (bias corrected)	26.48
95% Percentile of Chisquare (2kstar)	2.136	90% Percentile	36.7
95% Percentile	61.73	99% Percentile	130.1

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	228.7	378	95% Approx. Gamma UPL	83.15	105.1
95% Gamma USL	85.04	108.1			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	24.58	SD (KM)	9.768
Variance (KM)	95.42	SE of Mean (KM)	4.23
k hat (KM)	6.329	k star (KM)	4.039
nu hat (KM)	101.3	nu star (KM)	64.63
theta hat (KM)	3.883	theta star (KM)	6.084
80% gamma percentile (KM)	33.84	90% gamma percentile (KM)	40.96
95% gamma percentile (KM)	47.51	99% gamma percentile (KM)	61.5

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	58.18	58.61	95% Approx. Gamma UPL	43.01	42.85
95% KM Gamma Percentile	38.92	38.69	95% Gamma USL	43.27	43.12

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.338	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	15.98	Mean in Log Scale	2.34
SD in Original Scale	16	SD in Log Scale	1.015
95% UTL95% Coverage	263.5	95% BCA UTL95% Coverage	50.1
95% Bootstrap (%) UTL95% Coverage	50.1	95% UPL (t)	79.76
90% Percentile (z)	38.1	95% Percentile (z)	55.09
99% Percentile (z)	110	95% USL	81.57

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	3.148	95% KM UTL (Lognormal)95% Coverage	60.15
KM SD of Logged Data	0.298	95% KM UPL (Lognormal)	42.36
95% KM Percentile Lognormal (z)	38	95% KM USL (Lognormal)	42.64

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	18.33	Mean in Log Scale	2.715
SD in Original Scale	14.18	SD in Log Scale	0.617
95% UTL95% Coverage	107.8	95% UPL (t)	52.15
90% Percentile (z)	33.29	95% Percentile (z)	41.65
99% Percentile (z)	63.41	95% USL	52.87

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	8	95% UTL with95% Coverage	50.1
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	50.1
95% USL	50.1	95% KM Chebyshev UPL	69.74

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	36	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	32
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.219	Minimum Non-Detect	0.2
Maximum Detect	0.313	Maximum Non-Detect	0.2
Variance Detected	0.00179	Percent Non-Detects	88.89%
Mean Detected	0.251	SD Detected	0.0423
Mean of Detected Logged Data	-1.391	SD of Detected Logged Data	0.159

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.148	d2max (for USL)	2.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.83	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	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	0.206	KM SD	0.0202
95% UTL95% Coverage	0.249	95% KM UPL (t)	0.24
90% KM Percentile (z)	0.232	95% KM Percentile (z)	0.239
99% KM Percentile (z)	0.253	95% KM USL	0.263

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.117	SD	0.0498
95% UTL95% Coverage	0.224	95% UPL (t)	0.202
90% Percentile (z)	0.181	95% Percentile (z)	0.199
99% Percentile (z)	0.233	95% USL	0.257

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	0.473	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.325	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	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)	50.96	k star (bias corrected MLE)	12.91
Theta hat (MLE)	0.00493	Theta star (bias corrected MLE)	0.0195
nu hat (MLE)	407.6	nu star (bias corrected)	103.2
MLE Mean (bias corrected)	0.251		
MLE Sd (bias corrected)	0.0699	95% Percentile of Chisquare (2kstar)	38.65

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	0.0728
Maximum	0.313	Median	0.0347
SD	0.0817	CV	1.123
k hat (MLE)	0.835	k star (bias corrected MLE)	0.784
Theta hat (MLE)	0.0872	Theta star (bias corrected MLE)	0.0928
nu hat (MLE)	60.12	nu star (bias corrected)	56.44
MLE Mean (bias corrected)	0.0728	MLE Sd (bias corrected)	0.0822
95% Percentile of Chisquare (2kstar)	5.123	90% Percentile	0.178
95% Percentile	0.238	99% Percentile	0.38

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	0.326	0.353	95% Approx. Gamma UPL	0.24	0.25
95% Gamma USL	0.495	0.572			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.206	SD (KM)	0.0202
Variance (KM)	4.0866E-4	SE of Mean (KM)	0.00389
k hat (KM)	103.5	k star (KM)	94.93
nu hat (KM)	7455	nu star (KM)	6835
theta hat (KM)	0.00199	theta star (KM)	0.00217
80% gamma percentile (KM)	0.223	90% gamma percentile (KM)	0.233
95% gamma percentile (KM)	0.242	99% gamma percentile (KM)	0.258

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	0.246	0.246	95% Approx. Gamma UPL	0.237	0.237
95% KM Gamma Percentile	0.236	0.236	95% Gamma USL	0.26	0.26

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	0.309	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.117	Mean in Log Scale	-2.268
SD in Original Scale	0.0621	SD in Log Scale	0.507
95% UTL95% Coverage	0.308	95% BCA UTL95% Coverage	0.313
95% Bootstrap (%) UTL95% Coverage	0.313	95% UPL (t)	0.247
90% Percentile (z)	0.198	95% Percentile (z)	0.238
99% Percentile (z)	0.337	95% USL	0.434

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.585	95% KM UTL (Lognormal)95% Coverage	0.245
KM SD of Logged Data	0.0825	95% KM UPL (Lognormal)	0.236
95% KM Percentile Lognormal (z)	0.235	95% KM USL (Lognormal)	0.259

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.117	Mean in Log Scale	-2.201
SD in Original Scale	0.0498	SD in Log Scale	0.294
95% UTL95% Coverage	0.208	95% UPL (t)	0.183
90% Percentile (z)	0.161	95% Percentile (z)	0.18
99% Percentile (z)	0.219	95% USL	0.254

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	36	95% UTL with95% Coverage	0.313
Approx, f used to compute achieved CC	1.895	Approximate Actual Confidence Coefficient achieved by UTL	0.842
Approximate Sample Size needed to achieve specified CC	59	95% UPL	0.254
95% USL	0.313	95% KM Chebyshev UPL	0.295

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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]_intrawell_mw-13) was not processed!

x_ols (mercury [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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]_intrawell_mw-14) was not processed!

x_ols (mercury [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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]_intrawell_mw-15) was not processed!

x_ols (mercury [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
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
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]_intrawell_mw-17) was not processed!

x_ols (molybdenum [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (molybdenum [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (molybdenum [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (molybdenum [ug/l]_intrawell_mw-13) was not processed!

x_ols (molybdenum [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (molybdenum [ug/l]_intrawell_mw-14) was not processed!

x_ols (molybdenum [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (molybdenum [ug/l]_intrawell_mw-15) was not processed!

x_ols (molybdenum [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (molybdenum [ug/l]_intrawell_mw-17) was not processed!

x_ols (radium-226/228 [pci/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	39	Number of Distinct Observations	30
Minimum	0.521	First Quartile	0.621
Second Largest	6.16	Median	1.746
Maximum	9.85	Third Quartile	3.952
Mean	2.558	SD	2.175
Coefficient of Variation	0.85	Skewness	1.231
Mean of logged Data	0.553	SD of logged Data	0.929

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.124	d2max (for USL)	2.857

Normal GOF Test

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.917	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.163	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	7.179	90% Percentile (z)	5.346
95% UPL (t)	6.272	95% Percentile (z)	6.136
95% USL	8.773	99% Percentile (z)	7.618

Gamma GOF Test

A-D Test Statistic	1.303	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.767	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.144	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.438	k star (bias corrected MLE)	1.345
Theta hat (MLE)	1.778	Theta star (bias corrected MLE)	1.902
nu hat (MLE)	112.2	nu star (bias corrected)	104.9
MLE Mean (bias corrected)	2.558	MLE Sd (bias corrected)	2.206

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	7.033	90% Percentile	5.474
95% Hawkins Wixley (HW) Approx. Gamma UPL	7.275	95% Percentile	6.913
95% WH Approx. Gamma UTL with 95% Coverage	8.952	99% Percentile	10.18
95% HW Approx. Gamma UTL with 95% Coverage	9.499		
95% WH USL	13.11	95% HW USL	14.59

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.948	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.129	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	12.51	90% Percentile (z)	5.717
95% UPL (t)	8.492	95% Percentile (z)	8.013
95% USL	24.71	99% Percentile (z)	15.09

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	39	95% UTL with 95% Coverage	9.85
Approx, f used to compute achieved CC	2.053	Approximate Actual Confidence Coefficient achieved by UTL	0.865
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	9.85	95% BCA Bootstrap UTL with 95% Coverage	9.85
95% UPL	6.16	90% Percentile	5.044
90% Chebyshev UPL	9.167	95% Percentile	6.142
95% Chebyshev UPL	12.16	99% Percentile	8.448
95% USL	9.85		

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	1.07	First Quartile	2.613
Second Largest	4.77	Median	4.215
Maximum	5.67	Third Quartile	4.538
Mean	3.684	SD	1.504
Coefficient of Variation	0.408	Skewness	-0.624
Mean of logged Data	1.199	SD of logged Data	0.542

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	8.476	90% Percentile (z)	5.611
95% UPL (t)	6.706	95% Percentile (z)	6.157
95% USL	6.739	99% Percentile (z)	7.182

Gamma GOF Test

A-D Test Statistic	0.502	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.281	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	4.936	k star (bias corrected MLE)	3.168
Theta hat (MLE)	0.746	Theta star (bias corrected MLE)	1.163
nu hat (MLE)	78.97	nu star (bias corrected)	50.69
MLE Mean (bias corrected)	3.684	MLE Sd (bias corrected)	2.07

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	8.099	90% Percentile	6.459
95% Hawkins Wixley (HW) Approx. Gamma UPL	8.422	95% Percentile	7.611
95% WH Approx. Gamma UTL with 95% Coverage	12.16	99% Percentile	10.1
95% HW Approx. Gamma UTL with 95% Coverage	13.17		
95% WH USL	8.166	95% HW USL	8.497

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	18.67	90% Percentile (z)	6.645
95% UPL (t)	9.86	95% Percentile (z)	8.092
95% USL	9.979	99% Percentile (z)	11.71

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	5.67
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	5.67	95% BCA Bootstrap UTL with 95% Coverage	5.67
95% UPL	5.67	90% Percentile	5.04
90% Chebyshev UPL	8.469	95% Percentile	5.355
95% Chebyshev UPL	10.64	99% Percentile	5.607
95% USL	5.67		

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.17	First Quartile	2.633
Second Largest	5.13	Median	2.929
Maximum	5.92	Third Quartile	4.005
Mean	3.49	SD	1.341
Coefficient of Variation	0.384	Skewness	1.159
Mean of logged Data	1.192	SD of logged Data	0.352

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.254	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	7.763	90% Percentile (z)	5.208
95% UPL (t)	6.184	95% Percentile (z)	5.695
95% USL	6.214	99% Percentile (z)	6.609

Gamma GOF Test

A-D Test Statistic	0.496	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.236	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.294	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)	8.875	k star (bias corrected MLE)	5.63
Theta hat (MLE)	0.393	Theta star (bias corrected MLE)	0.62
nu hat (MLE)	142	nu star (bias corrected)	90.08
MLE Mean (bias corrected)	3.49	MLE Sd (bias corrected)	1.471

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	6.457	90% Percentile	5.457
95% Hawkins Wixley (HW) Approx. Gamma UPL	6.506	95% Percentile	6.207
95% WH Approx. Gamma UTL with 95% Coverage	8.947	99% Percentile	7.784
95% HW Approx. Gamma UTL with 95% Coverage	9.181		
95% WH USL	6.499	95% HW USL	6.55

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.265	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	10.11	90% Percentile (z)	5.172
95% UPL (t)	6.681	95% Percentile (z)	5.877
95% USL	6.733	99% Percentile (z)	7.469

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	5.92
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	5.92	95% BCA Bootstrap UTL with 95% Coverage	5.92
95% UPL	5.92	90% Percentile	5.367
90% Chebyshev UPL	7.757	95% Percentile	5.644
95% Chebyshev UPL	9.689	99% Percentile	5.865
95% USL	5.92		

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]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	0.289	First Quartile	0.381
Second Largest	1.66	Median	0.681
Maximum	1.94	Third Quartile	1.369
Mean	0.903	SD	0.641
Coefficient of Variation	0.71	Skewness	0.717
Mean of logged Data	-0.341	SD of logged Data	0.754

**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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.333	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	2.948	90% Percentile (z)	1.725
95% UPL (t)	2.192	95% Percentile (z)	1.958
95% USL	2.206	99% Percentile (z)	2.396

Gamma GOF Test

A-D Test Statistic	0.359	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.166	**Kolmogorov-Smirnov Gamma GOF Test**	
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

k hat (MLE)	2.247	k star (bias corrected MLE)	1.488
Theta hat (MLE)	0.402	Theta star (bias corrected MLE)	0.607
nu hat (MLE)	35.95	nu star (bias corrected)	23.8
MLE Mean (bias corrected)	0.903	MLE Sd (bias corrected)	0.741

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.632	90% Percentile	1.886
95% Hawkins Wixley (HW) Approx. Gamma UPL	2.739	95% Percentile	2.359
95% WH Approx. Gamma UTL with 95% Coverage	4.508	99% Percentile	3.429
95% HW Approx. Gamma UTL with 95% Coverage	4.978		
95% WH USL	2.661	95% HW USL	2.772

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	7.862	90% Percentile (z)	1.869
95% UPL (t)	3.236	95% Percentile (z)	2.458
95% USL	3.29	99% Percentile (z)	4.109

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	1.94
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	1.94	95% BCA Bootstrap UTL with 95% Coverage	1.94
95% UPL	1.94	90% Percentile	1.744
90% Chebyshev UPL	2.944	95% Percentile	1.842
95% Chebyshev UPL	3.869	99% Percentile	1.92
95% USL	1.94		

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]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	3.46	First Quartile	3.635
Second Largest	6.05	Median	4.72
Maximum	10.46	Third Quartile	5.705
Mean	5.273	SD	2.34
Coefficient of Variation	0.444	Skewness	1.82
Mean of logged Data	1.593	SD of logged Data	0.38

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.778	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	12.73	90% Percentile (z)	8.271
95% UPL (t)	9.974	95% Percentile (z)	9.121
95% USL	10.03	99% Percentile (z)	10.72

Gamma GOF Test

A-D Test Statistic	0.577	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.229	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	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)	7.351	k star (bias corrected MLE)	4.678
Theta hat (MLE)	0.717	Theta star (bias corrected MLE)	1.127
nu hat (MLE)	117.6	nu star (bias corrected)	74.84
MLE Mean (bias corrected)	5.273	MLE Sd (bias corrected)	2.438

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	10.26	90% Percentile	8.538
95% Hawkins Wixley (HW) Approx. Gamma UPL	10.32	95% Percentile	9.815
95% WH Approx. Gamma UTL with 95% Coverage	14.56	99% Percentile	12.52
95% HW Approx. Gamma UTL with 95% Coverage	14.94		
95% WH USL	10.33	95% HW USL	10.39

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.863	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.214	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	16.5	90% Percentile (z)	8.001
95% UPL (t)	10.55	95% Percentile (z)	9.185
95% USL	10.64	99% Percentile (z)	11.9

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	10.46
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	10.46	95% BCA Bootstrap UTL with 95% Coverage	10.46
95% UPL	10.46	90% Percentile	7.373
90% Chebyshev UPL	12.72	95% Percentile	8.917
95% Chebyshev UPL	16.09	99% Percentile	10.15
95% USL	10.46		

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	40	Number of Missing Observations	0
Number of Distinct Observations	10		
Number of Detects	9	Number of Non-Detects	31
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	1.68	Minimum Non-Detect	2
Maximum Detect	3.84	Maximum Non-Detect	2
Variance Detected	0.516	Percent Non-Detects	77.5%
Mean Detected	2.842	SD Detected	0.719
Mean of Detected Logged Data	1.014	SD of Detected Logged Data	0.269

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.117	d2max (for USL)	2.868

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.13	**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

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.942	KM SD	0.582
95% UTL95% Coverage	3.174	95% KM UPL (t)	2.934
90% KM Percentile (z)	2.687	95% KM Percentile (z)	2.899
99% KM Percentile (z)	3.296	95% KM USL	3.611

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.415	SD	0.844
95% UTL95% Coverage	3.202	95% UPL (t)	2.855
90% Percentile (z)	2.497	95% Percentile (z)	2.803
99% Percentile (z)	3.379	95% USL	3.836

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	0.23	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**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

Gamma Statistics on Detected Data Only

k hat (MLE)	16.45	k star (bias corrected MLE)	11.04
Theta hat (MLE)	0.173	Theta star (bias corrected MLE)	0.257
nu hat (MLE)	296.1	nu star (bias corrected)	198.7
MLE Mean (bias corrected)	2.842		
MLE Sd (bias corrected)	0.855	95% Percentile of Chisquare (2kstar)	34.03

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	0.0799	Mean	1.687
Maximum	3.84	Median	1.644
SD	0.89	CV	0.527
k hat (MLE)	2.788	k star (bias corrected MLE)	2.595
Theta hat (MLE)	0.605	Theta star (bias corrected MLE)	0.65
nu hat (MLE)	223	nu star (bias corrected)	207.6
MLE Mean (bias corrected)	1.687	MLE Sd (bias corrected)	1.047
95% Percentile of Chisquare (2kstar)	11.37	90% Percentile	3.091
95% Percentile	3.694	99% Percentile	5.013

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	4.487	4.783	95% Approx. Gamma UPL	3.736	3.906
95% Gamma USL	6.104	6.752			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.942	SD (KM)	0.582
Variance (KM)	0.339	SE of Mean (KM)	0.0976
k hat (KM)	11.12	k star (KM)	10.31
nu hat (KM)	890	nu star (KM)	824.6
theta hat (KM)	0.175	theta star (KM)	0.188
80% gamma percentile (KM)	2.424	90% gamma percentile (KM)	2.746
95% gamma percentile (KM)	3.031	99% gamma percentile (KM)	3.617

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	3.135	3.13	95% Approx. Gamma UPL	2.861	2.852
95% KM Gamma Percentile	2.822	2.812	95% Gamma USL	3.677	3.688

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.151	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.849	Mean in Log Scale	0.543
SD in Original Scale	0.733	SD in Log Scale	0.38
95% UTL95% Coverage	3.849	95% BCA UTL95% Coverage	3.84
95% Bootstrap (%) UTL95% Coverage	3.84	95% UPL (t)	3.292
90% Percentile (z)	2.802	95% Percentile (z)	3.217
99% Percentile (z)	4.167	95% USL	5.119

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.63	95% KM UTL (Lognormal)95% Coverage	3.116
KM SD of Logged Data	0.239	95% KM UPL (Lognormal)	2.824
95% KM Percentile Lognormal (z)	2.783	95% KM USL (Lognormal)	3.728

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.415	Mean in Log Scale	0.228
SD in Original Scale	0.844	SD in Log Scale	0.446
95% UTL95% Coverage	3.228	95% UPL (t)	2.687
90% Percentile (z)	2.224	95% Percentile (z)	2.615
99% Percentile (z)	3.543	95% USL	4.51

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	40	95% UTL with95% Coverage	3.84
Approx, f used to compute achieved CC	2.105	Approximate Actual Confidence Coefficient achieved by UTL	0.871
Approximate Sample Size needed to achieve specified CC	59	95% UPL	3.6
95% USL	3.84	95% KM Chebyshev UPL	4.51

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]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	2.65	Minimum Non-Detect	2
Maximum Detect	21.3	Maximum Non-Detect	2
Variance Detected	68.82	Percent Non-Detects	50%
Mean Detected	14.06	SD Detected	8.296
Mean of Detected Logged Data	2.392	SD of Detected Logged Data	0.965

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)	3.187	d2max (for USL)	2.032

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	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) Background Statistics Assuming Normal Distribution

KM Mean	8.031	KM SD	7.886
95% UTL95% Coverage	33.16	95% KM UPL (t)	23.88
90% KM Percentile (z)	18.14	95% KM Percentile (z)	21
99% KM Percentile (z)	26.38	95% KM USL	24.05

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	7.531	SD	8.846
95% UTL95% Coverage	35.72	95% UPL (t)	25.31
90% Percentile (z)	18.87	95% Percentile (z)	22.08
99% Percentile (z)	28.11	95% USL	25.5

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	0.499	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.314	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.398	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)	2.139	k star (bias corrected MLE)	0.701
Theta hat (MLE)	6.574	Theta star (bias corrected MLE)	20.05
nu hat (MLE)	17.11	nu star (bias corrected)	5.612
MLE Mean (bias corrected)	14.06		
MLE Sd (bias corrected)	16.79	95% Percentile of Chisquare (2kstar)	4.772

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	7.105
Maximum	21.3	Median	1.606
SD	9.211	CV	1.296
k hat (MLE)	0.273	k star (bias corrected MLE)	0.254
Theta hat (MLE)	26.02	Theta star (bias corrected MLE)	27.97
nu hat (MLE)	4.37	nu star (bias corrected)	4.064
MLE Mean (bias corrected)	7.105	MLE Sd (bias corrected)	14.1
95% Percentile of Chisquare (2kstar)	2.447	90% Percentile	21.3
95% Percentile	34.23	99% Percentile	68.56

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	120.1	197.4	95% Approx. Gamma UPL	46.8	60.58
95% Gamma USL	47.78	62.16			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.031	SD (KM)	7.886
Variance (KM)	62.18	SE of Mean (KM)	3.219
k hat (KM)	1.037	k star (KM)	0.732
nu hat (KM)	16.6	nu star (KM)	11.71
theta hat (KM)	7.743	theta star (KM)	10.98
80% gamma percentile (KM)	13.18	90% gamma percentile (KM)	19.95
95% gamma percentile (KM)	26.9	99% gamma percentile (KM)	43.44

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	56.81	64.99	95% Approx. Gamma UPL	29.25	30.64
95% KM Gamma Percentile	23.03	23.51	95% Gamma USL	29.66	31.12

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.333	**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

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	7.521	Mean in Log Scale	1.077
SD in Original Scale	8.866	SD in Log Scale	1.628
95% UTL95% Coverage	526.2	95% BCA UTL95% Coverage	21.3
95% Bootstrap (%) UTL95% Coverage	21.3	95% UPL (t)	77.37
90% Percentile (z)	23.65	95% Percentile (z)	42.73
99% Percentile (z)	129.6	95% USL	80.21

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.543	95% KM UTL (Lognormal)95% Coverage	126.5
KM SD of Logged Data	1.035	95% KM UPL (Lognormal)	37.41
95% KM Percentile Lognormal (z)	25.65	95% KM USL (Lognormal)	38.28

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	7.531	Mean in Log Scale	1.196
SD in Original Scale	8.846	SD in Log Scale	1.426
95% UTL95% Coverage	311.4	95% UPL (t)	58.08
90% Percentile (z)	20.57	95% Percentile (z)	34.53
99% Percentile (z)	91.25	95% USL	59.94

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	8	95% UTL with95% Coverage	21.3
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
Approximate Sample Size needed to achieve specified CC	59	95% UPL	21.3
95% USL	21.3	95% KM Chebyshev UPL	44.49

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]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.09	First Quartile	3.645
Second Largest	8.48	Median	5
Maximum	20.5	Third Quartile	8.3
Mean	6.994	SD	5.931
Coefficient of Variation	0.848	Skewness	2.031
Mean of logged Data	1.697	SD of logged Data	0.725

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	25.9	90% Percentile (z)	14.59
95% UPL (t)	18.91	95% Percentile (z)	16.75
95% USL	19.04	99% Percentile (z)	20.79

Gamma GOF Test

A-D Test Statistic	0.342	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov Gamma GOF Test**
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

k hat (MLE)	2.171	k star (bias corrected MLE)	1.44
Theta hat (MLE)	3.221	Theta star (bias corrected MLE)	4.856
nu hat (MLE)	34.74	nu star (bias corrected)	23.04
MLE Mean (bias corrected)	6.994	MLE Sd (bias corrected)	5.828

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	20.47	90% Percentile	14.72
95% Hawkins Wixley (HW) Approx. Gamma UPL	20.97	95% Percentile	18.47
95% WH Approx. Gamma UTL with 95% Coverage	35.26	99% Percentile	26.96
95% HW Approx. Gamma UTL with 95% Coverage	38.12		
95% WH USL	20.7	95% HW USL	21.22

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	54.96	90% Percentile (z)	13.82
95% UPL (t)	23.42	95% Percentile (z)	17.98
95% USL	23.8	99% Percentile (z)	29.46

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	20.5
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	20.5	95% BCA Bootstrap UTL with 95% Coverage	20.5
95% UPL	20.5	90% Percentile	12.09
90% Chebyshev UPL	25.87	95% Percentile	16.29
95% Chebyshev UPL	34.42	99% Percentile	19.66
95% USL	20.5		

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]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	2.31	First Quartile	2.693
Second Largest	3.13	Median	2.81
Maximum	3.34	Third Quartile	3.115
Mean	2.843	SD	0.347
Coefficient of Variation	0.122	Skewness	-0.19
Mean of logged Data	1.038	SD of logged Data	0.124

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	3.947	90% Percentile (z)	3.287
95% UPL (t)	3.539	95% Percentile (z)	3.413
95% USL	3.547	99% Percentile (z)	3.649

Gamma GOF Test

A-D Test Statistic	0.27	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.293	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)	75.17	k star (bias corrected MLE)	47.06
Theta hat (MLE)	0.0378	Theta star (bias corrected MLE)	0.0604
nu hat (MLE)	1203	nu star (bias corrected)	753
MLE Mean (bias corrected)	2.843	MLE Sd (bias corrected)	0.414

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	3.592	90% Percentile	3.385
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.6	95% Percentile	3.557
95% WH Approx. Gamma UTL with 95% Coverage	4.096	99% Percentile	3.894
95% HW Approx. Gamma UTL with 95% Coverage	4.119		
95% WH USL	3.601	95% HW USL	3.609

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.189	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	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	4.196	90% Percentile (z)	3.311
95% UPL (t)	3.625	95% Percentile (z)	3.464
95% USL	3.635	99% Percentile (z)	3.77

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	3.34
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	3.34	95% BCA Bootstrap UTL with 95% Coverage	3.34
95% UPL	3.34	90% Percentile	3.193
90% Chebyshev UPL	3.945	95% Percentile	3.267
95% Chebyshev UPL	4.445	99% Percentile	3.325
95% USL	3.34		

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]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Minimum	5.28	First Quartile	6.93
Second Largest	9.35	Median	7.87
Maximum	11.2	Third Quartile	9.23
Mean	8.075	SD	1.886
Coefficient of Variation	0.234	Skewness	0.227
Mean of logged Data	2.064	SD of logged Data	0.239

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)	3.187	d2max (for USL)	2.032

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	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	14.08	90% Percentile (z)	10.49
95% UPL (t)	11.86	95% Percentile (z)	11.18
95% USL	11.91	99% Percentile (z)	12.46

Gamma GOF Test

A-D Test Statistic	0.348	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.222	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.294	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)	20.61	k star (bias corrected MLE)	12.96
Theta hat (MLE)	0.392	Theta star (bias corrected MLE)	0.623
nu hat (MLE)	329.7	nu star (bias corrected)	207.4
MLE Mean (bias corrected)	8.075	MLE Sd (bias corrected)	2.243

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	12.36	90% Percentile	11.05
95% Hawkins Wixley (HW) Approx. Gamma UPL	12.44	95% Percentile	12.08
95% WH Approx. Gamma UTL with 95% Coverage	15.58	99% Percentile	14.19
95% HW Approx. Gamma UTL with 95% Coverage	15.85		
95% WH USL	12.41	95% HW USL	12.5

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.265	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	16.85	90% Percentile (z)	10.7
95% UPL (t)	12.73	95% Percentile (z)	11.67
95% USL	12.79	99% Percentile (z)	13.73

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	8	95% UTL with 95% Coverage	11.2
Approx, f used to compute achieved CC	0.421	Approximate Actual Confidence Coefficient achieved by UTL	0.337
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	11.2	95% BCA Bootstrap UTL with 95% Coverage	11.2
95% UPL	11.2	90% Percentile	9.905
90% Chebyshev UPL	14.08	95% Percentile	10.55
95% Chebyshev UPL	16.79	99% Percentile	11.07
95% USL	11.2		

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 (thallium [ug/l]_interwell_pooled-upgradient)

General Statistics

Total Number of Observations	36	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (thallium [ug/l]_interwell_pooled-upgradient) was not processed!

x_ols (thallium [ug/l]_intrawell_mw-13)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (thallium [ug/l]_intrawell_mw-13) was not processed!

x_ols (thallium [ug/l]_intrawell_mw-14)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (thallium [ug/l]_intrawell_mw-14) was not processed!

x_ols (thallium [ug/l]_intrawell_mw-15)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (thallium [ug/l]_intrawell_mw-15) was not processed!

x_ols (thallium [ug/l]_intrawell_mw-17)

General Statistics

Total Number of Observations	8	Number of Missing Observations	0
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	8
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	2
Maximum Detect	N/A	Maximum Non-Detect	2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
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 (thallium [ug/l]_intrawell_mw-17) was not processed!

group	D_x_ols	x_ols
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
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	448
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	256
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	325
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	139
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	1	3.39
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	1	2.47
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
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
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	3.32
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	2.12
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	43.08464425
Barium [ug/L]_Interwell_POOLED-Upgradient	1	34.72805479
Barium [ug/L]_Interwell_POOLED-Upgradient	1	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	4.358286439
Barium [ug/L]_Interwell_POOLED-Upgradient	1	5.649500504
Barium [ug/L]_Interwell_POOLED-Upgradient	1	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	32.88683792
Barium [ug/L]_Interwell_POOLED-Upgradient	1	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	15.72377338
Barium [ug/L]_Interwell_POOLED-Upgradient	1	16.6
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.83
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	4.03
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.760345492
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.025138862
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2

group	D_x_ols	x_ols
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.231724707
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.745719694
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.621
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.621
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.654386523
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.003942133
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.621
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.621
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.621
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.545126881
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.621
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
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	484
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	290
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	34.3
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40

group	D_x_ols	x_ols
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	86.72891329
Barium [ug/L]_Interwell_POOLED-Upgradient	1	102.6179924
Barium [ug/L]_Interwell_POOLED-Upgradient	1	94.95161115
Barium [ug/L]_Interwell_POOLED-Upgradient	1	90.28522986
Barium [ug/L]_Interwell_POOLED-Upgradient	1	82.47066872
Barium [ug/L]_Interwell_POOLED-Upgradient	1	81.80428743
Barium [ug/L]_Interwell_POOLED-Upgradient	1	77.62478282
Barium [ug/L]_Interwell_POOLED-Upgradient	1	76.76788458
Barium [ug/L]_Interwell_POOLED-Upgradient	1	89.05613359
Barium [ug/L]_Interwell_POOLED-Upgradient	1	88.4
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2

group	D_x_ols	x_ols
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.272634098
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.765567597
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.344967847
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.464368097
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.19827943
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.747679679
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.20688212
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.96
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.53
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.44
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.53
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2.47
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.32
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.09
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.29
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.9
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.99
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Mercury [ug/L]_Intrawell_MW-13	0	0.2
Lithium [ug/L]_Intrawell_MW-13	0	20
Lithium [ug/L]_Intrawell_MW-13	1	27.1
Lithium [ug/L]_Intrawell_MW-13	0	20
Lithium [ug/L]_Intrawell_MW-13	0	20
Lithium [ug/L]_Intrawell_MW-13	0	20
Lithium [ug/L]_Intrawell_MW-13	1	68.6

group	D_x_ols	x_ols
Lithium [ug/L]_Intrawell_MW-13	0	20
Lithium [ug/L]_Intrawell_MW-13	0	20
Fluoride [ug/L]_Intrawell_MW-13	1	285
Fluoride [ug/L]_Intrawell_MW-13	1	584
Fluoride [ug/L]_Intrawell_MW-13	1	410
Fluoride [ug/L]_Intrawell_MW-13	0	500
Fluoride [ug/L]_Intrawell_MW-13	0	500
Fluoride [ug/L]_Intrawell_MW-13	0	500
Fluoride [ug/L]_Intrawell_MW-13	0	500
Fluoride [ug/L]_Intrawell_MW-13	0	500
Fluoride [ug/L]_Intrawell_MW-13	0	500
Lead [ug/L]_Intrawell_MW-13	0	2
Lead [ug/L]_Intrawell_MW-13	1	2.55
Lead [ug/L]_Intrawell_MW-13	1	2.06
Lead [ug/L]_Intrawell_MW-13	0	2
Lead [ug/L]_Intrawell_MW-13	1	2.11
Lead [ug/L]_Intrawell_MW-13	0	2
Lead [ug/L]_Intrawell_MW-13	1	2.36
Lead [ug/L]_Intrawell_MW-13	1	4.08
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Molybdenum [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Thallium [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Antimony [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	2.86
Arsenic [ug/L]_Intrawell_MW-13	1	2.53
Arsenic [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	2.04
Arsenic [ug/L]_Intrawell_MW-13	0	2
Arsenic [ug/L]_Intrawell_MW-13	1	3.64
Arsenic [ug/L]_Intrawell_MW-13	1	4.55
Barium [ug/L]_Intrawell_MW-13	1	159
Barium [ug/L]_Intrawell_MW-13	1	164
Barium [ug/L]_Intrawell_MW-13	1	197
Barium [ug/L]_Intrawell_MW-13	1	156
Barium [ug/L]_Intrawell_MW-13	1	128
Barium [ug/L]_Intrawell_MW-13	1	133
Barium [ug/L]_Intrawell_MW-13	1	136
Barium [ug/L]_Intrawell_MW-13	1	136
Beryllium [ug/L]_Intrawell_MW-13	0	2
Beryllium [ug/L]_Intrawell_MW-13	0	2
Beryllium [ug/L]_Intrawell_MW-13	0	2
Beryllium [ug/L]_Intrawell_MW-13	0	2
Beryllium [ug/L]_Intrawell_MW-13	0	2

group	D_x_ols	x_ols
Beryllium [ug/L]_Intrawell_MW-13	0	2
Beryllium [ug/L]_Intrawell_MW-13	0	2
Beryllium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Cadmium [ug/L]_Intrawell_MW-13	0	2
Chromium [ug/L]_Intrawell_MW-13	0	4
Chromium [ug/L]_Intrawell_MW-13	0	4
Chromium [ug/L]_Intrawell_MW-13	1	4.99
Chromium [ug/L]_Intrawell_MW-13	0	4
Chromium [ug/L]_Intrawell_MW-13	0	4
Chromium [ug/L]_Intrawell_MW-13	0	4
Chromium [ug/L]_Intrawell_MW-13	0	4
Chromium [ug/L]_Intrawell_MW-13	1	5.66
Cobalt [ug/L]_Intrawell_MW-13	0	2
Cobalt [ug/L]_Intrawell_MW-13	1	2.34
Cobalt [ug/L]_Intrawell_MW-13	1	2.36
Cobalt [ug/L]_Intrawell_MW-13	1	2.07
Cobalt [ug/L]_Intrawell_MW-13	1	3.26
Cobalt [ug/L]_Intrawell_MW-13	0	2
Cobalt [ug/L]_Intrawell_MW-13	1	2.76
Cobalt [ug/L]_Intrawell_MW-13	1	3.35
Selenium [ug/L]_Intrawell_MW-13	0	2
Selenium [ug/L]_Intrawell_MW-13	0	2
Selenium [ug/L]_Intrawell_MW-13	1	13.4
Selenium [ug/L]_Intrawell_MW-13	1	21.3
Selenium [ug/L]_Intrawell_MW-13	0	2
Selenium [ug/L]_Intrawell_MW-13	0	2
Selenium [ug/L]_Intrawell_MW-13	1	18.9
Selenium [ug/L]_Intrawell_MW-13	1	2.65
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.12
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.31
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	5.67
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.46
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	2.69
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	2.38
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	4.77
Radium-226/228 [pCi/L]_Intrawell_MW-13	1	1.07
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Mercury [ug/L]_Intrawell_MW-14	0	0.2
Fluoride [ug/L]_Intrawell_MW-14	1	280
Fluoride [ug/L]_Intrawell_MW-14	1	682
Fluoride [ug/L]_Intrawell_MW-14	1	533
Fluoride [ug/L]_Intrawell_MW-14	0	500
Fluoride [ug/L]_Intrawell_MW-14	0	500
Fluoride [ug/L]_Intrawell_MW-14	0	500
Fluoride [ug/L]_Intrawell_MW-14	0	500
Fluoride [ug/L]_Intrawell_MW-14	0	500
Fluoride [ug/L]_Intrawell_MW-14	0	500
Lithium [ug/L]_Intrawell_MW-14	1	46.4
Lithium [ug/L]_Intrawell_MW-14	1	100
Lithium [ug/L]_Intrawell_MW-14	1	41.3
Lithium [ug/L]_Intrawell_MW-14	1	31.3

group	D_x_ols	x_ols
Lithium [ug/L]_Intrawell_MW-14	0	20
Lithium [ug/L]_Intrawell_MW-14	0	20
Lithium [ug/L]_Intrawell_MW-14	0	20
Lithium [ug/L]_Intrawell_MW-14	1	39.6
Lead [ug/L]_Intrawell_MW-14	1	3.97
Lead [ug/L]_Intrawell_MW-14	1	5.23
Lead [ug/L]_Intrawell_MW-14	0	2
Lead [ug/L]_Intrawell_MW-14	0	2
Lead [ug/L]_Intrawell_MW-14	0	2
Lead [ug/L]_Intrawell_MW-14	0	2
Lead [ug/L]_Intrawell_MW-14	1	2.54
Lead [ug/L]_Intrawell_MW-14	1	3.06
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Molybdenum [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Thallium [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Antimony [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	1	2.59
Arsenic [ug/L]_Intrawell_MW-14	1	4.75
Arsenic [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	0	2
Arsenic [ug/L]_Intrawell_MW-14	1	2.04
Arsenic [ug/L]_Intrawell_MW-14	0	2
Barium [ug/L]_Intrawell_MW-14	1	99.24853751
Barium [ug/L]_Intrawell_MW-14	1	114.3060584
Barium [ug/L]_Intrawell_MW-14	1	48.89233976
Barium [ug/L]_Intrawell_MW-14	1	40.47862112
Barium [ug/L]_Intrawell_MW-14	1	37.88864898
Barium [ug/L]_Intrawell_MW-14	1	56.47493033
Barium [ug/L]_Intrawell_MW-14	1	98.49747313
Barium [ug/L]_Intrawell_MW-14	1	101
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Beryllium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2

group	D_x_ols	x_ols
Cadmium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Cadmium [ug/L]_Intrawell_MW-14	0	2
Chromium [ug/L]_Intrawell_MW-14	1	4.07
Chromium [ug/L]_Intrawell_MW-14	1	5.04
Chromium [ug/L]_Intrawell_MW-14	0	4
Chromium [ug/L]_Intrawell_MW-14	0	4
Chromium [ug/L]_Intrawell_MW-14	0	4
Chromium [ug/L]_Intrawell_MW-14	0	4
Chromium [ug/L]_Intrawell_MW-14	0	4
Chromium [ug/L]_Intrawell_MW-14	0	4
Cobalt [ug/L]_Intrawell_MW-14	1	2.93
Cobalt [ug/L]_Intrawell_MW-14	1	3.87
Cobalt [ug/L]_Intrawell_MW-14	0	2
Cobalt [ug/L]_Intrawell_MW-14	0	2
Cobalt [ug/L]_Intrawell_MW-14	0	2
Cobalt [ug/L]_Intrawell_MW-14	0	2
Cobalt [ug/L]_Intrawell_MW-14	1	2.71
Cobalt [ug/L]_Intrawell_MW-14	1	2.26
Selenium [ug/L]_Intrawell_MW-14	1	2.67
Selenium [ug/L]_Intrawell_MW-14	1	5.35
Selenium [ug/L]_Intrawell_MW-14	1	8.24
Selenium [ug/L]_Intrawell_MW-14	1	4.65
Selenium [ug/L]_Intrawell_MW-14	1	2.09
Selenium [ug/L]_Intrawell_MW-14	1	8.48
Selenium [ug/L]_Intrawell_MW-14	1	3.97
Selenium [ug/L]_Intrawell_MW-14	1	20.5
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	5.13
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	5.92
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.81
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	3.63
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.55
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.17
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	3.048
Radium-226/228 [pCi/L]_Intrawell_MW-14	1	2.66
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Mercury [ug/L]_Intrawell_MW-15	0	0.2
Fluoride [ug/L]_Intrawell_MW-15	0	200
Fluoride [ug/L]_Intrawell_MW-15	1	486
Fluoride [ug/L]_Intrawell_MW-15	1	298
Fluoride [ug/L]_Intrawell_MW-15	0	500
Fluoride [ug/L]_Intrawell_MW-15	0	500
Fluoride [ug/L]_Intrawell_MW-15	0	500
Fluoride [ug/L]_Intrawell_MW-15	0	500
Fluoride [ug/L]_Intrawell_MW-15	0	500
Fluoride [ug/L]_Intrawell_MW-15	0	500
Lithium [ug/L]_Intrawell_MW-15	0	20
Lithium [ug/L]_Intrawell_MW-15	1	21.3
Lithium [ug/L]_Intrawell_MW-15	0	20
Lithium [ug/L]_Intrawell_MW-15	0	20
Lithium [ug/L]_Intrawell_MW-15	0	20
Lithium [ug/L]_Intrawell_MW-15	0	20
Lithium [ug/L]_Intrawell_MW-15	0	20
Lithium [ug/L]_Intrawell_MW-15	0	20
Lead [ug/L]_Intrawell_MW-15	1	8.59
Lead [ug/L]_Intrawell_MW-15	1	2.91
Lead [ug/L]_Intrawell_MW-15	1	2.36

group	D_x_ols	x_ols
Lead [ug/L]_Intrawell_MW-15	0	2
Lead [ug/L]_Intrawell_MW-15	1	2.21
Lead [ug/L]_Intrawell_MW-15	0	2
Lead [ug/L]_Intrawell_MW-15	0	2
Lead [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Molybdenum [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Thallium [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	1	2.22
Antimony [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Antimony [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	1	2.3
Arsenic [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Arsenic [ug/L]_Intrawell_MW-15	0	2
Barium [ug/L]_Intrawell_MW-15	1	165
Barium [ug/L]_Intrawell_MW-15	1	111
Barium [ug/L]_Intrawell_MW-15	1	89.9
Barium [ug/L]_Intrawell_MW-15	1	74.9
Barium [ug/L]_Intrawell_MW-15	1	84.4
Barium [ug/L]_Intrawell_MW-15	1	75.4
Barium [ug/L]_Intrawell_MW-15	1	83.6
Barium [ug/L]_Intrawell_MW-15	1	87.2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Beryllium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Cadmium [ug/L]_Intrawell_MW-15	0	2
Chromium [ug/L]_Intrawell_MW-15	1	8.71
Chromium [ug/L]_Intrawell_MW-15	1	4.42
Chromium [ug/L]_Intrawell_MW-15	0	4

group	D_x_ols	x_ols
Chromium [ug/L]_Intrawell_MW-15	0	4
Chromium [ug/L]_Intrawell_MW-15	1	4.51
Chromium [ug/L]_Intrawell_MW-15	0	4
Chromium [ug/L]_Intrawell_MW-15	0	4
Chromium [ug/L]_Intrawell_MW-15	0	4
Cobalt [ug/L]_Intrawell_MW-15	1	4.27
Cobalt [ug/L]_Intrawell_MW-15	1	2.05
Cobalt [ug/L]_Intrawell_MW-15	0	2
Cobalt [ug/L]_Intrawell_MW-15	0	2
Cobalt [ug/L]_Intrawell_MW-15	0	2
Cobalt [ug/L]_Intrawell_MW-15	0	2
Cobalt [ug/L]_Intrawell_MW-15	0	2
Cobalt [ug/L]_Intrawell_MW-15	0	2
Selenium [ug/L]_Intrawell_MW-15	1	2.84
Selenium [ug/L]_Intrawell_MW-15	1	2.77
Selenium [ug/L]_Intrawell_MW-15	1	3.34
Selenium [ug/L]_Intrawell_MW-15	1	3.11
Selenium [ug/L]_Intrawell_MW-15	1	3.13
Selenium [ug/L]_Intrawell_MW-15	1	2.78
Selenium [ug/L]_Intrawell_MW-15	1	2.46
Selenium [ug/L]_Intrawell_MW-15	1	2.31
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	0.735773565
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	1.659795837
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	0.625829245
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	1.271862654
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	0.29389235
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	0.409925759
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	0.28868565
Radium-226/228 [pCi/L]_Intrawell_MW-15	1	1.94
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
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	441
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	252
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	130
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	41.5
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20

group	D_x_ols	x_ols
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lead [ug/L]_Interwell_POOLED-Upgradient	1	14
Lead [ug/L]_Interwell_POOLED-Upgradient	1	9.51
Lead [ug/L]_Interwell_POOLED-Upgradient	1	8.56
Lead [ug/L]_Interwell_POOLED-Upgradient	1	2.29
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.06
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	1	7.92
Lead [ug/L]_Interwell_POOLED-Upgradient	1	12.7
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	23.2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	13.7
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	14.2
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	4.6
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	12
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	2.94
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	10.4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	20.6
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	68.58701335
Barium [ug/L]_Interwell_POOLED-Upgradient	1	60.97343963
Barium [ug/L]_Interwell_POOLED-Upgradient	1	37.55307904
Barium [ug/L]_Interwell_POOLED-Upgradient	1	27.13271846
Barium [ug/L]_Interwell_POOLED-Upgradient	1	36.31462017
Barium [ug/L]_Interwell_POOLED-Upgradient	1	15.89425958
Barium [ug/L]_Interwell_POOLED-Upgradient	1	52.78075149
Barium [ug/L]_Interwell_POOLED-Upgradient	1	74.84901385
Barium [ug/L]_Interwell_POOLED-Upgradient	1	46.32029496
Barium [ug/L]_Interwell_POOLED-Upgradient	1	47.5
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	3.96
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.48
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.59

group	D_x_ols	x_ols
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.67
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	10.4
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.8
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.73
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.25
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	7.19
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	10.7
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.064572268
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.963579912
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2.627091377
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	5.86948331
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.81
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.24
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.84
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.5
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	2.31
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.19
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.61
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	1.68
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.34
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.72
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.44
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	9.85
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	6.16
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	6.14
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	4.81
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	5.98
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.5
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.58
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Mercury [ug/L]_Intrawell_MW-17	0	0.2
Fluoride [ug/L]_Intrawell_MW-17	0	200
Fluoride [ug/L]_Intrawell_MW-17	1	441

group	D_x_ols	x_ols
Fluoride [ug/L]_Intrawell_MW-17	1	255
Fluoride [ug/L]_Intrawell_MW-17	0	500
Fluoride [ug/L]_Intrawell_MW-17	0	500
Fluoride [ug/L]_Intrawell_MW-17	0	500
Fluoride [ug/L]_Intrawell_MW-17	0	500
Fluoride [ug/L]_Intrawell_MW-17	0	500
Fluoride [ug/L]_Intrawell_MW-17	0	500
Lithium [ug/L]_Intrawell_MW-17	0	20
Lithium [ug/L]_Intrawell_MW-17	1	50.1
Lithium [ug/L]_Intrawell_MW-17	1	21.9
Lithium [ug/L]_Intrawell_MW-17	0	20
Lithium [ug/L]_Intrawell_MW-17	0	20
Lithium [ug/L]_Intrawell_MW-17	0	20
Lithium [ug/L]_Intrawell_MW-17	0	20
Lithium [ug/L]_Intrawell_MW-17	1	24.6
Lead [ug/L]_Intrawell_MW-17	1	7.64
Lead [ug/L]_Intrawell_MW-17	1	6.37
Lead [ug/L]_Intrawell_MW-17	0	2
Lead [ug/L]_Intrawell_MW-17	1	2.57
Lead [ug/L]_Intrawell_MW-17	1	4.73
Lead [ug/L]_Intrawell_MW-17	0	2
Lead [ug/L]_Intrawell_MW-17	1	14
Lead [ug/L]_Intrawell_MW-17	1	7.58
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Molybdenum [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Thallium [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Antimony [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	3.44
Arsenic [ug/L]_Intrawell_MW-17	1	3.08
Arsenic [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	2.37
Arsenic [ug/L]_Intrawell_MW-17	0	2
Arsenic [ug/L]_Intrawell_MW-17	1	6.4
Arsenic [ug/L]_Intrawell_MW-17	1	3.54
Barium [ug/L]_Intrawell_MW-17	1	234
Barium [ug/L]_Intrawell_MW-17	1	359
Barium [ug/L]_Intrawell_MW-17	1	320
Barium [ug/L]_Intrawell_MW-17	1	164
Barium [ug/L]_Intrawell_MW-17	1	272
Barium [ug/L]_Intrawell_MW-17	1	173
Barium [ug/L]_Intrawell_MW-17	1	382
Barium [ug/L]_Intrawell_MW-17	1	544
Beryllium [ug/L]_Intrawell_MW-17	0	2

group	D_x_ols	x_ols
Beryllium [ug/L]_Intrawell_MW-17	0	2
Beryllium [ug/L]_Intrawell_MW-17	0	2
Beryllium [ug/L]_Intrawell_MW-17	0	2
Beryllium [ug/L]_Intrawell_MW-17	0	2
Beryllium [ug/L]_Intrawell_MW-17	0	2
Beryllium [ug/L]_Intrawell_MW-17	1	2.92
Beryllium [ug/L]_Intrawell_MW-17	1	2.01
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	0	2
Cadmium [ug/L]_Intrawell_MW-17	1	2.58
Chromium [ug/L]_Intrawell_MW-17	1	12.1
Chromium [ug/L]_Intrawell_MW-17	1	10.2
Chromium [ug/L]_Intrawell_MW-17	0	4
Chromium [ug/L]_Intrawell_MW-17	1	4.03
Chromium [ug/L]_Intrawell_MW-17	1	8.13
Chromium [ug/L]_Intrawell_MW-17	0	4
Chromium [ug/L]_Intrawell_MW-17	1	16.8
Chromium [ug/L]_Intrawell_MW-17	1	10.7
Cobalt [ug/L]_Intrawell_MW-17	1	7.96
Cobalt [ug/L]_Intrawell_MW-17	1	7.94
Cobalt [ug/L]_Intrawell_MW-17	1	4.07
Cobalt [ug/L]_Intrawell_MW-17	1	2.39
Cobalt [ug/L]_Intrawell_MW-17	1	4.59
Cobalt [ug/L]_Intrawell_MW-17	1	2.54
Cobalt [ug/L]_Intrawell_MW-17	1	11.4
Cobalt [ug/L]_Intrawell_MW-17	1	6.26
Selenium [ug/L]_Intrawell_MW-17	1	6.95
Selenium [ug/L]_Intrawell_MW-17	1	5.28
Selenium [ug/L]_Intrawell_MW-17	1	8.79
Selenium [ug/L]_Intrawell_MW-17	1	9.19
Selenium [ug/L]_Intrawell_MW-17	1	6.94
Selenium [ug/L]_Intrawell_MW-17	1	6.9
Selenium [ug/L]_Intrawell_MW-17	1	11.2
Selenium [ug/L]_Intrawell_MW-17	1	9.35
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.46
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	6.05
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.68
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	5.47
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.97
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	3.5
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	5.59
Radium-226/228 [pCi/L]_Intrawell_MW-17	1	10.46
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.219
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	1	0.243
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.313
Mercury [ug/L]_Interwell_POOLED-Upgradient	1	0.23
Mercury [ug/L]_Interwell_POOLED-Upgradient	0	0.2
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	1	235
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	20

group	D_x_ols	x_ols
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Lithium [ug/L]_Interwell_POOLED-Upgradient	0	40
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	200
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	459
Fluoride [ug/L]_Interwell_POOLED-Upgradient	1	272
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Fluoride [ug/L]_Interwell_POOLED-Upgradient	0	500
Lead [ug/L]_Interwell_POOLED-Upgradient	1	3.85
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.42
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.99
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Lead [ug/L]_Interwell_POOLED-Upgradient	1	7.98
Lead [ug/L]_Interwell_POOLED-Upgradient	1	4.98
Lead [ug/L]_Interwell_POOLED-Upgradient	1	6.53
Lead [ug/L]_Interwell_POOLED-Upgradient	1	8.77
Lead [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Molybdenum [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Thallium [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	2
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Antimony [ug/L]_Interwell_POOLED-Upgradient	0	4
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	6.87
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	9.18
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	11.9
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	3.17

group	D_x_ols	x_ols
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	12.3
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	7.65
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	8.39
Arsenic [ug/L]_Interwell_POOLED-Upgradient	1	14.3
Arsenic [ug/L]_Interwell_POOLED-Upgradient	0	4
Barium [ug/L]_Interwell_POOLED-Upgradient	1	109
Barium [ug/L]_Interwell_POOLED-Upgradient	1	140
Barium [ug/L]_Interwell_POOLED-Upgradient	1	164
Barium [ug/L]_Interwell_POOLED-Upgradient	1	58.1
Barium [ug/L]_Interwell_POOLED-Upgradient	1	204
Barium [ug/L]_Interwell_POOLED-Upgradient	1	148
Barium [ug/L]_Interwell_POOLED-Upgradient	1	166
Barium [ug/L]_Interwell_POOLED-Upgradient	1	243
Barium [ug/L]_Interwell_POOLED-Upgradient	1	16.6
Barium [ug/L]_Interwell_POOLED-Upgradient	1	14.4
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.3
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.91
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.74
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	2.17
Beryllium [ug/L]_Interwell_POOLED-Upgradient	1	3.39
Beryllium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Cadmium [ug/L]_Interwell_POOLED-Upgradient	0	2
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.85
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	6.96
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	9.2
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.36
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	5.59
Chromium [ug/L]_Interwell_POOLED-Upgradient	1	9.98
Chromium [ug/L]_Interwell_POOLED-Upgradient	0	4
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	4.22
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.85
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	8.7
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	3.07
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	9.76
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.38
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	6.37
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	11.6
Cobalt [ug/L]_Interwell_POOLED-Upgradient	0	2
Cobalt [ug/L]_Interwell_POOLED-Upgradient	1	1.02
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	1	3.4
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Selenium [ug/L]_Interwell_POOLED-Upgradient	0	2
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	3.783517583

group	D_x_ols	x_ols
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.981737429
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	1.108957907
Radium-226/228 [pCi/L]_Interwell_POOLED-Upgradient	1	0.521

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