



Department of Energy

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May 28, 2025

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Division of Waste Management
Kentucky Department for Environmental Protection
625 Hospital Drive
Madisonville, Kentucky 42431

PPPO-02-10033008-25

Ms. April Webb
Hazardous Waste Branch Manager
Division of Waste Management
Kentucky Department for Environmental Protection
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

Dear Ms. Linehan and Ms. Webb:

C-404 HAZARDOUS WASTE LANDFILL MAY 2025 SEMIANNUAL GROUNDWATER REPORT (OCTOBER 2024–MARCH 2025), PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, FRNP-RPT-0382/V1, HAZARDOUS WASTE MANAGEMENT FACILITY PERMIT NO. KY8-890-008-982, AGENCY INTEREST ID NO. 3059

Enclosed is the subject report for the first reporting period, fiscal year 2025. This report is required in accordance with Part II, Specific Condition II.K.6.d, of Hazardous Waste Management Facility Permit No. KY8-890-008-982 (Permit).

Results of the statistical analyses indicate that compliance well concentrations of permit-required parameters are not statistically different from those in background wells, with the exception of trichloroethene (TCE) in compliance well MW84A and technetium-99 (Tc-99) in compliance wells MW84A and MW90A.

TCE in compliance well MW84A and Tc-99 concentrations in compliance well MW90A showed statistically significant concentrations compared to concentrations observed in the background wells. Mann-Kendall analysis of TCE in MW84A and Tc-99 in MW90A did not show increasing trends, confirming no exceedances of these parameters are attributable to the C-404 landfill.

Mann-Kendall analysis of Tc-99 in MW84A showed an increasing trend, indicating a confirmed statistical exceedance. Resampling of all C-404 monitoring wells for radionuclide constituents is planned per Part E, Section 6(2) of the Permit.

Notification of the statistically significant exceedance for Tc-99 in MW84A was submitted, pursuant to Part II, Specific Condition II.K.6.a, to the Kentucky Department for Environmental Protection under separate correspondence.

If you have any questions or require additional information, please contact Angus MacKelvey at (270) 349-7526.

Sincerely,

APRIL LADD

Digitally signed by APRIL
LADD
Date: 2025.05.28 16:23:19
-05'00'

April Ladd
Paducah Site Lead
Portsmouth/Paducah Project Office

Enclosures:

1. Certification Page
2. *C-404 Hazardous Waste Landfill May 2025 Semiannual Groundwater Report (October 2024–March 2025), Paducah Gaseous Diffusion Plant, Paducah, Kentucky, FRNP-RPT-0382/V1*

cc w/enclosures:

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**C-404 Hazardous Waste Landfill
May 2026 Semiannual
Groundwater Report
(October 2025–March 2026),
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**



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**C-404 Hazardous Waste Landfill
May 2026 Semiannual
Groundwater Report
(October 2025–March 2026),
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**

Date Issued—May 2026

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

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ACRONYMS

AKGWA	Assembled Kentucky Groundwater
ASD	alternate source demonstration
EPA	U.S. Environmental Protection Agency
MW	monitoring well
RCRA	Resource Conservation and Recovery Act
RGA	Regional Gravel Aquifer
UCRS	upper continental recharge system
URGA	Upper Regional Gravel Aquifer

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EXECUTIVE SUMMARY

This report, *C-404 Hazardous Waste Landfill May 2026 Semiannual Groundwater Report (October 2025–March 2026)*, Paducah Gaseous Diffusion Plant, Paducah, Kentucky, FRNP-RPT-0411/V1, is being submitted by the U.S. Department of Energy in accordance with requirements in Kentucky Division of Waste Management Hazardous Waste Management Facility Permit, KY8-890-008-982 (Permit). The period covered by this report is October 2025 through March 2026; and the report includes analytical data from the resampling for radionuclides in October 2025 and the January 2026 semiannual sampling for all parameters of monitoring wells (MWs) located in the vicinity of the closed C-404 Hazardous Waste Landfill (C-404 Landfill).

The groundwater monitoring analytical data were subjected to statistical analyses. The statistical analyses were conducted in accordance with the Hazardous Waste Management Facility Permit. With the exception of arsenic (As) and trichloroethene (TCE) in compliance well MW84A, and technetium-99 (Tc-99) observed in compliance wells MW84A and MW90A, the statistical tests on all other parameters showed no statistically significant differences above concentrations observed in background wells.

TCE and As concentrations in westernmost compliance wells MW84A are trending similarly. The 2007 *C-404 Landfill Source Demonstration, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PRS-ENM-0031/R2, determined that the TCE plume (and As, by comparison of trends) is derived from an upgradient source (PRS 2007a). Trends in the westernmost compliance and background wells monitor the depletion of the upgradient source zone; however, the observed statistically significant exceedances of Tc-99 in MW84A and MW90A do not show similar trends that would permit application of the 2007 alternate source demonstration.

The leachate in the C-404 Landfill leachate collection system is monitored at least monthly and, at a minimum, is removed and sampled when the level exceeds 36 inches in depth. During this reporting period of October 2025 through March 2026, the depth of the leachate did not exceed 36 inches. The maximum leachate depth in this reporting period was 24 inches, which was recorded on March 10, 2026. Because the leachate depth did not exceed 36 inches, the leachate from the sump was neither pumped, nor sampled.

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1. INTRODUCTION

This report contains the statistical evaluation of data from groundwater sampling and analysis for the closed C-404 Hazardous Waste Landfill (C-404 Landfill) at the U.S. Department of Energy Paducah Site (Paducah Site), Paducah, Kentucky. This semiannual report is required by the Kentucky Division of Waste Management Hazardous Waste Management Facility Permit, KY8-890-008-982 (Permit), Specific Condition II.J.6.d—Recordkeeping, Reporting and Response (KDWM 2025). The period covered by this report is October 2025 through March 2026.

Groundwater analytical results for the semiannual and special compliance groundwater sampling are provided in Appendix A, A1, and A2, respectively. The statistical analyses and qualification statement are provided in Appendix B.

1.1 BACKGROUND

The closed C-404 Landfill is located in the west-central portion of the Paducah Site secured area. The 1.2-acre facility operated as a surface impoundment from approximately 1952 until early 1957. During this time, influents to the impoundment originated from the C-400 Cleaning Building. In 1957, the impoundment was converted to a solid waste disposal facility for uranium-contaminated solid waste. When the impoundment was converted into a disposal facility, a sump was installed at the former impoundment weir to collect the leachate from the facility. Leachate is pumped from the sump, as needed, into a mobile tank. The leachate then is transferred to a permitted hazardous waste storage facility on-site prior to characterization; once characterized, the leachate is transferred off-site for treatment.

In 1986, the disposal of waste at the C-404 Landfill was halted, and a portion of the disposed-of waste was found to be Resource Conservation and Recovery Act (RCRA)-hazardous. The landfill was covered with a RCRA multilayered cap and certified closed in 1987. It currently is regulated under RCRA as a land disposal unit and compliance is monitored under the current Hazardous Waste Management Facility Permit (KDWM 2025).

Previous groundwater monitoring documented that concentrations of trichloroethene (TCE) found in compliance wells were statistically different from those found in background wells. The *C-404 Landfill Source Demonstration, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PRS-ENM-0031/R2, demonstrated that the source of TCE in compliance wells is not from the C-404 Landfill, but rather, the source is located upgradient/crossgradient of the C-404 Landfill (PRS 2007a).

Regional Gravel Aquifer (RGA) compliance monitoring well (MW) MW90 was abandoned and replaced by MW90A in 2001. RGA compliance well MW420 was installed in 2007 to better assess groundwater quality at the C-404 Landfill (PRS 2007b).

Previous groundwater monitoring of RGA compliance well MW87 documented that concentrations in the compliance well were statistically different from background wells for lead and uranium (FRNP 2018). The *C-404 Hazardous Waste Landfill Alternate Source Demonstration—Source of Lead and Uranium in MW87 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, concluded that the statistical differences were a result of infiltration of upper continental recharge system (UCRS) groundwater into the RGA well due to compromised integrity of the well (FRNP 2019). The integrity of the well had deteriorated to a point that it no longer was suitable for its intended purpose. RGA compliance wells MW84, MW87, and background well MW93 were abandoned and replaced with MW84A, MW87A, and MW93A in 2019. RGA wells MW84 and MW93 were abandoned and replaced because they were the same age (installed in 1988) as

MW87. MW84A and MW87A were placed 10 ft north of MW84 and MW87, respectively, and screened at the same depth intervals. MW93A was placed 6 ft west of MW93 and screened at the same depth interval.

In the first semiannual reporting period for 2021 (October 2020–March 2021), statistical analysis of technetium-99 (Tc-99) detections in downgradient compliance well MW84A indicated a statistically significant exceedance over background concentrations. Notification of the statistically significant difference for Tc-99 in MW84A was submitted, pursuant to Part II, Specific Condition II.J.6.a, to the Kentucky Department of Waste Management.

An alternate source demonstration investigation for Tc-99 in MW84A was performed in June 2021. The *C-404 Hazardous Waste Landfill Alternate Source Demonstration—Source of Technetium-99 in MW84A at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0206, consisted of redevelopment and over pumping of MW84A, and review of the lines of evidence relating redevelopment of MW84A and the associated Tc-99 levels (FRNP 2021). The lines of evidence concluded that the observed trend of increasing Tc-99 in MW84A is not a result of contamination introduced into the well boring during drilling and well installation, but it is indicative of dissolved Tc-99 contamination in the RGA. Quarterly compliance monitoring for Tc-99 and other radionuclides was conducted at the C-404 Landfill through November 2022.

In accordance with Permit Specific Condition II.J.6.j, development and submittal of an engineering feasibility plan for a corrective action program is not required when a statistically significant exceedance has been confirmed for radionuclides (i.e., Tc-99).

A statistically significant exceedance of Tc-99 was again observed and reported in the May 2025 semiannual groundwater report, in MW84A. Resampling of all C-404 monitoring wells for radionuclides was performed in May 2025 in response to the Tc-99 exceedance in MW84A.

TCE and As concentrations in westernmost compliance wells MW84A are trending similarly. The 2007 *C-404 Landfill Source Demonstration, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PRS-ENM-0031/R2, determined that the TCE plume (and As, by comparison of trends) is derived from an upgradient source (PRS 2007a). Trends in the westernmost compliance and background wells monitor the depletion of the upgradient source zone. This demonstration for As and TCE in MW84A fulfills Section II.J.8 of the Hazardous Waste Management Facility Permit, which allows for demonstrating that the exceedance is consistent with the findings of the 2007 alternate source demonstration (ASD) and allows for the demonstration to be submitted within the semiannual report.

The observed statistically significant exceedances of Tc-99 in MW84A and MW90A do not show similar trends that would permit application of the 2007 ASD.

1.2 MONITORING PERIOD ACTIVITIES

1.2.1 Groundwater Monitoring

There are nine MWs sampled under the Permit for the C-404 Landfill: four UCRS wells and five Upper Regional Gravel Aquifer (URGA) wells. A map of the MW locations is provided in Figure 1.

Table 1 presents the well number for URGA wells located upgradient and downgradient of the C-404 Landfill. Table 1 also presents the well numbers for the UCRS wells located in proximity to the URGA wells. This table refers to the UCRS wells as being adjacent to an upgradient or downgradient URGA

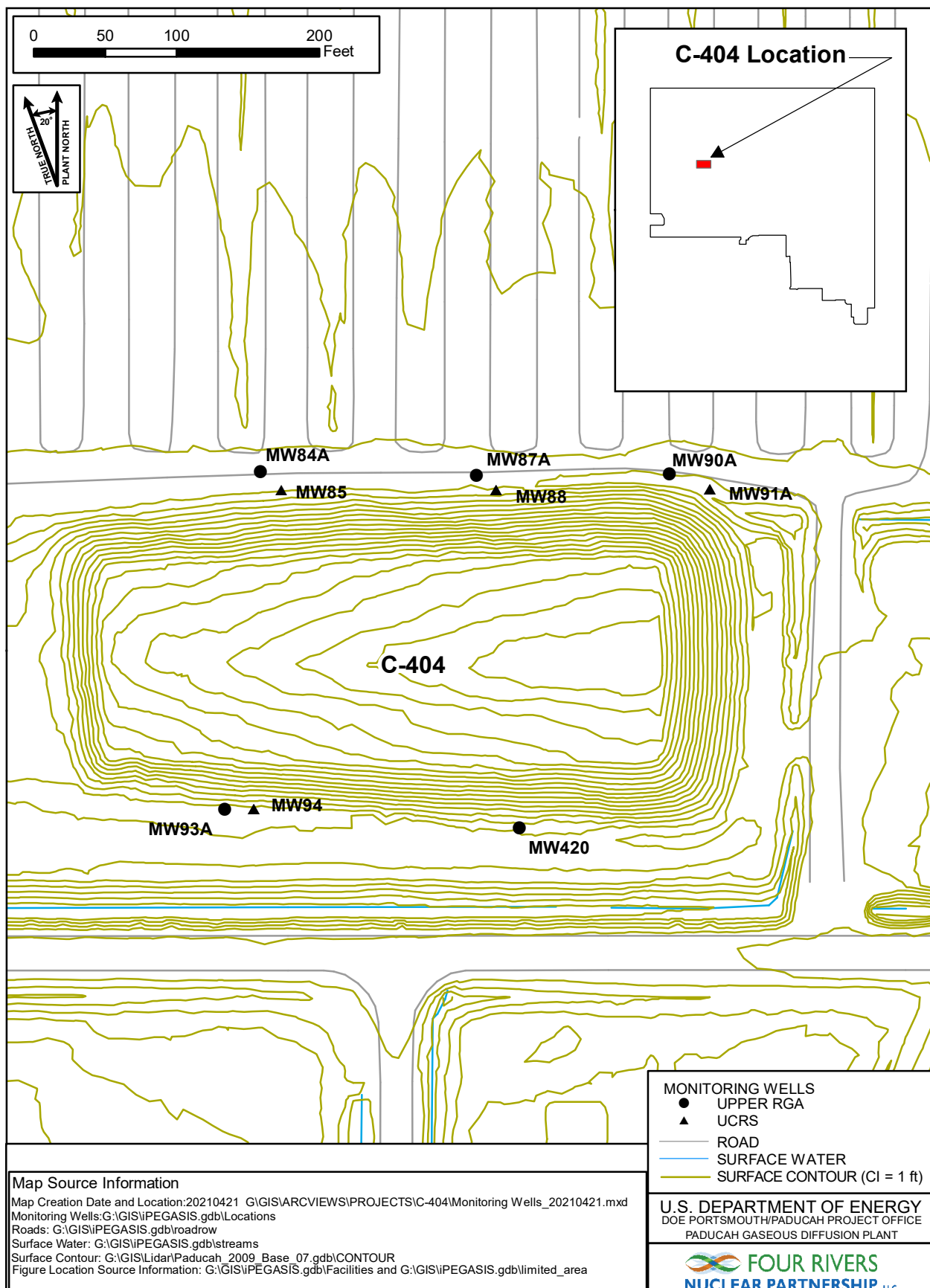


Figure 1. Monitoring Wells

well location and are identified relative to URGAs groundwater flow direction. The conceptual model for the C-404 Landfill indicates that groundwater in the UCRS wells flows primarily vertically downward until it reaches the URGAs; therefore, UCRS wells are not considered “upgradient” or “downgradient” of other UCRS wells in the area.

Table 1. Monitoring Well Locations

UCRS	
Located south of C-404 Landfill, adjacent to upgradient URGAs background well MW93A	MW94
Located north of C-404 Landfill, adjacent to downgradient URGAs compliance wells	MW85, MW88, MW91A*
URGA	
Upgradient background wells	MW93A*, MW420
Downgradient compliance wells	MW84A*, MW87A*, MW90A*

*MW90 was abandoned in 2001 and replaced with MW90A. MW91 was abandoned in 2017 and replaced with MW91A. MW84, MW87, and MW93 were abandoned in 2019 and replaced with MW84A, MW87A, and MW93A.

Table 2 presents the Assembled Kentucky Groundwater (AKGWA) numbers for each MW.

Table 2. AKGWA Numbers

Paducah Site Well Number	AKGWA Number
MW84A	8007-4849
MW85	8000-5234
MW87A	8007-4850
MW88	8000-5237
MW90A	8004-0357
MW91A	8007-2917
MW93A	8007-4851
MW94	8000-5103
MW420	8005-3263

All nine MWs were sampled in October 2025 and January 2026 during this reporting period. Samples collected in October 2025 were analyzed for radionuclides only, while the samples collected in January 2026 were analyzed for all parameters that are required by Part VIII.E of the Permit. Groundwater sampling was conducted using procedure CP4-ES-2101, *Groundwater Sampling*. The appropriate sample containers and preservatives were used. The laboratory that performed the analyses used U.S. Environmental Protection Agency-approved methods, as applicable. Appendix A, A1 and A2, of this report contain the analytical results. Appendix B of this report contains the statistical analyses.

1.2.2 Landfill Leachate

In accordance with Appendix I2, C-404 Landfill Closure Plan (Section 1.2 of the Permit), the quantity of liquid in the leachate collection system is monitored (at least monthly) and, at a minimum, will be “removed when the quantity exceeds 36 inches in depth.” Once the leachate depth reaches 36 inches, the leachate is pumped into a mobile tank. The leachate then is transferred to a permitted hazardous waste storage facility on-site prior to characterization; once characterized, the leachate is transferred off-site for treatment. During this reporting period of October 2025 through March 2026, the depth of the leachate did not exceed 36 inches. The maximum leachate depth in this reporting period was 24 inches, which was recorded on March 10, 2026. Because the leachate depth did not exceed 36 inches, the leachate in the sump was neither pumped, nor sampled.

2. STATISTICAL SYNOPSIS

The statistical analyses conducted on the data collected from the C-404 Landfill were performed in accordance with procedures in the Permit, Part VIII.E, reissued in November 2025. Appendix B of this report contains the statistical analyses performed for this reporting period. Statistical analyses utilized data from the URGA background wells, MW93A and MW420, and URGA compliance wells, MW84A, MW87A, and MW90A. For this reporting period, the data set includes data from January 2016 through January 2026.

Appendix B provides a summary of the statistical analyses performed. The statistical analysis approach in the newly reissued Hazardous Waste Management Facility Permit is prediction limits, without a retesting strategy, as found in Section 18 of the U.S. Environmental Protection Agency (EPA) guidance document, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*, now referred to as Unified Guidance (EPA 2009). With the exception of As and TCE in compliance well MW84A, and Tc-99 observed in compliance wells MW84A and MW90A, the statistical tests on all other parameters showed no statistically significant differences above concentrations observed in background wells.

3. DATA VALIDATION AND QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

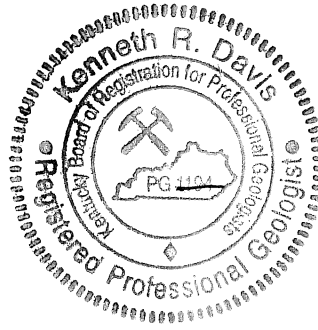
The data and the data validation codes for the January 2026 data set are provided in Appendix A, A1. All data for these data sets were considered usable as reported. Data validation was performed on the analytical data by an independent, third-party validator.

Field quality control samples are collected during each semiannual sampling event. Equipment rinseate blanks, field blanks, field duplicates, and trip blanks are obtained to ensure quality control and are reported in the analytical results in Appendix A, A1 and A2. Laboratory quality control samples, such as matrix spikes, matrix spike duplicates, and method blanks, are performed by the laboratory and reported in the laboratory report. Both field and laboratory quality control sample results are reviewed as part of the data assessment review and data validation process.

4. PROFESSIONAL GEOLOGIST AUTHORIZATION

DOCUMENT IDENTIFICATION: *C-404 Hazardous Waste Landfill
May 2026 Semiannual Groundwater Report
(October 2025–March 2026),
Paducah Gaseous Diffusion Plant, Paducah, Kentucky
(FRNP-RPT-0411/V1)*

Stamped and signed pursuant to my authority as a duly registered geologist under the provisions of KRS Chapter 322A.



113927
KD 5-12-26

Kenneth R. Davis
Kenneth R. Davis

PG113927

May 12, 2026
Date

5. REFERENCES

- EPA (U.S. Environmental Protection Agency) 2009, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*, EPA 530-R-09-007, U.S. Environmental Protection Agency, Washington DC, March.
- FRNP (Four Rivers Nuclear Partnership, LLC) 2018. *C-404 Hazardous Waste Landfill November 2018 Semiannual Groundwater Report (April 2018—September 2018), Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0026/V2, U.S. Department of Energy, Paducah, KY, November.
- FRNP 2019. *C-404 Hazardous Waste Landfill Alternate Source Demonstration—Source of Lead and Uranium in MW87 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0078, Four Rivers Nuclear Partnership, LLC, Paducah, KY, February.
- FRNP 2021. *C-404 Hazardous Waste Landfill Alternate Source Demonstration—Source of Technetium-99 in MW84A at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0206, Four Rivers Nuclear Partnership, LLC, Paducah, KY, August.
- KDWM (Kentucky Division of Waste Management) 2025. Hazardous Waste Management Facility Permit for the U.S. Department of Energy, Paducah Gaseous Diffusion Plant, KY8-890-008-982, effective December 12.
- PRS (Paducah Remediation Services, LLC) 2007a. *C-404 Landfill Source Demonstration, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PRS-ENM-0031/R2, Paducah Remediation Services, LLC, Kevil, KY, August.
- PRS 2007b. *Well Plan for Addition of Wells for C-404 Monitoring Well Network, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, PRS/PROJ/0028, Paducah Remediation Services, LLC, Kevil, KY, July.

APPENDIX A

C-404 HAZARDOUS WASTE LANDFILL GROUNDWATER ANALYTICAL RESULTS

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APPENDIX A1
SEMIANNUAL GROUNDWATER SAMPLING

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**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982

Sampling Point: MW84A REG Downgradient URGA **Period:** Semiannual Report

AKGWA Well Tag #: 8007-4849

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		30.02	Inches/Hg		1/5/2026			FS	X
Conductivity		498	µmhos/cm		1/5/2026			FS	X
Depth to Water		51.45	ft		1/5/2026			FS	X
Dissolved Oxygen		4.84	mg/L		1/5/2026			FS	X
Eh (approx)		526.5	mV		1/5/2026			FS	X
pH		5.55	Std Unit		1/5/2026			FS	X
Temperature		53.3	deg F		1/5/2026			FS	X
Turbidity		7.01	NTU		1/5/2026			FS	X
Arsenic		0.0296	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99		219	pCi/L	11.2	1/5/2026	18.1	30.8	HASL 300, Tc-02-RC M	=
Uranium-234	U	0.129	pCi/L	1.47	1/5/2026	0.726	0.727	HASL 300, U-02-RC M	=
Uranium-235	U	0.168	pCi/L	1.06	1/5/2026	0.63	0.631	HASL 300, U-02-RC M	=
Uranium-238	U	0.272	pCi/L	0.99	1/5/2026	0.624	0.625	HASL 300, U-02-RC M	=
Trichloroethene		4680	ug/L	50	1/5/2026			SW846-8260D	J

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982

Sampling Point: MW84A FR Downgradient URGA **Period:** Semiannual Report

AKGWA Well Tag #: 8007-4849

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Arsenic		0.0303	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99		165	pCi/L	11.3	1/5/2026	16	24.6	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.392	pCi/L	1.6	1/5/2026	0.529	0.529	HASL 300, U-02-RC M	=
Uranium-235	U	0.479	pCi/L	1.28	1/5/2026	0.847	0.849	HASL 300, U-02-RC M	=
Uranium-238	U	0.177	pCi/L	1.12	1/5/2026	0.604	0.605	HASL 300, U-02-RC M	=
Trichloroethene		3370	ug/L	100	1/5/2026			SW846-8260D	J

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Sampling Point: MW85 REG Downgradient UCRS **Period:** Semiannual Report
AKGWA Well Tag #: 8000-5234

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.76	Inches/Hg		1/6/2026			FS	X
Conductivity		360	µmhos/cm		1/6/2026			FS	X
Depth to Water		9.09	ft		1/6/2026			FS	X
Dissolved Oxygen		4.02	mg/L		1/6/2026			FS	X
Eh (approx)		500.5	mV		1/6/2026			FS	X
pH		5.85	Std Unit		1/6/2026			FS	X
Temperature		64.1	deg F		1/6/2026			FS	X
Turbidity		109.74	NTU		1/6/2026			FS	X
Arsenic	J	0.00402	mg/L	0.005	1/6/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/6/2026			SW846-6020B	=
Chromium	J	0.00826	mg/L	0.01	1/6/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/6/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/6/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/6/2026			SW846-6020B	=
Uranium		0.000416	mg/L	0.0002	1/6/2026			SW846-6020B	=
Technetium-99		59	pCi/L	15.5	1/6/2026	12.1	13.8	HASL 300, Tc-02-RC M	=
Uranium-234	U	0.333	pCi/L	2.45	1/6/2026	1.26	1.26	HASL 300, U-02-RC M	=
Uranium-235	U	0.156	pCi/L	2.22	1/6/2026	1.1	1.11	HASL 300, U-02-RC M	=
Uranium-238	U	0.871	pCi/L	1.49	1/6/2026	1.24	1.25	HASL 300, U-02-RC M	=
Trichloroethene	S	3.83	ug/L	1	1/6/2026			SW846-8260D	J

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Sampling Point: MW87A REG Downgradient URGA **Period:** Semiannual Report
AKGWA Well Tag #: 8007-4850

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		30.01	Inches/Hg		1/5/2026			FS	X
Conductivity		371	µmhos/cm		1/5/2026			FS	X
Depth to Water		51.53	ft		1/5/2026			FS	X
Dissolved Oxygen		3.67	mg/L		1/5/2026			FS	X
Eh (approx)		535.8	mV		1/5/2026			FS	X
pH		5.64	Std Unit		1/5/2026			FS	X
Temperature		56.7	deg F		1/5/2026			FS	X
Turbidity		4.16	NTU		1/5/2026			FS	X
Arsenic		0.00644	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99		23	pCi/L	11.2	1/5/2026	8.16	8.57	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.265	pCi/L	1.78	1/5/2026	0.69	0.691	HASL 300, U-02-RC M	=
Uranium-235	U	0.35	pCi/L	1.28	1/5/2026	0.804	0.805	HASL 300, U-02-RC M	=
Uranium-238	U	-0.0894	pCi/L	1.03	1/5/2026	0.395	0.396	HASL 300, U-02-RC M	=
Trichloroethene		80.4	ug/L	1	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982

Sampling Point: MW88 REG Downgradient UCRS **Period:** Semiannual Report

AKGWA Well Tag #: 8000-5237

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.97	Inches/Hg		1/5/2026			FS	X
Conductivity		615	µmhos/cm		1/5/2026			FS	X
Depth to Water		8.43	ft		1/5/2026			FS	X
Dissolved Oxygen		1.99	mg/L		1/5/2026			FS	X
Eh (approx)		497.3	mV		1/5/2026			FS	X
pH		5.72	Std Unit		1/5/2026			FS	X
Temperature		60.8	deg F		1/5/2026			FS	X
Turbidity		15.06	NTU		1/5/2026			FS	X
Arsenic		0.00656	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	J	0.000158	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	J	0.000114	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99		19.4	pCi/L	11.4	1/5/2026	8	8.29	HASL 300, Tc-02-RC M	=
Uranium-234	U	0.549	pCi/L	2.68	1/5/2026	1.46	1.46	HASL 300, U-02-RC M	=
Uranium-235	U	0.599	pCi/L	1.32	1/5/2026	0.951	0.954	HASL 300, U-02-RC M	=
Uranium-238	U	-0.0922	pCi/L	1.06	1/5/2026	0.408	0.409	HASL 300, U-02-RC M	=
Trichloroethene		4.48	ug/L	1	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Sampling Point: MW90A REG Downgradient URGA **Period:** Semiannual Report
AKGWA Well Tag #: 8004-0357

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.97	Inches/Hg		1/5/2026			FS	X
Conductivity		313	µmhos/cm		1/5/2026			FS	X
Depth to Water		50.79	ft		1/5/2026			FS	X
Dissolved Oxygen		5.49	mg/L		1/5/2026			FS	X
Eh (approx)		543.6	mV		1/5/2026			FS	X
pH		5.65	Std Unit		1/5/2026			FS	X
Temperature		61.8	deg F		1/5/2026			FS	X
Turbidity		4.48	NTU		1/5/2026			FS	X
Arsenic	J	0.00368	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99		85.9	pCi/L	11	1/5/2026	12.1	15.6	HASL 300, Tc-02-RC M	=
Uranium-234	U	0.00433	pCi/L	1.66	1/5/2026	0.771	0.772	HASL 300, U-02-RC M	=
Uranium-235	U	0.367	pCi/L	0.961	1/5/2026	0.709	0.71	HASL 300, U-02-RC M	=
Uranium-238	U	0.18	pCi/L	1.33	1/5/2026	0.688	0.689	HASL 300, U-02-RC M	=
Trichloroethene		10.9	ug/L	1	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982

Sampling Point: MW91A REG Downgradient UCRS **Period:** Semiannual Report

AKGWA Well Tag #: 8007-2917

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.76	Inches/Hg		1/6/2026			FS	X
Conductivity		767	µmhos/cm		1/6/2026			FS	X
Depth to Water		12.07	ft		1/6/2026			FS	X
Dissolved Oxygen		1.1	mg/L		1/6/2026			FS	X
Eh (approx)		323.1	mV		1/6/2026			FS	X
pH		5.86	Std Unit		1/6/2026			FS	X
Temperature		64.6	deg F		1/6/2026			FS	X
Turbidity		47.06	NTU		1/6/2026			FS	X
Arsenic	J	0.00449	mg/L	0.005	1/6/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/6/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/6/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/6/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/6/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/6/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/6/2026			SW846-6020B	=
Technetium-99		154	pCi/L	15.1	1/6/2026	15.8	23.5	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.22	pCi/L	1.3	1/6/2026	0.496	0.497	HASL 300, U-02-RC M	=
Uranium-235	U	0.34	pCi/L	1.1	1/6/2026	0.677	0.678	HASL 300, U-02-RC M	=
Uranium-238	U	0.0162	pCi/L	1.24	1/6/2026	0.577	0.577	HASL 300, U-02-RC M	=
Trichloroethene	S	11.9	ug/L	1	1/6/2026			SW846-8260D	J

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Sampling Point: MW93A REG Upgradient URGA **Period:** Semiannual Report
AKGWA Well Tag #: 8007-4851

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.91	Inches/Hg		1/5/2026			FS	X
Conductivity		414	µmhos/cm		1/5/2026			FS	X
Depth to Water		54.43	ft		1/5/2026			FS	X
Dissolved Oxygen		2.3	mg/L		1/5/2026			FS	X
Eh (approx)		540.1	mV		1/5/2026			FS	X
pH		5.62	Std Unit		1/5/2026			FS	X
Temperature		62.3	deg F		1/5/2026			FS	X
Turbidity		4.93	NTU		1/5/2026			FS	X
Arsenic		0.0194	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99	U	1.86	pCi/L	11.1	1/5/2026	6.21	6.21	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.0819	pCi/L	1.45	1/5/2026	0.644	0.644	HASL 300, U-02-RC M	=
Uranium-235	U	0.129	pCi/L	0.812	1/5/2026	0.483	0.483	HASL 300, U-02-RC M	=
Uranium-238	U	-0.159	pCi/L	1.15	1/5/2026	0.431	0.431	HASL 300, U-02-RC M	=
Trichloroethene		701	ug/L	20	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982

Sampling Point: MW94 REG Upgradient UCRS **Period:** Semiannual Report

AKGWA Well Tag #: 8000-5103

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.8	Inches/Hg		1/6/2026			FS	X
Conductivity		685	µmhos/cm		1/6/2026			FS	X
Depth to Water		13.53	ft		1/6/2026			FS	X
Dissolved Oxygen		1.17	mg/L		1/6/2026			FS	X
Eh (approx)		535.3	mV		1/6/2026			FS	X
pH		6.06	Std Unit		1/6/2026			FS	X
Temperature		62.8	deg F		1/6/2026			FS	X
Turbidity		40.4	NTU		1/6/2026			FS	X
Arsenic	U	0.005	mg/L	0.005	1/6/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/6/2026			SW846-6020B	=
Chromium		0.0141	mg/L	0.01	1/6/2026			SW846-6020B	=
Lead	J	0.00193	mg/L	0.002	1/6/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/6/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/6/2026			SW846-6020B	=
Uranium		0.00105	mg/L	0.0002	1/6/2026			SW846-6020B	=
Technetium-99		3370	pCi/L	15.7	1/6/2026	64.5	390	HASL 300, Tc-02-RC M	=
Uranium-234	U	0.331	pCi/L	2.44	1/6/2026	1.26	1.26	HASL 300, U-02-RC M	=
Uranium-235	U	0.684	pCi/L	1.83	1/6/2026	1.33	1.33	HASL 300, U-02-RC M	=
Uranium-238	U	0.516	pCi/L	1.6	1/6/2026	1.08	1.08	HASL 300, U-02-RC M	=
Trichloroethene	S	2.03	ug/L	1	1/6/2026			SW846-8260D	J

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Sampling Point: MW420 REG Upgradient URGA **Period:** Semiannual Report
AKGWA Well Tag #: 8005-3263

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.93	Inches/Hg		1/5/2026			FS	X
Conductivity		403	µmhos/cm		1/5/2026			FS	X
Depth to Water		54.16	ft		1/5/2026			FS	X
Dissolved Oxygen		2.27	mg/L		1/5/2026			FS	X
Eh (approx)		552.7	mV		1/5/2026			FS	X
pH		5.53	Std Unit		1/5/2026			FS	X
Temperature		62.3	deg F		1/5/2026			FS	X
Turbidity		4.27	NTU		1/5/2026			FS	X
Arsenic		0.0206	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99	U	-2.86	pCi/L	10.8	1/5/2026	5.55	5.55	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.227	pCi/L	1.62	1/5/2026	0.597	0.597	HASL 300, U-02-RC M	=
Uranium-235	U	-0.0597	pCi/L	1.19	1/5/2026	0.515	0.516	HASL 300, U-02-RC M	=
Uranium-238	U	-0.0483	pCi/L	0.965	1/5/2026	0.417	0.417	HASL 300, U-02-RC M	=
Trichloroethene		2510	ug/L	50	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Type of Sample: FB **Period:** Semiannual Report QC Samples
AKGWA Well Tag #: 0000-0000

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Arsenic	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99	U	-0.259	pCi/L	10.7	1/5/2026	5.77	5.77	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.529	pCi/L	2	1/5/2026	0.557	0.558	HASL 300, U-02-RC M	=
Uranium-235	U	-0.145	pCi/L	1.68	1/5/2026	0.643	0.644	HASL 300, U-02-RC M	=
Uranium-238	U	-0.235	pCi/L	1.61	1/5/2026	0.545	0.546	HASL 300, U-02-RC M	=
Trichloroethene	U	1	ug/L	1	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Type of Sample: RI **Period:** Semiannual Report QC Samples
AKGWA Well Tag #: 0000-0000

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Arsenic	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Cadmium	U	0.001	mg/L	0.001	1/5/2026			SW846-6020B	=
Chromium	U	0.01	mg/L	0.01	1/5/2026			SW846-6020B	=
Lead	U	0.002	mg/L	0.002	1/5/2026			SW846-6020B	=
Mercury	U	0.0002	mg/L	0.0002	1/5/2026			SW846-7470A	=
Selenium	U	0.005	mg/L	0.005	1/5/2026			SW846-6020B	=
Uranium	U	0.0002	mg/L	0.0002	1/5/2026			SW846-6020B	=
Technetium-99	U	-2.28	pCi/L	10.8	1/5/2026	5.61	5.61	HASL 300, Tc-02-RC M	=
Uranium-234	U	-0.686	pCi/L	2.67	1/5/2026	0.885	0.886	HASL 300, U-02-RC M	=
Uranium-235	U	0	pCi/L	1.02	1/5/2026	0.686	0.687	HASL 300, U-02-RC M	=
Uranium-238	U	-0.187	pCi/L	2.13	1/5/2026	0.846	0.847	HASL 300, U-02-RC M	=
Trichloroethene	U	1	ug/L	1	1/5/2026			SW846-8260D	=

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982
Type of Sample: TB **Period:** Semiannual Report QC Samples
AKGWA Well Tag #: 0000-0000

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Trichloroethene	J	0.42	ug/L	1	1/5/2026			SW846-8260D	=
Trichloroethene	US	1	ug/L	1	1/6/2026			SW846-8260D	=

QUALIFIER Codes

- U Not detected. (RADS: Value reported is < MDA.)
- J Estimated value.
- S Sample surrogate recovery outside acceptance criteria.

SAMPLING POINT Codes

- UCRS Upper Continental Recharge System
- URGA Upper Regional Gravel Aquifer

SAMPLE TYPE Codes

- FB Field Blank
- FR Field Duplicate as defined in sampling procedure.
- REG Regular
- RI Equipment Rinsate Blank
- TB Trip Blank

VALIDATION Codes

- = Validated result, no additional qualifier necessary.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- UJ Analyte, compound or nuclide not detected above the reported detection limit, and the reported detection limit is approximated due to quality deficiency.
- X Not validated.

APPENDIX A2

SPECIAL COMPLIANCE GROUNDWATER SAMPLING

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**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW84A REG

Downgradient URGA

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8007-4849

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		30	Inches/Hg		10/21/2025			FS	X
Conductivity		509	µmhos/cm		10/21/2025			FS	X
Depth to Water		49.8	ft		10/21/2025			FS	X
Dissolved Oxygen		3.73	mg/L		10/21/2025			FS	X
Eh (approx)		522	mV		10/21/2025			FS	X
pH		5.72	Std Unit		10/21/2025			FS	X
Temperature		62.5	deg F		10/21/2025			FS	X
Turbidity		19.94	NTU		10/21/2025			FS	X
Technetium-99		73.7	pCi/L	17.4	10/21/2025	13.9	16.2	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.393	pCi/L	0.632	10/21/2025	0.403	0.407	HASL 300, U-02-RC M	X
Uranium-235	U	0.228	pCi/L	0.349	10/21/2025	0.268	0.269	HASL 300, U-02-RC M	X
Uranium-238	U	0.222	pCi/L	0.455	10/21/2025	0.29	0.29	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW84A FR

Downgradient URGA

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8007-4849

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Technetium-99		74.7	pCi/L	17.4	10/21/2025	14	16.4	HASL 300, Tc-02-RC M	X
Uranium-234	U	-0.156	pCi/L	1.11	10/21/2025	0.521	0.521	HASL 300, U-02-RC M	X
Uranium-235	U	0.297	pCi/L	0.758	10/21/2025	0.513	0.514	HASL 300, U-02-RC M	X
Uranium-238	U	0.561	pCi/L	0.767	10/21/2025	0.566	0.569	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW85 REG

Downgradient UCRS

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8000-5234

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.98	Inches/Hg		10/21/2025			FS	X
Conductivity		399	µmhos/cm		10/21/2025			FS	X
Depth to Water		8.91	ft		10/21/2025			FS	X
Dissolved Oxygen		2.39	mg/L		10/21/2025			FS	X
Eh (approx)		529	mV		10/21/2025			FS	X
pH		6.09	Std Unit		10/21/2025			FS	X
Temperature		66.4	deg F		10/21/2025			FS	X
Turbidity		6.36	NTU		10/21/2025			FS	X
Technetium-99		63.4	pCi/L	16.3	10/21/2025	12.8	14.7	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.403	pCi/L	0.662	10/21/2025	0.417	0.421	HASL 300, U-02-RC M	X
Uranium-235	U	0.307	pCi/L	0.336	10/21/2025	0.285	0.286	HASL 300, U-02-RC M	X
Uranium-238		0.426	pCi/L	0.34	10/21/2025	0.295	0.297	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW87A REG

Downgradient URGA

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8007-4850

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		30	Inches/Hg		10/21/2025			FS	X
Conductivity		350	µmhos/cm		10/21/2025			FS	X
Depth to Water		49.88	ft		10/21/2025			FS	X
Dissolved Oxygen		4.84	mg/L		10/21/2025			FS	X
Eh (approx)		516	mV		10/21/2025			FS	X
pH		5.73	Std Unit		10/21/2025			FS	X
Temperature		62.9	deg F		10/21/2025			FS	X
Turbidity		7.7	NTU		10/21/2025			FS	X
Technetium-99		33.6	pCi/L	17.6	10/21/2025	11.8	12.4	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.00569	pCi/L	0.71	10/21/2025	0.37	0.37	HASL 300, U-02-RC M	X
Uranium-235	U	0.298	pCi/L	0.38	10/21/2025	0.308	0.309	HASL 300, U-02-RC M	X
Uranium-238	U	0.281	pCi/L	0.445	10/21/2025	0.305	0.306	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW88 REG

Downgradient UCRS

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8000-5237

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.98	Inches/Hg		10/21/2025			FS	X
Conductivity		624	µmhos/cm		10/21/2025			FS	X
Depth to Water		8.06	ft		10/21/2025			FS	X
Dissolved Oxygen		1.71	mg/L		10/21/2025			FS	X
Eh (approx)		515	mV		10/21/2025			FS	X
pH		5.75	Std Unit		10/21/2025			FS	X
Temperature		65.8	deg F		10/21/2025			FS	X
Turbidity		71.04	NTU		10/21/2025			FS	X
Technetium-99		23.6	pCi/L	17.5	10/21/2025	11.2	11.5	HASL 300, Tc-02-RC M	X
Uranium-234	U	-0.0514	pCi/L	0.707	10/21/2025	0.36	0.36	HASL 300, U-02-RC M	X
Uranium-235	U	0.227	pCi/L	0.348	10/21/2025	0.267	0.268	HASL 300, U-02-RC M	X
Uranium-238	U	0.184	pCi/L	0.563	10/21/2025	0.33	0.33	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW90A REG

Downgradient URGA

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8004-0357

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.94	Inches/Hg		10/21/2025			FS	X
Conductivity		267	µmhos/cm		10/21/2025			FS	X
Depth to Water		49.03	ft		10/21/2025			FS	X
Dissolved Oxygen		5.21	mg/L		10/21/2025			FS	X
Eh (approx)		478	mV		10/21/2025			FS	X
pH		5.72	Std Unit		10/21/2025			FS	X
Temperature		66.3	deg F		10/21/2025			FS	X
Turbidity		39.15	NTU		10/21/2025			FS	X
Technetium-99		57.9	pCi/L	16.4	10/21/2025	12.5	14.2	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.389	pCi/L	0.593	10/21/2025	0.391	0.395	HASL 300, U-02-RC M	X
Uranium-235	U	0.309	pCi/L	0.633	10/21/2025	0.404	0.404	HASL 300, U-02-RC M	X
Uranium-238	U	0.208	pCi/L	0.558	10/21/2025	0.337	0.337	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW91A REG

Downgradient

UCRS

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8007-2917

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.94	Inches/Hg		10/21/2025			FS	X
Conductivity		772	µmhos/cm		10/21/2025			FS	X
Depth to Water		12.17	ft		10/21/2025			FS	X
Dissolved Oxygen		1.05	mg/L		10/21/2025			FS	X
Eh (approx)		297	mV		10/21/2025			FS	X
pH		5.93	Std Unit		10/21/2025			FS	X
Temperature		66.8	deg F		10/21/2025			FS	X
Turbidity		36.05	NTU		10/21/2025			FS	X
Technetium-99		177	pCi/L	16.7	10/21/2025	17.7	26.9	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.289	pCi/L	0.744	10/21/2025	0.44	0.443	HASL 300, U-02-RC M	X
Uranium-235	U	0.463	pCi/L	0.512	10/21/2025	0.385	0.387	HASL 300, U-02-RC M	X
Uranium-238		0.636	pCi/L	0.286	10/21/2025	0.336	0.341	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW93A REG

Upgradient

URGA

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8007-4851

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.99	Inches/Hg		10/21/2025			FS	X
Conductivity		408	µmhos/cm		10/21/2025			FS	X
Depth to Water		52.79	ft		10/21/2025			FS	X
Dissolved Oxygen		2.9	mg/L		10/21/2025			FS	X
Eh (approx)		543	mV		10/21/2025			FS	X
pH		5.76	Std Unit		10/21/2025			FS	X
Temperature		62	deg F		10/21/2025			FS	X
Turbidity		4.36	NTU		10/21/2025			FS	X
Technetium-99	U	12.3	pCi/L	16.8	10/21/2025	10.2	10.3	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.376	pCi/L	0.693	10/21/2025	0.43	0.434	HASL 300, U-02-RC M	X
Uranium-235	U	0.394	pCi/L	0.426	10/21/2025	0.347	0.349	HASL 300, U-02-RC M	X
Uranium-238	U	0.298	pCi/L	0.638	10/21/2025	0.389	0.39	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW94 REG

Upgradient

UCRS

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8000-5103

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.99	Inches/Hg		10/21/2025			FS	X
Conductivity		768	µmhos/cm		10/21/2025			FS	X
Depth to Water		13.68	ft		10/21/2025			FS	X
Dissolved Oxygen		1.4	mg/L		10/21/2025			FS	X
Eh (approx)		525	mV		10/21/2025			FS	X
pH		6.26	Std Unit		10/21/2025			FS	X
Temperature		63.9	deg F		10/21/2025			FS	X
Turbidity		81.06	NTU		10/21/2025			FS	X
Technetium-99		1300	pCi/L	17.9	10/21/2025	43.5	154	HASL 300, Tc-02-RC M	X
Uranium-234		0.745	pCi/L	0.547	10/21/2025	0.431	0.439	HASL 300, U-02-RC M	X
Uranium-235	U	0.186	pCi/L	0.573	10/21/2025	0.342	0.342	HASL 300, U-02-RC M	X
Uranium-238		0.716	pCi/L	0.505	10/21/2025	0.411	0.416	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill

County: McCracken

Permit #: KY8-890-008-982

Sampling Point: MW420 REG

Upgradient

URGA

Period: Quarterly Special Compliance

AKGWA Well Tag #: 8005-3263

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Barometric Pressure Reading		29.98	Inches/Hg		10/21/2025			FS	X
Conductivity		402	µmhos/cm		10/21/2025			FS	X
Depth to Water		52.48	ft		10/21/2025			FS	X
Dissolved Oxygen		1.56	mg/L		10/21/2025			FS	X
Eh (approx)		553	mV		10/21/2025			FS	X
pH		5.67	Std Unit		10/21/2025			FS	X
Temperature		63	deg F		10/21/2025			FS	X
Turbidity		3	NTU		10/21/2025			FS	X
Technetium-99	U	2.36	pCi/L	16.7	10/21/2025	9.54	9.54	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.064	pCi/L	0.605	10/21/2025	0.325	0.326	HASL 300, U-02-RC M	X
Uranium-235	U	-0.106	pCi/L	0.65	10/21/2025	0.293	0.293	HASL 300, U-02-RC M	X
Uranium-238	U	0	pCi/L	0.573	10/21/2025	0.29	0.29	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982 **Period:** Quarterly Special Compliance QC Samples

Type of Sample: FB

AKGWA Well Tag #: 0000-0000

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Technetium-99	U	-0.159	pCi/L	15.7	10/21/2025	8.8	8.8	HASL 300, Tc-02-RC M	X
Uranium-234	U	0.405	pCi/L	0.839	10/21/2025	0.523	0.526	HASL 300, U-02-RC M	X
Uranium-235	U	0.36	pCi/L	0.55	10/21/2025	0.423	0.424	HASL 300, U-02-RC M	X
Uranium-238	U	0.175	pCi/L	0.716	10/21/2025	0.411	0.411	HASL 300, U-02-RC M	X

**Paducah OREIS
GROUNDWATER MONITORING REPORT**

Facility: C-404 Landfill **County:** McCracken **Permit #:** KY8-890-008-982 **Period:** Quarterly Special Compliance QC Samples
Type of Sample: RI
AKGWA Well Tag #: 0000-0000

Parameter	Qualifier	Result	Units	Reporting Limit	Date Collected	Counting Error (+/-)	TPU	Method	Validation
Technetium-99	U	1.75	pCi/L	16.9	10/21/2025	9.57	9.57	HASL 300, Tc-02-RC M	X
Uranium-234	U	-0.144	pCi/L	1.25	10/21/2025	0.591	0.591	HASL 300, U-02-RC M	X
Uranium-235	U	0.112	pCi/L	0.86	10/21/2025	0.493	0.493	HASL 300, U-02-RC M	X
Uranium-238	U	0.273	pCi/L	1.01	10/21/2025	0.591	0.592	HASL 300, U-02-RC M	X

QUALIFIER Codes

- U Not detected. (RADS: Value reported is < MDA.)
- J Estimated value.

SAMPLING POINT Codes

- UCRS Upper Continental Recharge System
- URGA Upper Regional Gravel Aquifer

SAMPLE TYPE Codes

- FB Field Blank
- FR Field Duplicate as defined in sampling procedure.
- REG Regular
- RI Equipment Rinsate Blank
- TB Trip Blank

VALIDATION Codes

- = Validated result, no additional qualifier necessary.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- UJ Analyte, compound or nuclide not detected above the reported detection limit, and the reported detection limit is approximated due to quality deficiency.
- X Not validated.

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APPENDIX B

**C-404 HAZARDOUS WASTE LANDFILL
STATISTICAL ANALYSES**

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GROUNDWATER STATISTICAL SUMMARY

INTRODUCTION

The statistical analyses conducted on the data collected from the C-404 Hazardous Waste Landfill (C-404 Landfill) were performed in accordance with procedures provided in Appendix E of the Hazardous Waste Management Facility Permit, reissued by the Kentucky Division of Waste Management in November 2025. Prediction limits (PLs) are the statistical analysis method for C-404 groundwater data, without a retesting strategy, as found in Section 18 of the Unified Guidance. The method utilizes the current data set and groundwater samples collected from the most recent C-404 groundwater sampling events.

For this semiannual report (October 2025–January 2026), the data set includes data from January 2016 through January 2026.

STATISTICAL ANALYSIS PROCESS

PLs are the statistical analysis method for C-404 groundwater data, without a retesting strategy, as found in Section 18 of the U.S. Environmental Protection Agency (EPA) guidance document, Unified Guidance. The method utilizes the current data set and groundwater samples collected over the previous 20 C-404 most recent groundwater sampling events.

Elements of the PL statistical analysis include determination of the percentage of censored data, testing for statistical outliers, construction of PLs based on background data, and comparison of the current downgradient (compliance) monitoring well data to the calculated PL. Based on the result of the PL comparison, the results were evaluated for applicability of the alternate source demonstration (ASD). The statistical analysis method is summarized below.

CENSORING PERCENTAGE AND STATISTICAL ANALYSIS

The percentage of nondetects (censored data) of the data set determines how censored data were treated in determining PLs.

- If < 15% of the background observations were nondetects, then these were replaced with one-half of the method reporting limit prior to running the analysis.
- If > 15% but less than 50% of the background data were less than the detection limit, then the data's sample mean and sample standard deviation were adjusted according to the method of Cohen, Aitchison, or Kaplan-Meier.
- If > 50% of the background data were less than the detection limit, then a nonparametric PL was computed. Poisson-based PLs were available as an alternative method when > 90% of the background data were less than the detection limit.

DATA HANDLING CONVENTIONS

The following statements describe conventions on how data were considered and how qualifier codes applied to the data set.

- When a data point has been rejected following data validation or data assessment, this result is not used, and the next available data point is used.
- A result is considered nondetect if it has a “U” laboratory, validation, or assessment code.
- If more than one sample is collected for a constituent from a well on a given day and includes detects, the maximum of the detected sample results is used.
- If more than one sample is collected for a constituent from a well on a given day and all samples are nondetects, then the highest detection limit is used.
- If a well is sampled multiple times during the reporting period for a constituent, the most recent sample result is used.
- Nonparametric PLs were assigned a PL equal to the highest background value.
- In evaluating the data, the nondetect values are replaced by the detection limit.

TESTING FOR STATISTICAL OUTLIERS AND NORMALITY

The data were tested for statistical outliers using Dixon’s and Rosner’s outlier evaluation methods. Potential outliers were evaluated for potential sources of error or evidence that the data point was not representative. Nonrepresentative data points were not excluded from the statistical analysis based on professional judgment.

After testing for and exclusion of statistical outliers, the data set was evaluated for normality distribution using the Shapiro-Wilk or Shapiro-Francia testing methods. If less than 50% of the background data are nondetects and the normality of the data set was confirmed, or could be confirmed by transforming the data, parametric PLs were performed. If less than 50% of the background data are nondetects and normality of the raw or transformed data set could not be confirmed, nonparametric PLs were computed.

PREDICTION LIMIT DETERMINATION

Groundwater data collected from background MWs were used to construct a concentration limit PL, which was then compared to one or more observations from a compliance well. The acceptable range of concentrations included all values no greater than the PL. The appropriate prediction interval generally had the form [0, PL], with the upper limit PL as the comparison of importance (EPA 2009).

COMPARISON OF COMPLIANCE WELL RESULTS TO PL

If the PL indicated no statistically significant difference between concentrations in downgradient wells and concentrations in background wells, then there was no indication of statistically significant impacts to the groundwater from the C-404 Landfill.

ALTERNATIVE SOURCE DEMONSTRATION

If the PLs method identified a statistically significant difference between concentrations in downgradient wells and concentrations in background wells, then the data was evaluated further to determine if the concentrations in downgradient and vicinity wells were consistent with the findings of the 2007 ASD (*Revised C-404 Landfill Statistically Significant Increase Source Demonstration*, PRS-ENM-0031/R2, transmitted via DOE correspondence, PPPO-02-506-07, August 1, 2007).

DATA ANALYSIS

Data from the upgradient background wells in the Upper Regional Gravel Aquifer (URGA) were included for comparison with three downgradient URGA wells. Figure 1 of this C-404 Landfill Groundwater Report provides a map of the well locations associated with the C-404 Landfill. Upper continental recharge system (UCRS) wells in Figure 1 are provided for reference only. Data from wells that are in the UCRS are not included in the statistical analyses.

Table B.1 presents the C-404 Landfill upgradient or background wells and downgradient or compliance wells from the URGA. Data from the URGA compliance wells were compared with data from the URGA background wells.

Table B.1. Monitoring Well Locations

URGA	
Upgradient background wells	MW93A*, MW420
Downgradient compliance wells	MW84A*, MW87A*, MW90A*

*MW90 was abandoned in 2001 and replaced with MW90A. MW84, MW87, and MW93 were abandoned in 2019 and replaced with MW84A, MW87A, and MW93A, respectively.

For this reporting period, the background data set included groundwater data for the 20 most recent groundwater sampling events as compared to the January 2026 semiannual groundwater sampling. Because the date range of the data set spans sampling of the originally installed monitoring wells (MW84, MW87, MW90A, MW93, and MW420) and the more recent replacement wells (MW84A, MW87A, and MW93A), the well naming convention used in this report combines both the original and the replacement monitoring names (i.e., MW84-84A, MW87-87A, MW93-93A).

STATISTICAL OUTLIER SCREENING

Dixon's outlier test was performed for each constituent on each well. Although statistical outliers were identified in the outlier screening, these identified outliers will not be excluded from the data set.

The Regional Gravel Aquifer groundwater flow system is in the vicinity of the C-404 Landfill and is subject to dynamic influences (e.g., upgradient and crossgradient source areas), potential impacts from the

C-404 Landfill that includes source area remediation, varying current and historical groundwater recovery efforts, hydraulic interaction with river stage, and monitoring well replacement. Confidence in identified statistical outliers was not sufficient to justify exclusion of that data.

NORMALITY TESTING

Normality testing was performed on 12 constituents. The data sets for arsenic, technetium-99, trichloroethene, uranium-234, and uranium-235 were determined to be normally distributed. The data sets for all other constituents were not normally distributed.

PREDICTION LIMIT TESTING

Results of the PL determination and comparison to the most recent data point are summarized in Table B.2. and presented in Attachment B.

Table B.2. Summary of Prediction Limit Statistical Analysis

Constituent Name	Well	PL	Observation 1/5/2026	Exceeds PL	% Nondetects	Nondetect Adjustment	Method
Arsenic (mg/L)	MW84-84A	1.70×10^{-2}	3.03×10^{-2}	Yes	9.52	½ DL	Parametric
Arsenic (mg/L)	MW87-87A	1.70×10^{-2}	6.44×10^{-3}	No	9.52	½ DL	Parametric
Arsenic (mg/L)	MW90A	1.70×10^{-2}	3.68×10^{-3}	No	9.52	½ DL	Parametric
Cadmium (mg/L)	MW84-84A	1.00×10^{-3}	1.00×10^{-3}	No	95.24	N/A	Nonparametric
Cadmium (mg/L)	MW87-87A	1.00×10^{-3}	1.00×10^{-3}	No	95.24	N/A	Nonparametric
Cadmium (mg/L)	MW90A	1.00×10^{-3}	1.00×10^{-3}	No	95.24	N/A	Nonparametric
Chromium (mg/L)	MW84-84A	4.28×10^{-1}	1.00×10^{-2}	No	71.43	N/A	Nonparametric
Chromium (mg/L)	MW87-87A	4.28×10^{-1}	1.00×10^{-2}	No	71.43	N/A	Nonparametric
Chromium (mg/L)	MW90A	4.28×10^{-1}	1.00×10^{-2}	No	71.43	N/A	Nonparametric
Lead (mg/L)	MW84-84A	2.13×10^{-3}	2.00×10^{-3}	No	83.33	N/A	Nonparametric
Lead (mg/L)	MW87-87A	2.13×10^{-3}	2.00×10^{-3}	No	83.33	N/A	Nonparametric
Lead (mg/L)	MW90A	2.13×10^{-3}	2.00×10^{-3}	No	83.33	N/A	Nonparametric
Mercury (mg/L)	MW84-84A	2.00×10^{-4}	2.00×10^{-4}	No	100	N/A	Nonparametric
Mercury (mg/L)	MW87-87A	2.00×10^{-4}	2.00×10^{-4}	No	100	N/A	Nonparametric
Mercury (mg/L)	MW90A	2.00×10^{-4}	2.00×10^{-4}	No	100	N/A	Nonparametric
Selenium (mg/L)	MW84-84A	5.00×10^{-3}	5.00×10^{-3}	No	97.62	N/A	Nonparametric
Selenium (mg/L)	MW87-87A	5.00×10^{-3}	5.00×10^{-3}	No	97.62	N/A	Nonparametric
Selenium (mg/L)	MW90A	5.00×10^{-3}	5.00×10^{-3}	No	97.62	N/A	Nonparametric
Technetium-99 (pCi/L)	MW84-84A	2.69×10^1	219	Yes	95.24	N/A	Nonparametric
Technetium-99 (pCi/L)	MW87-87A	2.69×10^1	23	No	95.24	N/A	Nonparametric
Technetium-99 (pCi/L)	MW90A	2.69×10^1	85.9	Yes	95.24	N/A	Nonparametric

Table B.2. Summary of Prediction Limit Statistical Analysis (Continued)

Constituent Name	Well	PL	Observation 1/5/2026	Exceeds PL	% Nondetects	Nondetect Adjustment	Method
Trichloroethene (µg/L)	MW84-84A	2.94×10^3	4.68×10^3	Yes	0	N/A	Parametric
Trichloroethene (µg/L)	MW87-87A	2.94×10^3	8.04×10^1	No	0	N/A	Parametric
Trichloroethene (µg/L)	MW90A	2.94×10^3	1.09×10^1	No	0	N/A	Parametric
Uranium (mg/L)	MW84-84A	5.60×10^{-4}	2.00×10^{-4}	No	73.81	N/A	Nonparametric
Uranium (mg/L)	MW87-87A	5.60×10^{-4}	2.00×10^{-4}	No	73.81	N/A	Nonparametric
Uranium (mg/L)	MW90A	5.60×10^{-4}	2.00×10^{-4}	No	73.81	N/A	Nonparametric
Uranium-234 (pCi/L)	MW84-84A	3.20×10^0	1.47×10^0	No	97.62	N/A	Nonparametric
Uranium-234 (pCi/L)	MW87-87A	3.20×10^0	1.78×10^0	No	97.62	N/A	Nonparametric
Uranium-234 (pCi/L)	MW90A	3.20×10^0	1.66×10^0	No	97.62	N/A	Nonparametric
Uranium-235 (pCi/L)	MW84-84A	2.73×10^0	1.28×10^0	No	100	N/A	Nonparametric
Uranium-235 (pCi/L)	MW87-87A	2.73×10^0	1.28×10^0	No	100	N/A	Nonparametric
Uranium-235 (pCi/L)	MW90A	2.73×10^0	9.61×10^{-1}	No	100	N/A	Nonparametric
Uranium-238 (pCi/L)	MW84-84A	3.15×10^0	9.90×10^{-1}	No	100	N/A	Nonparametric
Uranium-238 (pCi/L)	MW87-87A	3.15×10^0	1.03×10^0	No	100	N/A	Nonparametric
Uranium-238 (pCi/L)	MW90A	3.15×10^0	1.33×10^0	No	100	N/A	Nonparametric

Bold type indicates exceedance of the Prediction Limit (PL).

Background wells for the Prediction Limit comparison are MW420 and MW93-93A

Notes:

N/A: Not applicable

PL: Prediction Limit

mg/L: milligrams per liter

µg/L: micrograms per liter

pCi/L: picocuries per liter

½ DL: Calculated PL using one-half of the detection limit

% nondetects: Percentage of censored observations based on a total of 42 background observations for each constituent

SUMMARY OF CONCLUSIONS

The statistical analyses were conducted in accordance with the Hazardous Waste Management Facility Permit. With the exception of As and TCE in compliance well MW84A and technetium-99 (Tc-99) observed in compliance wells MW84A and MW90A, the statistical tests on all other parameters showed no statistically significant differences above concentrations observed in background wells.

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ATTACHMENT B1
PREDICTION LIMIT TESTING RESULTS

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ARSENIC DATASET

Table B1.1 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.1 have been changed to less than the detection limit value.

Table B1.1. Arsenic Dataset Information

Arsenic (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/25/2016		0.00481	< 0.005	0.00743	< 0.005
2	1/27/2016	0.0103				
3	7/12/2016	0.0137	0.00698			
4	7/13/2016			< 0.005	0.00709	< 0.005
5	1/23/2017		0.00692	< 0.005	0.00842	< 0.005
6	1/24/2017	0.017				
7	7/12/2017	0.0191	0.00907	< 0.005	0.00755	0.00207
8	1/9/2018		0.0087	< 0.005	0.00807	< 0.005
9	1/10/2018	0.0185				
10	8/20/2018	0.0289	0.0105	< 0.005	0.00619	0.00304
11	1/15/2019		0.0116			0.00414
12	1/16/2019	0.0275		< 0.005	0.00462	
13	7/22/2019	0.0168	0.00723	< 0.005	0.00602	0.00359
14	1/14/2020	0.0202	0.00928	0.00211	0.00817	0.00518
15	7/14/2020	0.0222	0.00895	< 0.005	0.0109	0.00534
16	1/12/2021	0.0212	0.00939	0.00211	0.0154	0.00832
17	7/14/2021	0.0284	0.00793	< 0.005	0.00806	0.00859
18	1/6/2022	0.0348	0.00838	0.00213	0.0134	0.0106
19	7/11/2022	0.036	0.00827	< 0.005	0.0111	0.0103
20	1/4/2023	0.0343	0.00857	0.00278	0.0111	0.011
21	7/11/2023	0.0351	0.00863		0.00863	0.0114
22	7/12/2023			0.0026		
23	1/3/2024	0.0376	0.0082	0.00272	0.00819	0.0128
24	7/9/2024	0.0379	0.0078	0.00327	0.00739	0.0135
25	1/7/2025	0.0432	0.00799	0.00334	0.00902	0.0173
26	7/9/2025	0.0343	0.00684	0.0041	0.0156	0.0162
27	1/5/2026	0.0303	0.00644	0.00368	0.0194	0.0206
n = Number of background samples =					42	
Background nondetects =					4	
Percentage of background nondetects =					9.52	

Table B1.1 shows the percentage of background nondetects is 9.52%. Because < 15% of the background observations are nondetects, per the Hazardous Waste Permit, nondetect values were replaced with ½ the detection limit for the Dixon's outlier and Shapiro-Wilk test of normality for Tables B1.2 and B1.3. These tables include decimal places not shown when rounding.

Notes for Table B1.2:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.2. Arsenic Dixon's Outlier Test Using $\frac{1}{2}$ Detection Limit

Rank	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
1	0.0103	0.00481	0.00211	0.00462	0.00207
2	0.0137	0.00644	0.00211	0.00602	0.0025
3	0.0168	0.00684	0.00213	0.00619	0.0025
4	0.017	0.00692	0.0025	0.00709	0.0025
5	0.0185	0.00698	0.0025	0.00739	0.0025
6	0.0191	0.00723	0.0025	0.00743	0.00304
7	0.0202	0.0078	0.0025	0.00755	0.00359
8	0.0212	0.00793	0.0025	0.00806	0.00414
9	0.0222	0.00799	0.0025	0.00807	0.00518
10	0.0275	0.0082	0.0025	0.00817	0.00534
11	0.0284	0.00827	0.0025	0.00819	0.00832
12	0.0289	0.00838	0.0025	0.00842	0.00859
13	0.0303	0.00857	0.0025	0.00863	0.0103
14	0.0343	0.00863	0.0025	0.00902	0.0106
15	0.0343	0.0087	0.0026	0.0109	0.011
16	0.0348	0.00895	0.00272	0.0111	0.0114
17	0.0351	0.00907	0.00278	0.0111	0.0128
18	0.036	0.00928	0.00327	0.0134	0.0135
19	0.0376	0.00939	0.00334	0.0154	0.0162
20	0.0379	0.0105	0.00368	0.0156	0.0173
21	0.0432	0.0116	0.0041	0.0194	0.0206
low outlier = $C_{\text{low}} =$	0.2381	0.4432	0.0163	0.1456	0.0304
Results less than C ?	Yes	No	Yes	Yes	Yes
high outlier = $C_{\text{high}} =$	0.2121	0.4643	0.3858	0.3028	0.2431
Results less than C ?	Yes	No	Yes	Yes	Yes

Dixon's test identified observations in MW87-87A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Table B1.3 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.3:

1. Number of observations = $n = 42$
2. Significance level = $\alpha = 0.01$
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the $i * \text{Differences column} = b$
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = W_{critical} and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{\text{critical}}$ then distribution is normal.

Table B1.3. Arsenic Shapiro-Wilk Test of Normality Using ½ Detection Limit

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.00207	i1	0.3917	x42 - x1	0.01853	0.0072582
2	0.0025	i2	0.2701	x41 - x2	0.01690	0.00456469
3	0.0025	i3	0.2345	x40 - x3	0.01480	0.0034706
4	0.0025	i4	0.2085	x39 - x4	0.01370	0.00285645
5	0.0025	i5	0.1874	x38 - x5	0.01310	0.00245494
6	0.00304	i6	0.1694	x37 - x6	0.01236	0.00209378
7	0.00359	i7	0.1535	x36 - x7	0.00991	0.00152119
8	0.00414	i8	0.1392	x35 - x8	0.00926	0.00128899
9	0.00462	i9	0.1259	x34 - x9	0.00818	0.00102986
10	0.00518	i10	0.1136	x33 - x10	0.00622	0.00070659
11	0.00534	i11	0.1020	x32 - x11	0.00576	0.00058752
12	0.00602	i12	0.0909	x31 - x12	0.00508	0.00046177
13	0.00619	i13	0.0804	x30 - x13	0.00481	0.00038672
14	0.00709	i14	0.0701	x29 - x14	0.00381	0.00026708
15	0.00739	i15	0.0602	x28 - x15	0.00321	0.00019324
16	0.00743	i16	0.0506	x27 - x16	0.00287	0.00014522
17	0.00755	i17	0.0411	x26 - x17	0.00147	6.0417E-05
18	0.00806	i18	0.0318	x25 - x18	0.00057	1.8126E-05
19	0.00807	i19	0.0227	x24 - x19	0.00052	1.1804E-05
20	0.00817	i20	0.0136	x23 - x20	0.00025	0.0000034
21	0.00819	i21	0.0045	x22 - x21	0.00013	5.85E-07
22	0.00832				b =	0.02938119
23	0.00842					
24	0.00859					
25	0.00863					
26	0.00902					
27	0.0103					
28	0.0106					
29	0.0109					
30	0.011					
31	0.0111					
32	0.0111					
33	0.0114					
34	0.0128					
35	0.0134					
36	0.0135					
37	0.0154					
38	0.0156					
39	0.0162					
40	0.0173					
41	0.0194					
42	0.0206					
mean =		0.008946				
standard deviation =		0.004718				

SS =	0.00091272	sum of the squares of the concentrations
b =	0.02938119	sum of the i * differences column
W = b ² / SS =	0.9458	Normal Distribution
W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.3 is 0.9458. Because 0.9458 is greater than the critical value of 0.922, normality is confirmed and a parametric PL is determined.

The parametric PL is determined using Unified Guidance Equation 18.3, which is shown below.

$$PL = \text{mean} + \text{standard deviation} * \sqrt{1/m + 1/n} * t\text{-quantile}$$

where:

mean = average of background values = 0.008946

standard deviation = standard deviation of background values = 0.004718

m = 1

n = observations = 42

degrees of freedom = n – 1 = 41

t-quantile is from Unified Guidance Appendix D, Table 16 -1. The t-quantile for 41° of freedom at a 95% confidence level = 1.683

$$PL = 0.008946 + 0.004718 * \text{square root } (1/1 + 1/42) * 1.683 = 0.0170$$

Table B1.4 shows the data used to plot the comparison of the compliance wells to the PL. Nondetects shown in Table B1.1 have been changed to the detection limit value of 0.005.

Table B1.4. Arsenic Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.00481	0.005	0.0170
1/27/2016	0.0103			0.0170
7/12/2016	0.0137	0.00698		0.0170
7/13/2016			0.005	0.0170
1/23/2017		0.00692	0.005	0.0170
1/24/2017	0.017			0.0170
7/12/2017	0.0191	0.00907	0.005	0.0170
1/9/2018		0.0087	0.005	0.0170
1/10/2018	0.0185			0.0170
8/20/2018	0.0289	0.0105	0.005	0.0170
1/15/2019		0.0116		0.0170
1/16/2019	0.0275		0.005	0.0170
7/22/2019	0.0168	0.00723	0.005	0.0170
1/14/2020	0.0202	0.00928	0.00211	0.0170
7/14/2020	0.0222	0.00895	0.005	0.0170
1/12/2021	0.0212	0.00939	0.00211	0.0170
7/14/2021	0.0284	0.00793	0.005	0.0170
1/6/2022	0.0348	0.00838	0.00213	0.0170
7/11/2022	0.036	0.00827	0.005	0.0170
1/4/2023	0.0343	0.00857	0.00278	0.0170
7/11/2023	0.0351	0.00863		0.0170
7/12/2023			0.0026	0.0170
1/3/2024	0.0376	0.0082	0.00272	0.0170
7/9/2024	0.0379	0.0078	0.00327	0.0170
1/7/2025	0.0432	0.00799	0.00334	0.0170
7/9/2025	0.0343	0.00684	0.0041	0.0170
1/5/2026	0.0303	0.00644	0.00368	0.0170

Figure B1.1 shows the chart for Table B1.4, which indicates that MW84-84A exceeds the PL.

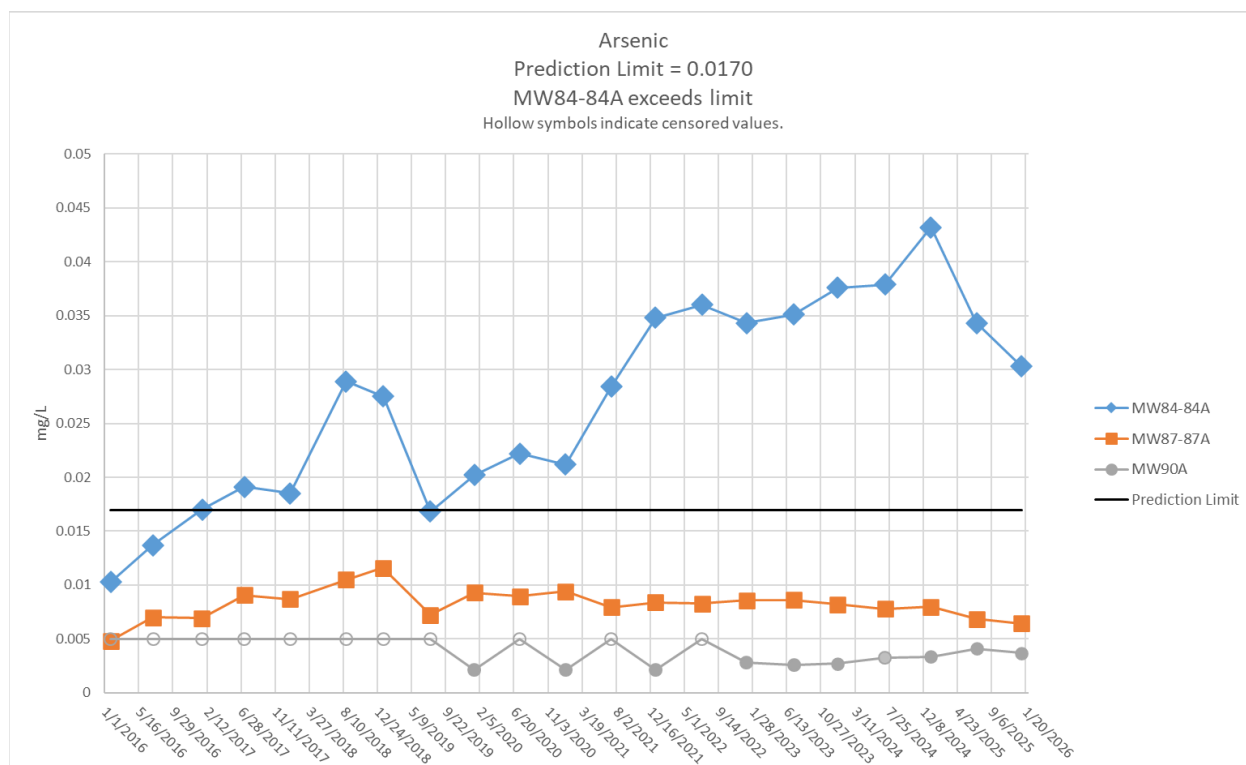


Figure B1.1. Arsenic PL Chart

CADMIUM DATASET

Table B1.5 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.5 have been changed to less than the detection limit value.

Table B1.5. Cadmium Dataset Information

Cadmium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
1	1/25/2016		0.000121	< 0.001	0.000152	< 0.001
2	1/27/2016	0.000179				
3	7/12/2016	0.000292	0.000451			
4	7/13/2016			< 0.001	0.000199	< 0.001
5	1/23/2017		< 0.001	< 0.001	< 0.001	< 0.001
6	1/24/2017	0.000619				
7	7/12/2017	0.000396	0.000304	< 0.001	< 0.001	< 0.001
8	1/9/2018		0.000375	< 0.001	< 0.001	< 0.001
9	1/10/2018	< 0.001				
10	8/20/2018	0.000323	0.000372	< 0.001	< 0.001	< 0.001
11	1/15/2019		0.000481			< 0.001
12	1/16/2019	0.000415		< 0.001	< 0.001	

Table B1.5. Cadmium Dataset Information (Continued)

Cadmium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		x_i	x_i	x_i	x_i	x_i
13	7/22/2019	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
14	1/14/2020	0.000385	0.000503	< 0.001	< 0.001	< 0.001
15	7/14/2020	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
16	1/12/2021	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
17	7/14/2021	0.000317	< 0.001	< 0.001	< 0.001	< 0.001
18	1/6/2022	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
19	7/11/2022	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
20	1/4/2023	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
21	7/11/2023	< 0.001	< 0.001		< 0.001	< 0.001
22	7/12/2023			< 0.001		
23	1/3/2024	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
24	7/9/2024	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
25	1/7/2025	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
26	7/9/2025	< 0.001	0.000805	< 0.001	< 0.001	< 0.001
27	1/5/2026	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
n = Number of background samples =					42	
Background nondetects =					40	
Percentage of background nondetects =					95.24	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.6 and B1.7 and include decimal places not shown when rounding.

Notes for Table B1.6:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.6. Cadmium Dixon's Outlier Test

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	x_i	x_i	x_i	x_i	x_i
1	0.000179	0.000121	0.001	0.000152	0.001
2	0.000292	0.000304	0.001	0.000199	0.001
3	0.000317	0.000372	0.001	0.001	0.001
4	0.000323	0.000375	0.001	0.001	0.001
5	0.000385	0.000451	0.001	0.001	0.001
6	0.000396	0.000481	0.001	0.001	0.001
7	0.000415	0.000503	0.001	0.001	0.001
8	0.000619	0.000805	0.001	0.001	0.001
9	0.001	0.001	0.001	0.001	0.001
10	0.001	0.001	0.001	0.001	0.001
11	0.001	0.001	0.001	0.001	0.001

Table B1.6. Cadmium Dixon's Outlier Test (Continued)

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
12	0.001	0.001	0.001	0.001	0.001
13	0.001	0.001	0.001	0.001	0.001
14	0.001	0.001	0.001	0.001	0.001
15	0.001	0.001	0.001	0.001	0.001
16	0.001	0.001	0.001	0.001	0.001
17	0.001	0.001	0.001	0.001	0.001
18	0.001	0.001	0.001	0.001	0.001
19	0.001	0.001	0.001	0.001	0.001
20	0.001	0.001	0.001	0.001	0.001
21	0.001	0.001	0.001	0.001	0.001
low outlier = C _{low} =	0.1681	0.2856	#DIV/0!	1.0000	#DIV/0!
Results less than C?	Yes	Yes	#DIV/0!	No	#DIV/0!
high outlier = C _{high} =	0.0000	0.0000	#DIV/0!	#DIV/0!	#DIV/0!
Results less than C?	Yes	Yes	#DIV/0!	#DIV/0!	#DIV/0!

Dixon's test identified observations in MW93-93A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Table B1.7 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.7:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.7. Cadmium Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.000152	i1	0.3917	x42 - x1	0.000848	0.00033216
2	0.000199	i2	0.2701	x41 - x2	0.000801	0.00021635
3	0.001	i3	0.2345	x40 - x3	0	0
4	0.001	i4	0.2085	x39 - x4	0	0
5	0.001	i5	0.1874	x38 - x5	0	0
6	0.001	i6	0.1694	x37 - x6	0	0
7	0.001	i7	0.1535	x36 - x7	0	0
8	0.001	i8	0.1392	x35 - x8	0	0
9	0.001	i9	0.1259	x34 - x9	0	0
10	0.001	i10	0.1136	x33 - x10	0	0
11	0.001	i11	0.1020	x32 - x11	0	0
12	0.001	i12	0.0909	x31 - x12	0	0
13	0.001	i13	0.0804	x30 - x13	0	0
14	0.001	i14	0.0701	x29 - x14	0	0
15	0.001	i15	0.0602	x28 - x15	0	0
16	0.001	i16	0.0506	x27 - x16	0	0
17	0.001	i17	0.0411	x26 - x17	0	0
18	0.001	i18	0.0318	x25 - x18	0	0
19	0.001	i19	0.0227	x24 - x19	0	0
20	0.001	i20	0.0136	x23 - x20	0	0
21	0.001	i21	0.0045	x22 - x21	0	0
22	0.001				b =	0.00054851
23	0.001					
24	0.001					
25	0.001					
26	0.001					
27	0.001					
28	0.001					
29	0.001					
30	0.001					
31	0.001					
32	0.001					
33	0.001					
34	0.001					
35	0.001					
36	0.001					
37	0.001					
38	0.001					
39	0.001					
40	0.001					
41	0.001					
42	0.001					
mean =			0.000961			
standard deviation =			0.000178			

SS =	1.296E-06	sum of the squares of the concentrations
b =	0.00054851	sum of the i * differences column
W = b ² / SS =	0.2322	Distribution not normal.
W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.7 is 0.2322. Because 0.2322 is less than the critical value of 0.922, normality cannot be confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value, which is 0.001.

Table B1.8 shows the data used to plot the comparison of the compliance wells to the PL. All < 0.001 values shown in Table B1.5 have been changed to 0.001 in Table B1.8.

Table B1.8. Cadmium Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.000121	0.001	0.001
1/27/2016	0.000179			0.001
7/12/2016	0.000292	0.000451		0.001
7/13/2016			0.001	0.001
1/23/2017		0.001	0.001	0.001
1/24/2017	0.000619			0.001
7/12/2017	0.000396	0.000304	0.001	0.001
1/9/2018		0.000375	0.001	0.001
1/10/2018	0.001			0.001
8/20/2018	0.000323	0.000372	0.001	0.001
1/15/2019		0.000481		0.001
1/16/2019	0.000415		0.001	0.001
7/22/2019	0.001	0.001	0.001	0.001
1/14/2020	0.000385	0.000503	0.001	0.001
7/14/2020	0.001	0.001	0.001	0.001
1/12/2021	0.001	0.001	0.001	0.001
7/14/2021	0.000317	0.001	0.001	0.001
1/6/2022	0.001	0.001	0.001	0.001
7/11/2022	0.001	0.001	0.001	0.001
1/4/2023	0.001	0.001	0.001	0.001
7/11/2023	0.001	0.001		0.001
7/12/2023			0.001	0.001
1/3/2024	0.001	0.001	0.001	0.001
7/9/2024	0.001	0.001	0.001	0.001
1/7/2025	0.001	0.001	0.001	0.001
7/9/2025	0.001	0.000805	0.001	0.001
1/5/2026	0.001	0.001	0.001	0.001

Figure B1.2 shows the chart for Table 8 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

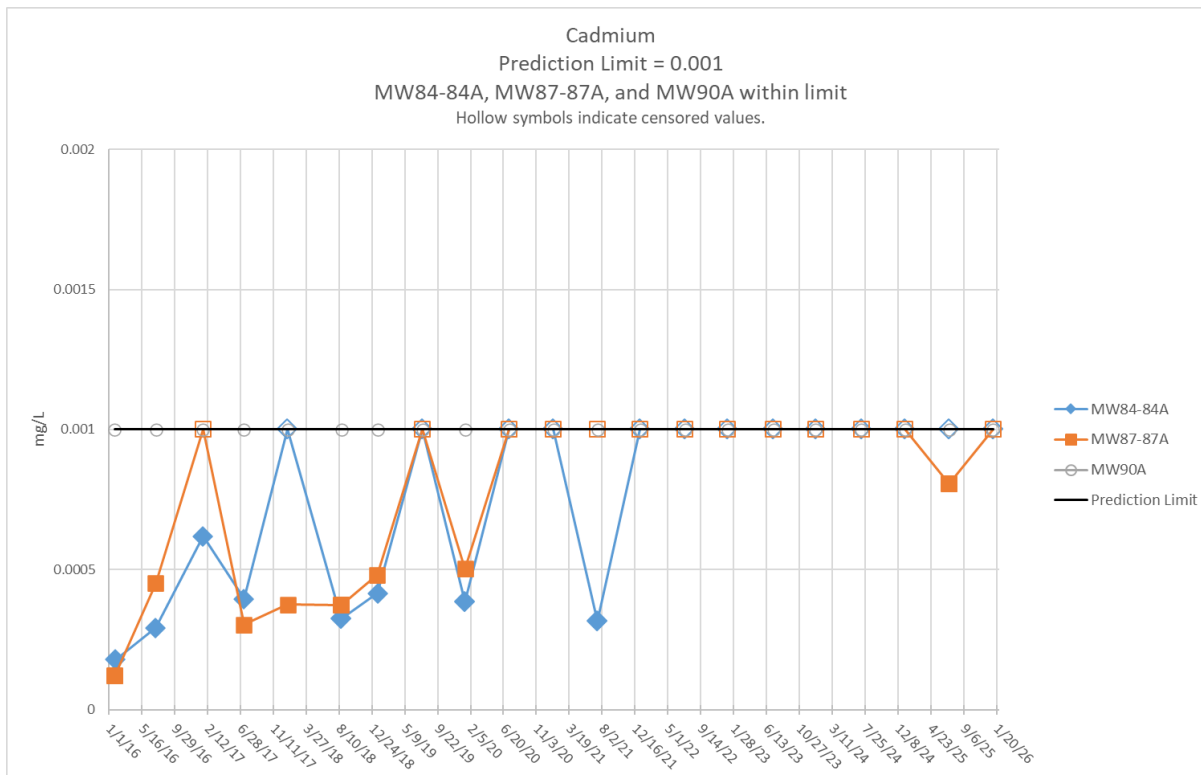


Figure B1.2. Cadmium PL Chart

CHROMIUM DATASET AND STATISTICAL ANALYSIS

Table B1.9 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.9 have been changed to less than the detection limit value.

Table B1.9. Chromium Dataset Information

Chromium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/25/2016		0.0266	< 0.01	0.0401	< 0.01
2	1/27/2016	0.0393				
3	7/12/2016	0.0206	0.165			
4	7/13/2016			< 0.01	0.207	< 0.01
5	1/23/2017		0.262	< 0.01	0.428	< 0.01
6	1/24/2017	0.0309				
7	7/12/2017	0.103	0.0557	< 0.01	0.261	< 0.01
8	1/9/2018		1.18	0.00381	0.151	< 0.01
9	1/10/2018	0.143				
10	8/20/2018	0.0752	0.275	< 0.01	0.11	< 0.01

Table B1.9. Chromium Dataset Information (Continued)

Chromium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		X_i	X_i	X_i	X_i	X_i
11	1/15/2019		0.0424			< 0.01
12	1/16/2019	0.0251		< 0.01	0.0561	
13	7/22/2019	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
14	1/14/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
15	7/14/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
16	1/12/2021	< 0.01	< 0.01	< 0.01	0.00338	< 0.01
17	7/14/2021	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
18	1/6/2022	< 0.01	< 0.01	< 0.01	0.00777	< 0.01
19	7/11/2022	< 0.01	< 0.01	< 0.01	0.00527	< 0.01
20	1/4/2023	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
21	7/11/2023	< 0.01	< 0.01		< 0.01	< 0.01
22	7/12/2023			< 0.01		
23	1/3/2024	< 0.01	0.00416	< 0.01	0.00382	< 0.01
24	7/9/2024	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
25	1/7/2025	< 0.01	0.00531	< 0.01	0.0159	< 0.01
26	7/9/2025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
27	1/5/2026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n = number of background samples =					42	
Background nondetects =					30	
Percentage of background nondetects =					71.43	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.10 and B1.11 and include decimal places not shown when rounding.

Notes for Table B1.10:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.10. Chromium Dixon's Outlier Test

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
1	0.01	0.00416	0.00381	0.00338	0.01
2	0.01	0.00531	0.01	0.00382	0.01
3	0.01	0.01	0.01	0.00527	0.01
4	0.01	0.01	0.01	0.00777	0.01
5	0.01	0.01	0.01	0.01	0.01
6	0.01	0.01	0.01	0.01	0.01
7	0.01	0.01	0.01	0.01	0.01
8	0.01	0.01	0.01	0.01	0.01
9	0.01	0.01	0.01	0.01	0.01
10	0.01	0.01	0.01	0.01	0.01
11	0.01	0.01	0.01	0.01	0.01

Table B1.10. Chromium Dixon's Outlier Test (Continued)

Rank	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
12	0.01	0.01	0.01	0.01	0.01
13	0.01	0.01	0.01	0.01	0.01
14	0.01	0.01	0.01	0.0159	0.01
15	0.0206	0.0266	0.01	0.0401	0.01
16	0.0251	0.0424	0.01	0.0561	0.01
17	0.0309	0.0557	0.01	0.11	0.01
18	0.0393	0.165	0.01	0.151	0.01
19	0.0752	0.262	0.01	0.207	0.01
20	0.103	0.275	0.01	0.261	0.01
21	0.143	1.18	0.01	0.428	0.01
low outlier = C_{low} =	0.0000	0.0226	1.0000	0.0093	#DIV/0!
Results less than C?	Yes	Yes	No	Yes	#DIV/0!
High outlier = C_{high} =	0.5098	0.7846	#DIV/0!	0.5228	#DIV/0!
Results less than C?	No	No	#DIV/0!	No	#DIV/0!

Dixon's test identified observations in MW84-84A, MW87-87A, MW90A, and MW93-93A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Table B1.11 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.11:

1. Number of observations = $n = 42$
2. Significance level = $\alpha = 0.01$
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the $i * \text{Differences column} = b$
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.11. Chromium Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.00338	i1	0.3917	x42 – x1	0.42462	0.166323654
2	0.00382	i2	0.2701	x41 – x2	0.25718	0.069464318
3	0.00527	i3	0.2345	x40 – x3	0.20173	0.047305685
4	0.00777	i4	0.2085	x39 – x4	0.14323	0.029863455
5	0.01	i5	0.1874	x38 – x5	0.10000	0.01874
6	0.01	i6	0.1694	x37 – x6	0.04610	0.00780934
7	0.01	i7	0.1535	x36 – x7	0.03010	0.00462035
8	0.01	i8	0.1392	x35 – x8	0.00590	0.00082128
9	0.01	i9	0.1259	x34 – x9	0	0
10	0.01	i10	0.1136	x33 – x10	0	0
11	0.01	i11	0.1020	x32 – x11	0	0
12	0.01	i12	0.0909	x31 – x12	0	0
13	0.01	i13	0.0804	x30 – x13	0	0
14	0.01	i14	0.0701	x29 – x14	0	0
15	0.01	i15	0.0602	x28 – x15	0	0
16	0.01	i16	0.0506	x27 – x16	0	0
17	0.01	i17	0.0411	x26 – x17	0	0
18	0.01	i18	0.0318	x25 – x18	0	0
19	0.01	i19	0.0227	x24 – x19	0	0
20	0.01	i20	0.0136	x23 – x20	0	0
21	0.01	i21	0.0045	x22 – x21	0	0
22	0.01				b =	0.34494808
23	0.01					
24	0.01					
25	0.01					
26	0.01					
27	0.01					
28	0.01					
29	0.01					
30	0.01					
31	0.01					
32	0.01					
33	0.01					
34	0.01					
35	0.0159					
36	0.0401					
37	0.0561					
38	0.11					
39	0.151					
40	0.207					
41	0.261					
42	0.428					
mean =			0.037841			
standard deviation =			0.082201			

SS =	0.2770343
b =	0.34494808
W = b ² / SS =	0.4295
W _{critical} =	0.922

sum of the squares of the concentrations

sum of the i * differences column

Distribution not normal.

Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.11 is 0.4295. Because 0.4295 is less than the critical value of 0.922, normality cannot be confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 0.428.

Table B1.12 shows the data used to plot the comparison of the compliance wells to the PL. All values < 0.01 shown in Table B1.9 have been changed to 0.01 in Table B1.12.

Table B1.12. Chromium Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.0266	0.01	0.428
1/27/2016	0.0393			0.428
7/12/2016	0.0206	0.165		0.428
7/13/2016			0.01	0.428
1/23/2017		0.262	0.01	0.428
1/24/2017	0.0309			0.428
7/12/2017	0.103	0.0557	0.01	0.428
1/9/2018		1.18	0.00381	0.428
1/10/2018	0.143			0.428
8/20/2018	0.0752	0.275	0.01	0.428
1/15/2019		0.0424		0.428
1/16/2019	0.0251		0.01	0.428
7/22/2019	0.01	0.01	0.01	0.428
1/14/2020	0.01	0.01	0.01	0.428
7/14/2020	0.01	0.01	0.01	0.428
1/12/2021	0.01	0.01	0.01	0.428
7/14/2021	0.01	0.01	0.01	0.428
1/6/2022	0.01	0.01	0.01	0.428
7/11/2022	0.01	0.01	0.01	0.428
1/4/2023	0.01	0.01	0.01	0.428
7/11/2023	0.01	0.01		0.428
7/12/2023			0.01	0.428
1/3/2024	0.01	0.00416	0.01	0.428
7/9/2024	0.01	0.01	0.01	0.428
1/7/2025	0.01	0.00531	0.01	0.428
7/9/2025	0.01	0.01	0.01	0.428
1/5/2026	0.01	0.01	0.01	0.428

Figure B1.3 shows the chart for Table B1.12 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

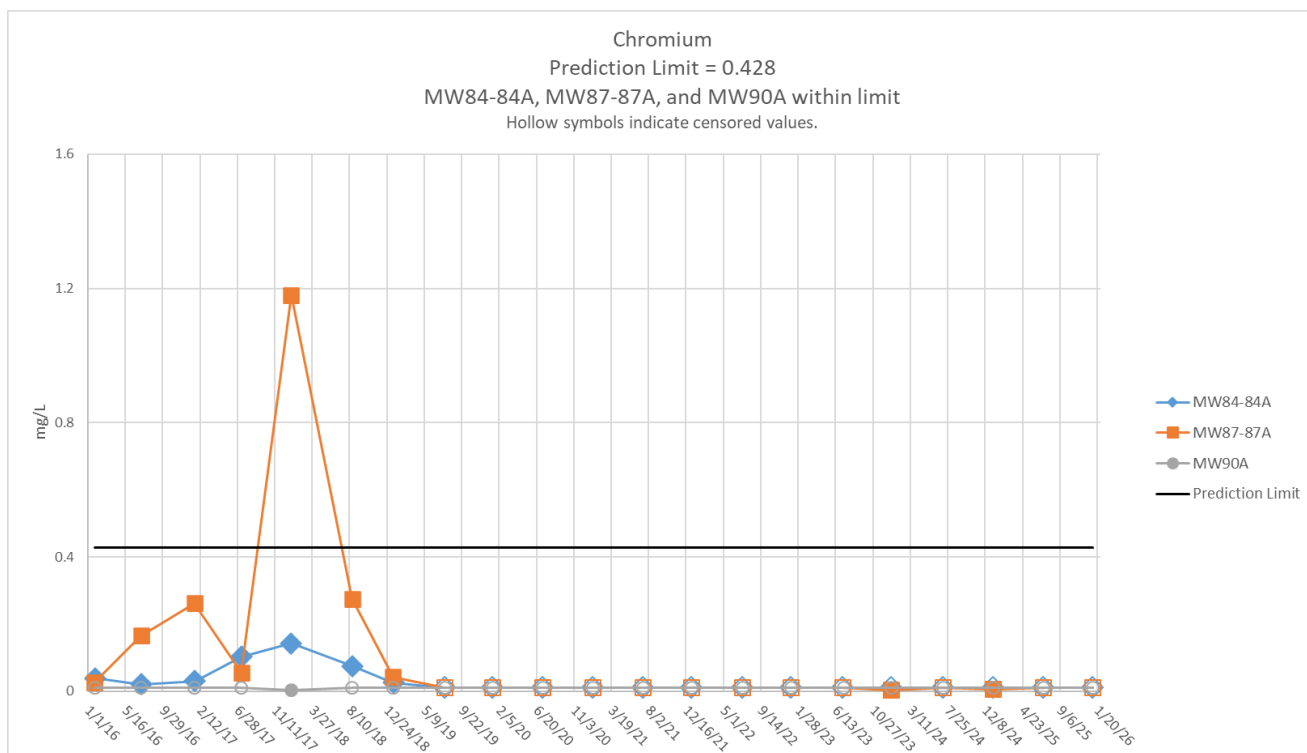


Figure B1.3. Chromium PL Chart

LEAD DATASET

Table B1.13 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.13 have been changed to less than the detection limit value.

Table B1.13. Lead Dataset Information

Lead (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		X_i	X_i	X_i	X_i	X_i
1	1/25/2016		0.00107	< 0.002	0.00144	< 0.002
2	1/27/2016	0.00108				
3	7/12/2016	0.00239	0.0056			
4	7/13/2016			< 0.002	0.00181	< 0.002
5	1/23/2017		0.00439	< 0.002	0.00155	< 0.002
6	1/24/2017	0.00475				
7	7/12/2017	0.00267	0.00533	< 0.002	0.00213	< 0.002
8	1/9/2018		0.00579	0.000634	0.00186	< 0.002
9	1/10/2018	0.00191				
10	8/20/2018	0.00319	0.00682	< 0.002	0.000802	< 0.002
11	1/15/2019		0.00502			< 0.002
12	1/16/2019	0.00204		< 0.002	< 0.002	
13	7/22/2019	< 0.002	< 0.002	< 0.002	0.00051	< 0.002
14	1/14/2020	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
15	7/14/2020	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Table B1.13. Lead Dataset Information (Continued)

Lead (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		X_i	X_i	X_i	X_i	X_i
16	1/12/2021	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
17	7/14/2021	0.000874	< 0.002	< 0.002	< 0.002	< 0.002
18	1/6/2022	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
19	7/11/2022	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
20	1/4/2023	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
21	7/11/2023	< 0.002	< 0.002		< 0.002	< 0.002
22	7/12/2023			< 0.002		
23	1/3/2024	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
24	7/9/2024	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
25	1/7/2025	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
26	7/9/2025	0.000593	< 0.002	< 0.002	< 0.002	< 0.002
27	1/5/2026	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
n = number of background samples =					42	
Background nondetects =					35	
Percentage of background nondetects =					83.33	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.14 and B1.15 and include decimal places not shown when rounding.

Notes for Table B1.14:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.14. Lead Dixon's Outlier Test

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
1	0.000593	0.00107	0.000634	0.00051	0.002
2	0.000874	0.002	0.002	0.000802	0.002
3	0.00108	0.002	0.002	0.00144	0.002
4	0.00191	0.002	0.002	0.00155	0.002
5	0.002	0.002	0.002	0.00181	0.002
6	0.002	0.002	0.002	0.00186	0.002
7	0.002	0.002	0.002	0.002	0.002
8	0.002	0.002	0.002	0.002	0.002
9	0.002	0.002	0.002	0.002	0.002
10	0.002	0.002	0.002	0.002	0.002
11	0.002	0.002	0.002	0.002	0.002
12	0.002	0.002	0.002	0.002	0.002
13	0.002	0.002	0.002	0.002	0.002
14	0.002	0.002	0.002	0.002	0.002
15	0.002	0.002	0.002	0.002	0.002
16	0.002	0.00439	0.002	0.002	0.002

Table B1.14. Lead Dixon's Outlier Test (Continued)

Rank	MW84-84A X_i	MW87-87A X_i	MW90A X_i	MW93-93A X_i	MW420 X_i
17	0.00204	0.00502	0.002	0.002	0.002
18	0.00239	0.00533	0.002	0.002	0.002
19	0.00267	0.0056	0.002	0.002	0.002
20	0.00319	0.00579	0.002	0.002	0.002
21	0.00475	0.00682	0.002	0.00213	0.002
low outlier = C _{low} =	0.2345	0.2053	1.0000	0.6242	#DIV/0!
Results less than C?	Yes	Yes	No	No	#DIV/0!
High outlier = C _{high} =	0.5668	0.2531	#DIV/0!	0.1884	#DIV/0!
Results less than C?	No	Yes	#DIV/0!	Yes	#DIV/0!

Dixon's test identified observations in MW84-84A, MW90A, and MW93-93A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Table B1.15 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.15:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.15. Lead Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.00051	i1	0.3917	x42 – x1	0.001620	0.000634554
2	0.000802	i2	0.2701	x41 – x2	0.001198	0.00032358
3	0.00144	i3	0.2345	x40 – x3	0.000560	0.00013132
4	0.00155	i4	0.2085	x39 – x4	0.000450	0.000093825
5	0.00181	i5	0.1874	x38 – x5	0.000190	0.000035606
6	0.00186	i6	0.1694	x37 – x6	0.000140	0.000023716
7	0.002	i7	0.1535	x36 – x7	0	0
8	0.002	i8	0.1392	x35 – x8	0	0
9	0.002	i9	0.1259	x34 – x9	0	0
10	0.002	i10	0.1136	x33 – x10	0	0
11	0.002	i11	0.1020	x32 – x11	0	0
12	0.002	i12	0.0909	x31 – x12	0	0
13	0.002	i13	0.0804	x30 – x13	0	0
14	0.002	i14	0.0701	x29 – x14	0	0
15	0.002	i15	0.0602	x28 – x15	0	0
16	0.002	i16	0.0506	x27 – x16	0	0
17	0.002	i17	0.0411	x26 – x17	0	0
18	0.002	i18	0.0318	x25 – x18	0	0
19	0.002	i19	0.0227	x24 – x19	0	0
20	0.002	i20	0.0136	x23 – x20	0	0
21	0.002	i21	0.0045	x22 – x21	0	0
22	0.002				b =	0.001242601
23	0.002					
24	0.002					
25	0.002					
26	0.002					
27	0.002					
28	0.002					
29	0.002					
30	0.002					
31	0.002					
32	0.002					
33	0.002					
34	0.002					
35	0.002					
36	0.002					
37	0.002					
38	0.002					
39	0.002					
40	0.002					
41	0.002					
42	0.00213					
mean =			0.001907			
standard deviation =			0.000308			

SS =	3.882E-06	sum of the squares of the concentrations
b =	0.0012426	sum of the i * differences column
W = b ² / SS =	0.3977	Distribution not normal.
W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.15 is 0.3977. Because 0.3977 is less than the critical value of 0.922, normality cannot be confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 0.00213.

Table B1.16 shows the data used to plot the comparison of the compliance wells to the PL. All < 0.002 values shown in Table B1.13 have been changed to 0.002 in Table B1.16.

Table B1.16. Lead Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.00107	0.002	0.00213
1/27/2016	0.00108			0.00213
7/12/2016	0.00239	0.0056		0.00213
7/13/2016			0.002	0.00213
1/23/2017		0.00439	0.002	0.00213
1/24/2017	0.00475			0.00213
7/12/2017	0.00267	0.00533	0.002	0.00213
1/9/2018		0.00579	0.000634	0.00213
1/10/2018	0.00191			0.00213
8/20/2018	0.00319	0.00682	0.002	0.00213
1/15/2019		0.00502		0.00213
1/16/2019	0.00204		0.002	0.00213
7/22/2019	0.002	0.002	0.002	0.00213
1/14/2020	0.002	0.002	0.002	0.00213
7/14/2020	0.002	0.002	0.002	0.00213
1/12/2021	0.002	0.002	0.002	0.00213
7/14/2021	0.000874	0.002	0.002	0.00213
1/6/2022	0.002	0.002	0.002	0.00213
7/11/2022	0.002	0.002	0.002	0.00213
1/4/2023	0.002	0.002	0.002	0.00213
7/11/2023	0.002	0.002		0.00213
7/12/2023			0.002	0.00213
1/3/2024	0.002	0.002	0.002	0.00213
7/9/2024	0.002	0.002	0.002	0.00213
1/7/2025	0.002	0.002	0.002	0.00213
7/9/2025	0.000593	0.002	0.002	0.00213
1/5/2026	0.002	0.002	0.002	0.00213

Figure B1.4 shows the chart for Table 16 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

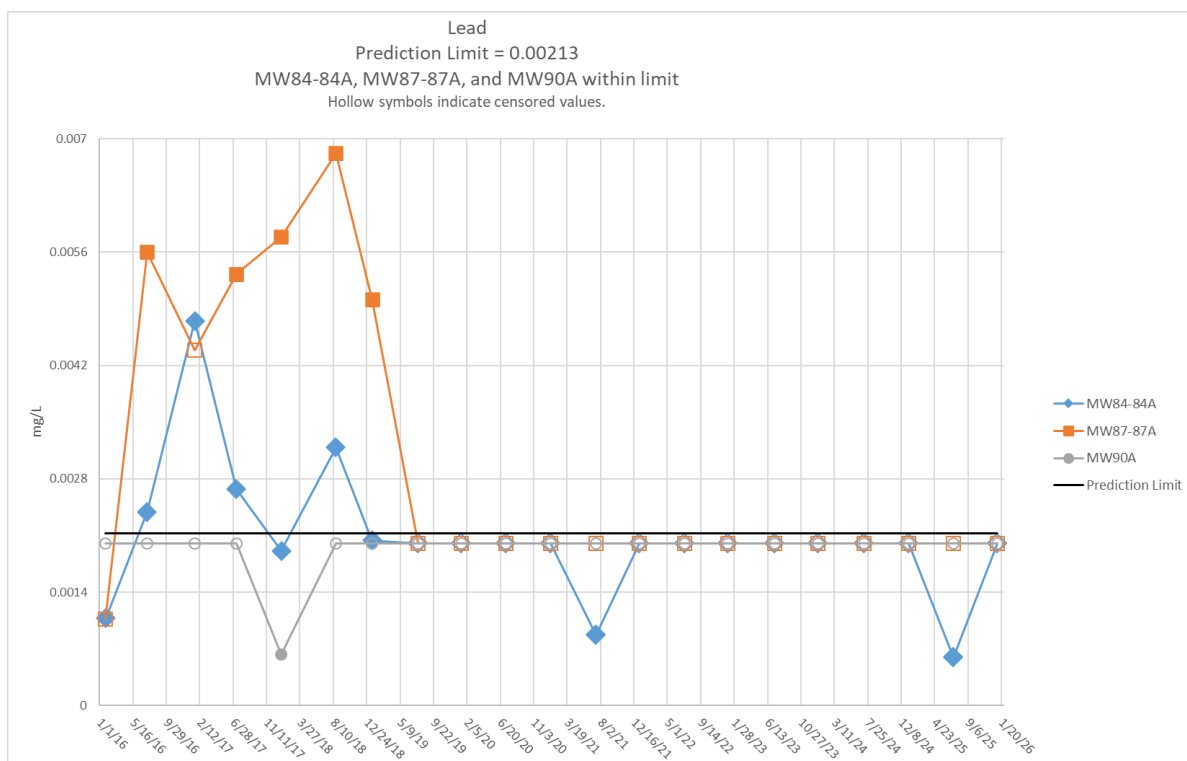


Figure B1.4. Lead PL Chart

MERCURY DATASET

Table B1.17 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.17 have been changed to less than the detection limit value.

Table B1.17. Mercury Dataset Information

Mercury (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/25/2016		< 0.0002	< 0.0002	< 0.0002	< 0.0002
2	1/27/2016	< 0.0002				
3	7/12/2016	< 0.0002	< 0.0002			
4	7/13/2016			< 0.0002	< 0.0002	< 0.0002
5	1/23/2017		< 0.0002	< 0.0002	< 0.0002	< 0.0002
6	1/24/2017	< 0.0002				
7	7/12/2017	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
8	1/9/2018		< 0.0002	< 0.0002	< 0.0002	< 0.0002
9	1/10/2018	< 0.0002				
10	8/20/2018	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
11	1/15/2019		< 0.0002			< 0.0002
12	1/16/2019	< 0.0002		< 0.0002	< 0.0002	
13	7/22/2019	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Table B1.17. Mercury Dataset Information (Continued)

Number	Date	MW84-84A X _i	MW87-87A X _i	MW90A X _i	MW93-93A X _i	MW420 X _i
14	1/14/2020	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
15	7/14/2020	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
16	1/12/2021	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
17	7/14/2021	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
18	1/6/2022	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
19	7/11/2022	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
20	1/4/2023	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
21	7/11/2023	< 0.0002	< 0.0002		< 0.0002	< 0.0002
22	7/12/2023			< 0.0002		
23	1/3/2024	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
24	7/9/2024	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
25	1/7/2025	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
26	7/9/2025	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
27	1/5/2026	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
n = number of background samples =					42	
Background nondetects =					42	
Percentage of background nondetects =					100	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.18 and B1.19 and include decimal places not shown when rounding.

Notes for Table B1.18:

1. Number of observations = n = 21
2. Significance level = $\alpha = 0.05$
3. Critical point = C = 0.440 from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C, which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.18. Mercury Dixon's Outlier Test

Rank	MW84-84A X _i	MW87-87A X _i	MW90A X _i	MW93-93A X _i	MW420 X _i
1	0.0002	0.0002	0.0002	0.0002	0.0002
2	0.0002	0.0002	0.0002	0.0002	0.0002
3	0.0002	0.0002	0.0002	0.0002	0.0002
4	0.0002	0.0002	0.0002	0.0002	0.0002
5	0.0002	0.0002	0.0002	0.0002	0.0002
6	0.0002	0.0002	0.0002	0.0002	0.0002
7	0.0002	0.0002	0.0002	0.0002	0.0002
8	0.0002	0.0002	0.0002	0.0002	0.0002
9	0.0002	0.0002	0.0002	0.0002	0.0002
10	0.0002	0.0002	0.0002	0.0002	0.0002
11	0.0002	0.0002	0.0002	0.0002	0.0002
12	0.0002	0.0002	0.0002	0.0002	0.0002
13	0.0002	0.0002	0.0002	0.0002	0.0002
14	0.0002	0.0002	0.0002	0.0002	0.0002

Table B1.18. Mercury Dixon's Outlier Test (Continued)

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
15	0.0002	0.0002	0.0002	0.0002	0.0002
16	0.0002	0.0002	0.0002	0.0002	0.0002
17	0.0002	0.0002	0.0002	0.0002	0.0002
18	0.0002	0.0002	0.0002	0.0002	0.0002
19	0.0002	0.0002	0.0002	0.0002	0.0002
20	0.0002	0.0002	0.0002	0.0002	0.0002
21	0.0002	0.0002	0.0002	0.0002	0.0002
low outlier = C _{low} =	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Results less than C?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
high outlier = C _{high} =	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Results less than C?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Dixon's test identified no observations as statistical outliers.

Table B1.19 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.19:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = x₄₂ - x₁, x₄₁ - x₂,x₂₂ - x₂₁
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = W_{critical} and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated W > W_{critical} then distribution is normal.

Table B1.19. Mercury Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.0002	i1	0.3917	x42 - x1	0	0
2	0.0002	i2	0.2701	x41 - x2	0	0
3	0.0002	i3	0.2345	x40 - x3	0	0
4	0.0002	i4	0.2085	x39 - x4	0	0
5	0.0002	i5	0.1874	x38 - x5	0	0
6	0.0002	i6	0.1694	x37 - x6	0	0
7	0.0002	i7	0.1535	x36 - x7	0	0
8	0.0002	i8	0.1392	x35 - x8	0	0
9	0.0002	i9	0.1259	x34 - x9	0	0
10	0.0002	i10	0.1136	x33 - x10	0	0
11	0.0002	i11	0.1020	x32 - x11	0	0
12	0.0002	i12	0.0909	x31 - x12	0	0
13	0.0002	i13	0.0804	x30 - x13	0	0
14	0.0002	i14	0.0701	x29 - x14	0	0
15	0.0002	i15	0.0602	x28 - x15	0	0
16	0.0002	i16	0.0506	x27 - x16	0	0
17	0.0002	i17	0.0411	x26 - x17	0	0
18	0.0002	i18	0.0318	x25 - x18	0	0
19	0.0002	i19	0.0227	x24 - x19	0	0
20	0.0002	i20	0.0136	x23 - x20	0	0
21	0.0002	i21	0.0045	x22 - x21	0	0
22	0.0002				b =	0
23	0.0002					
24	0.0002					
25	0.0002					
26	0.0002					
27	0.0002					
28	0.0002					
29	0.0002					
30	0.0002					
31	0.0002					
32	0.0002					
33	0.0002					
34	0.0002					
35	0.0002					
36	0.0002					
37	0.0002					
38	0.0002					
39	0.0002					
40	0.0002					
41	0.0002					
42	0.0002					
mean =		0.0002				
standard deviation =		0				

SS =	4.937E-37
b =	0
W = b ² / SS =	0
W _{critical} =	0.922

sum of the squares of the concentrations
sum of the i * differences column
Distribution not normal.
Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.19 is 0. Because 0 is less than the critical value of 0.922, normality cannot be confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 0.0002.

Table B1.20 shows the data used to plot the comparison of the compliance wells to the PL. All < 0.0002 values shown in Table B1.17 have been changed to 0.0002 in Table B1.20.

Table B1.20. Mercury Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.0002	0.0002	0.0002
1/27/2016	0.0002			0.0002
7/12/2016	0.0002	0.0002		0.0002
7/13/2016			0.0002	0.0002
1/23/2017		0.0002	0.0002	0.0002
1/24/2017	0.0002			0.0002
7/12/2017	0.0002	0.0002	0.0002	0.0002
1/9/2018		0.0002	0.0002	0.0002
1/10/2018	0.0002			0.0002
8/20/2018	0.0002	0.0002	0.0002	0.0002
1/15/2019		0.0002		0.0002
1/16/2019	0.0002		0.0002	0.0002
7/22/2019	0.0002	0.0002	0.0002	0.0002
1/14/2020	0.0002	0.0002	0.0002	0.0002
7/14/2020	0.0002	0.0002	0.0002	0.0002
1/12/2021	0.0002	0.0002	0.0002	0.0002
7/14/2021	0.0002	0.0002	0.0002	0.0002
1/6/2022	0.0002	0.0002	0.0002	0.0002
7/11/2022	0.0002	0.0002	0.0002	0.0002
1/4/2023	0.0002	0.0002	0.0002	0.0002
7/11/2023	0.0002	0.0002		0.0002
7/12/2023			0.0002	0.0002
1/3/2024	0.0002	0.0002	0.0002	0.0002
7/9/2024	0.0002	0.0002	0.0002	0.0002
1/7/2025	0.0002	0.0002	0.0002	0.0002
7/9/2025	0.0002	0.0002	0.0002	0.0002
1/5/2026	0.0002	0.0002	0.0002	0.0002

Figure B1.5 shows the chart for Table B1.20 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

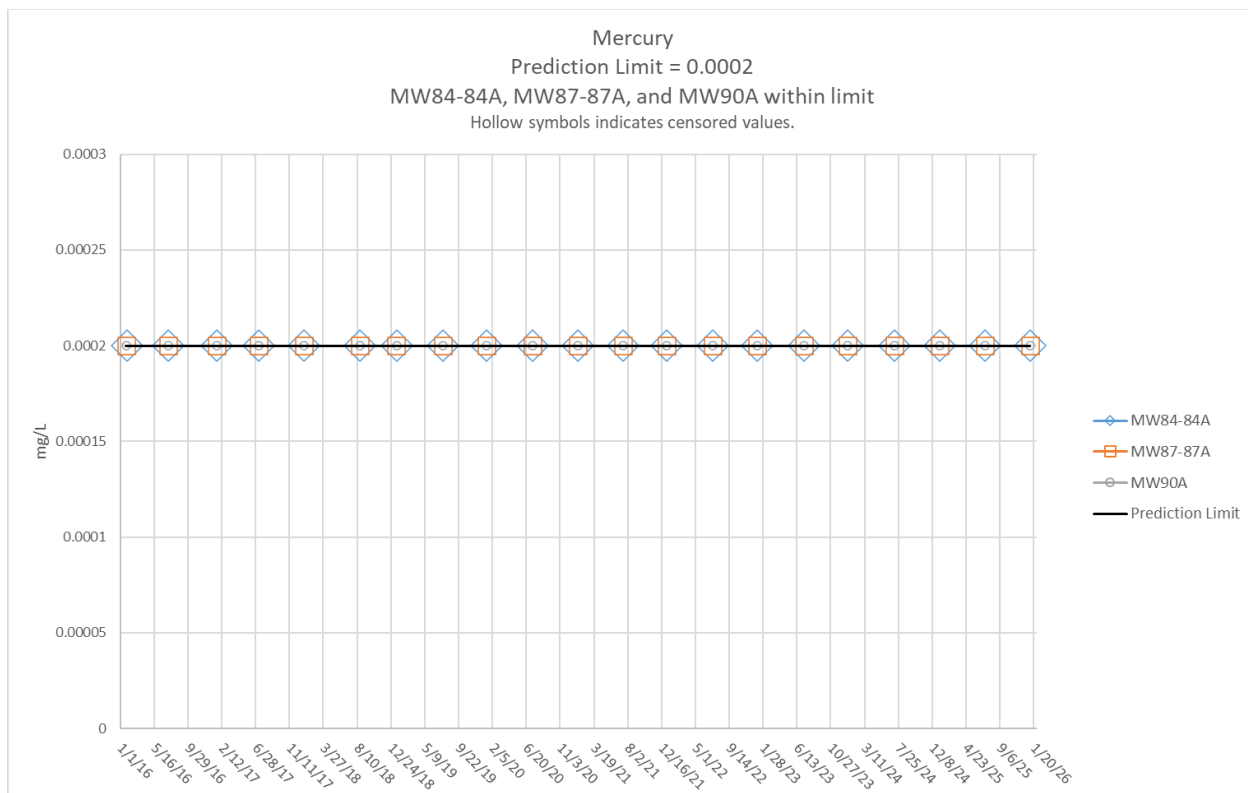


Figure B1.5. Mercury PL chart

SELENIUM DATASET

Table B1.21 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.21 have been changed to less than the detection limit value.

Table B1.21. Selenium Dataset Information

Selenium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/25/2016		< 0.005	0.00231	0.00165	< 0.005
2	1/27/2016	< 0.005				
3	7/12/2016	< 0.005	0.00159			
4	7/13/2016			0.0017	< 0.005	< 0.005
5	1/23/2017		< 0.005	< 0.005	< 0.005	< 0.005
6	1/24/2017	0.00294				
7	7/12/2017	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
8	1/9/2018		0.00219	< 0.005	< 0.005	< 0.005
9	1/10/2018	< 0.005				
10	8/20/2018	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
11	1/15/2019		< 0.005			< 0.005
12	1/16/2019	< 0.005		< 0.005	< 0.005	
13	7/22/2019	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
14	1/14/2020	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Table B1.21. Selenium Dataset Information (Continued)

Selenium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		X_i	X_i	X_i	X_i	X_i
15	7/14/2020	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
16	1/12/2021	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
17	7/14/2021	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
18	1/6/2022	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
19	7/11/2022	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
20	1/4/2023	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
21	7/11/2023	< 0.005	< 0.005		< 0.005	< 0.005
22	7/12/2023			< 0.005		
23	1/3/2024	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
24	7/9/2024	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
25	1/7/2025	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
26	7/9/2025	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
27	1/5/2026	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
n = number of background samples =					42	
Background nondetects =					41	
Percentage of background nondetects =					97.62	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.22 and B1.23 and include decimal places not shown when rounding.

Notes for Table B1.22:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.22. Selenium Dixon's Outlier Test

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
1	0.00294	0.00159	0.0017	0.00165	0.005
2	0.005	0.00219	0.00231	0.005	0.005
3	0.005	0.005	0.005	0.005	0.005
4	0.005	0.005	0.005	0.005	0.005
5	0.005	0.005	0.005	0.005	0.005
6	0.005	0.005	0.005	0.005	0.005
7	0.005	0.005	0.005	0.005	0.005
8	0.005	0.005	0.005	0.005	0.005
9	0.005	0.005	0.005	0.005	0.005
10	0.005	0.005	0.005	0.005	0.005
11	0.005	0.005	0.005	0.005	0.005
12	0.005	0.005	0.005	0.005	0.005
13	0.005	0.005	0.005	0.005	0.005
14	0.005	0.005	0.005	0.005	0.005
15	0.005	0.005	0.005	0.005	0.005

Table B1.22. Selenium Dixon's Outlier Test (Continued)

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
16	0.005	0.005	0.005	0.005	0.005
17	0.005	0.005	0.005	0.005	0.005
18	0.005	0.005	0.005	0.005	0.005
19	0.005	0.005	0.005	0.005	0.005
20	0.005	0.005	0.005	0.005	0.005
21	0.005	0.005	0.005	0.005	0.005
low outlier = C _{low} =	1.0000	1.0000	1.0000	1.0000	#DIV/0!
Results less than C?	No	No	No	No	#DIV/0!
high outlier = C _{high} =	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Results less than C?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Dixon's test identified observations in MW84-84A, MW87-87A, MW90A, and MW93-93A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Table B1.23 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.23:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.23. Selenium Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.00165	i1	0.3917	x42 - x1	0.003350	0.00131220
2	0.005	i2	0.2701	x41 - x2	0	0
3	0.005	i3	0.2345	x40 - x3	0	0
4	0.005	i4	0.2085	x39 - x4	0	0
5	0.005	i5	0.1874	x38 - x5	0	0
6	0.005	i6	0.1694	x37 - x6	0	0
7	0.005	i7	0.1535	x36 - x7	0	0
8	0.005	i8	0.1392	x35 - x8	0	0
9	0.005	i9	0.1259	x34 - x9	0	0
10	0.005	i10	0.1136	x33 - x10	0	0
11	0.005	i11	0.1020	x32 - x11	0	0
12	0.005	i12	0.0909	x31 - x12	0	0
13	0.005	i13	0.0804	x30 - x13	0	0
14	0.005	i14	0.0701	x29 - x14	0	0
15	0.005	i15	0.0602	x28 - x15	0	0
16	0.005	i16	0.0506	x27 - x16	0	0
17	0.005	i17	0.0411	x26 - x17	0	0
18	0.005	i18	0.0318	x25 - x18	0	0
19	0.005	i19	0.0227	x24 - x19	0	0
20	0.005	i20	0.0136	x23 - x20	0	0
21	0.005	i21	0.0045	x22 - x21	0	0
22	0.005				b =	0.00131220
23	0.005					
24	0.005					
25	0.005					
26	0.005					
27	0.005					
28	0.005					
29	0.005					
30	0.005					
31	0.005					
32	0.005					
33	0.005					
34	0.005					
35	0.005					
36	0.005					
37	0.005					
38	0.005					
39	0.005					
40	0.005					
41	0.005					
42	0.005					
mean =			0.005			
standard deviation =			0.000517			
		SS =	1.096E-05	sum of the squares of the concentrations		
		b =	0.00131220	sum of the i * differences column		
		W = b ² / SS =	0.1572	Distribution not normal.		
		W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3		

The Shapiro-Wilk test of normality value shown in Table B1.23 is 0.1572. Because 0.1572 is less than the critical value of 0.922, normality cannot be confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 0.005.

Table B1.24 shows the data used to plot the comparison of the compliance wells to the PL. All < 0.005 values shown in Table B1.21 have been changed to 0.005 in Table B1.24.

Table B1.24. Selenium Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.005	0.00231	0.005
1/27/2016	0.005			0.005
7/12/2016	0.005	0.00159		0.005
7/13/2016			0.0017	0.005
1/23/2017		0.005	0.005	0.005
1/24/2017	0.00294			0.005
7/12/2017	0.005	0.005	0.005	0.005
1/9/2018		0.00219	0.005	0.005
1/10/2018	0.005			0.005
8/20/2018	0.005	0.005	0.005	0.005
1/15/2019		0.005		0.005
1/16/2019	0.005		0.005	0.005
7/22/2019	0.005	0.005	0.005	0.005
1/14/2020	0.005	0.005	0.005	0.005
7/14/2020	0.005	0.005	0.005	0.005
1/12/2021	0.005	0.005	0.005	0.005
7/14/2021	0.005	0.005	0.005	0.005
1/6/2022	0.005	0.005	0.005	0.005
7/11/2022	0.005	0.005	0.005	0.005
1/4/2023	0.005	0.005	0.005	0.005
7/11/2023	0.005	0.005		0.005
7/12/2023			0.005	0.005
1/3/2024	0.005	0.005	0.005	0.005
7/9/2024	0.005	0.005	0.005	0.005
1/7/2025	0.005	0.005	0.005	0.005
7/9/2025	0.005	0.005	0.005	0.005
1/5/2026	0.005	0.005	0.005	0.005

Figure B1.6 shows the chart for Table B1.24 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

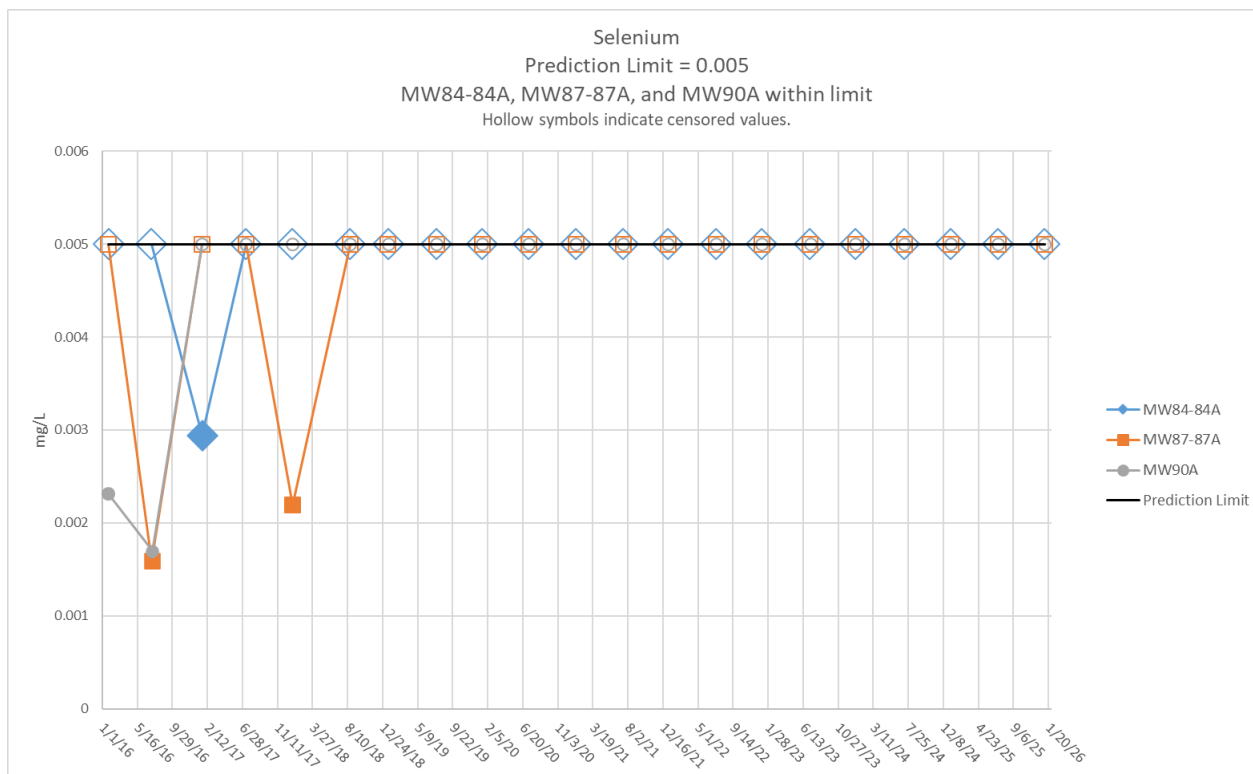


Figure B1.6. Selenium PL Chart

TECHNETIUM-99 DATASET

Table B1.25 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B2.25 have been changed to less than the detection limit value.

Table B1.25. Technetium-99 Dataset Information

Technetium-99 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/15/2019		< 19			< 19
2	1/16/2019	28.8		< 15.8	< 22.1	
3	7/22/2019	126	< 19.9	< 19.4	< 20.2	< 20.5
4	1/14/2020	297	< 21	< 23.4	< 20.5	< 21.2
5	7/14/2020	332	< 19.7	< 20.5	< 20.7	< 21.4
6	1/12/2021	353	< 19.1	< 17.6	< 18.3	< 17.6
7	4/29/2021	294	< 18	26.2	26.9	< 18.3
8	7/14/2021	229	< 11.5	24.3	20.5	< 10.6
9	11/29/2021	258	< 18.2	< 18.1	< 18.5	< 18.8
10	1/6/2022	225	< 20	< 19.1	< 20.9	< 19.3
11	5/11/2022	47.9	< 12	34.4	< 15.9	< 15.9

Table B1.25. Technetium-99 Dataset Information (Continued)

Technetium-99 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A X_i	MW87-87A X_i	MW90A X_i	MW93-93A X_i	MW420 X_i
12	7/11/2022	47.2				
13	8/15/2022		< 13.4	25.7	< 15.7	< 14.5
14	11/7/2022	64	< 16.8	22.3	< 17.3	< 16.6
15	1/4/2023	202	24.4	< 23.7	< 18.3	< 17.7
16	7/11/2023	64.2	33.3		< 18.7	< 19.5
17	7/12/2023			24.7		
18	1/3/2024	86	19.2	43.5	< 16.6	< 16.3
19	7/9/2024	93.5	< 19.6	45.3	< 19.9	< 19.6
20	1/7/2025	104	25.7	55.8	< 23.4	< 21.9
21	5/29/2025	79.2	< 23.1	77.8	< 23.2	< 22.6
22	7/9/2025	93.7	47.7	72.7	< 20	< 20.1
23	10/21/2025	74.7	33.6	57.9	< 16.8	< 16.7
24	1/5/2026	219	23	85.9	< 11.1	< 10.8
n = number of background samples =					42	
Background nondetects =					40	
Percentage of background nondetects =					95.24	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.26 and B1.27 and include decimal places not shown when rounding.

Notes for Table B1.26:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.26. Technetium-99 Dixon's Outlier Test

Rank	MW84-84A X_i	MW87-87A X_i	MW90A X_i	MW93-93A X_i	MW420 X_i
1	28.8	11.5	15.8	11.1	10.6
2	47.2	12	17.6	15.7	10.8
3	47.9	13.4	18.1	15.9	14.5
4	64	16.8	19.1	16.6	15.9
5	64.2	18	19.4	16.8	16.3
6	74.7	18.2	20.5	17.3	16.6
7	79.2	19	22.3	18.3	16.7
8	86	19.1	23.4	18.3	17.6
9	93.5	19.2	23.7	18.5	17.7
10	93.7	19.6	24.3	18.7	18.3
11	104	19.7	24.7	19.9	18.8
12	126	19.9	25.7	20	19
13	202	20	26.2	20.2	19.3
14	219	21	34.4	20.5	19.5

Table B1.26. Technetium-99 Dixon's Outlier Test (Continued)

Rank	MW84-84A X_i	MW87-87A X_i	MW90A X_i	MW93-93A X_i	MW420 X_i
15	225	23	43.5	20.5	19.6
16	229	23.1	45.3	20.7	20.1
17	258.0	24.4	55.8	20.9	20.5
18	294	25.7	57.9	22.1	21.2
19	297	33.3	72.7	23.2	21.4
20	332	33.6	77.8	23.4	21.9
21	353	47.7	85.9	26.9	22.6
low outlier = C _{low} =	0.0712	0.0872	0.0404	0.3967	0.3611
Results less than C?	Yes	Yes	Yes	Yes	Yes
high outlier = C _{high} =	0.1835	0.4198	0.1947	0.3364	0.1481
Results less than C?	Yes	Yes	Yes	Yes	Yes

Dixon's test identified no observations as statistical outliers.

Table B1.27 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.27:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = W_{critical} and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated W > W_{critical} then distribution is normal.

Table B1.27. Technetium-99 Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	10.6	i1	0.3917	x42 - x1	16.3	6.38471
2	10.8	i2	0.2701	x41 - x2	12.6	3.40326
3	11.1	i3	0.2345	x40 - x3	12.1	2.83745
4	14.5	i4	0.2085	x39 - x4	8.1	1.68885
5	15.7	i5	0.1874	x38 - x5	6.4	1.19936
6	15.9	i6	0.1694	x37 - x6	6.0	1.0164
7	15.9	i7	0.1535	x36 - x7	5.5	0.84425
8	16.3	i8	0.1392	x35 - x8	4.9	0.68208
9	16.6	i9	0.1259	x34 - x9	4.3	0.54137
10	16.6	i10	0.1136	x33 - x10	4.1	0.46576
11	16.7	i11	0.1020	x32 - x11	3.8	0.3876
12	16.8	i12	0.0909	x31 - x12	3.7	0.33633
13	17.3	i13	0.0804	x30 - x13	3.2	0.25728
14	17.6	i14	0.0701	x29 - x14	2.6	0.18226
15	17.7	i15	0.0602	x28 - x15	2.4	0.14448
16	18.3	i16	0.0506	x27 - x16	1.7	0.08602
17	18.3	i17	0.0411	x26 - x17	1.6	0.06576
18	18.3	i18	0.0318	x25 - x18	1.3	0.04134
19	18.5	i19	0.0227	x24 - x19	1.0	0.0227
20	18.7	i20	0.0136	x23 - x20	0.6	0.00816
21	18.8	i21	0.0045	x22 - x21	0.2	0.0009
22	19				b =	20.59632
23	19.3					
24	19.5					
25	19.6					
26	19.9					
27	20					
28	20.1					
29	20.2					
30	20.5					
31	20.5					
32	20.5					
33	20.7					
34	20.9					
35	21.2					
36	21.4					
37	21.9					
38	22.1					
39	22.6					
40	23.2					
41	23.4					
42	26.9					
mean =		18.676				
standard deviation =		3.287				

SS =	442.89619	sum of the squares of the concentrations
b =	20.59632	sum of the i * differences column
$W = b^2 / SS =$	0.9578	Normal Distribution
$W_{critical} =$	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.27 is 0.9578. Because 0.9578 is greater than the critical value of 0.922, normality is confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 26.9.

Table B1.28 shows the data used to plot the comparison of the compliance wells to the PL. All less than values shown in Table B1.25 have been changed to the value without the less than symbol in Table B1.28.

Table B1.28. Technetium-99 Compliance Well sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/15/2019		19		26.9
1/16/2019	28.8		15.8	26.9
7/22/2019	126	19.9	19.4	26.9
1/14/2020	297	21	23.4	26.9
7/14/2020	332	19.7	20.5	26.9
1/12/2021	353	19.1	17.6	26.9
4/29/2021	294	18	26.2	26.9
7/14/2021	229	11.5	24.3	26.9
11/29/2021	258	18.2	18.1	26.9
1/6/2022	225	20	19.1	26.9
5/11/2022	47.9	12	34.4	26.9
7/11/2022	47.2			26.9
8/15/2022		13.4	25.7	26.9
11/7/2022	64	16.8	22.3	26.9
1/4/2023	202	24.4	23.7	26.9
7/11/2023	64.2	33.3		26.9
7/12/2023			24.7	26.9
1/3/2024	86	19.2	43.5	26.9
7/9/2024	93.5	19.6	45.3	26.9
1/7/2025	104	25.7	55.8	26.9
5/29/2025	79.2	23.1	77.8	26.9
7/9/2025	93.7	47.7	72.7	26.9
10/21/2025	74.7	33.6	57.9	26.9
1/5/2026	219	23	85.9	26.9

Figure B1.7 shows the chart for Table B1.28 and indicates MW84-84A and MW90A exceeds the PL.

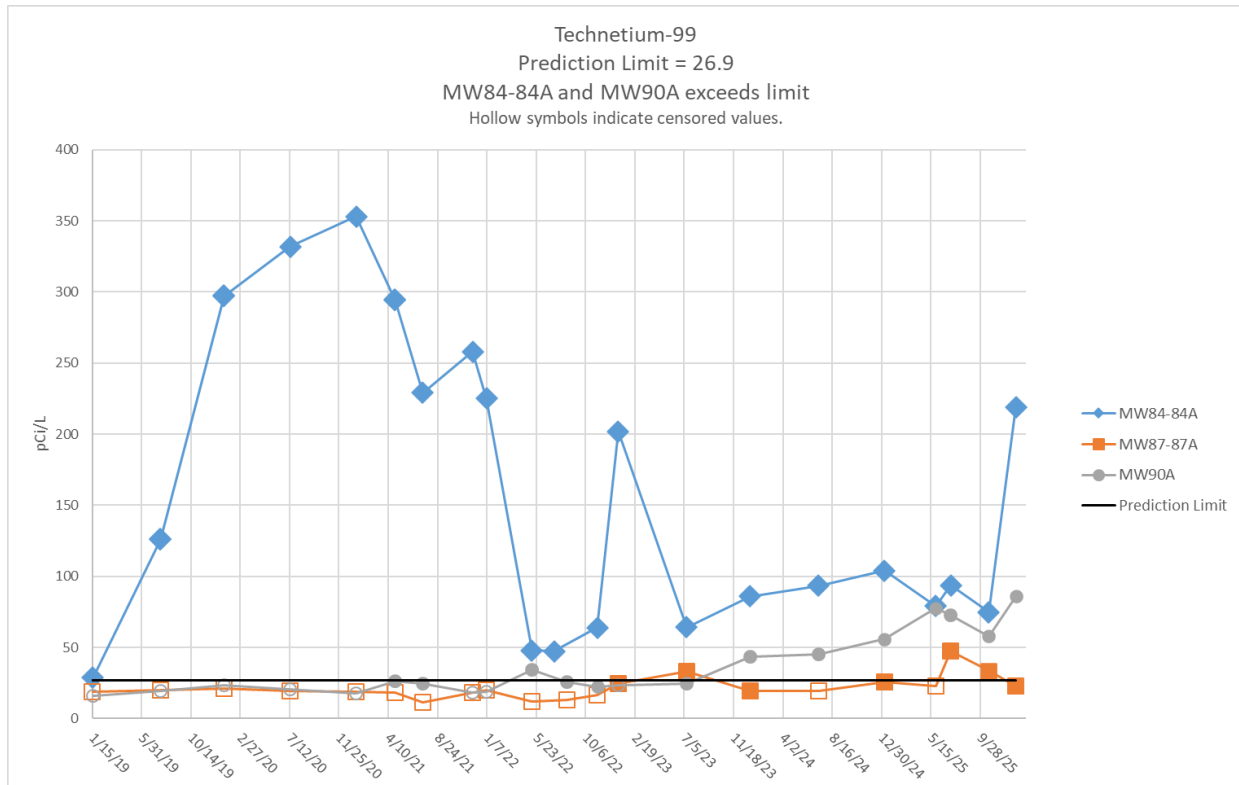


Figure B1.7. Technetium-99 PL Chart

TRICHLOROETHENE DATASET

Table B1.29 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding.

Table B1.29. Trichloroethene Dataset Information

Trichloroethene (µg/L)		Compliance MW84-84A	Compliance MW87-87A	Compliance MW90A	Background MW93-93A	Background MW420
Number	Date	X_i	X_i	X_i	X_i	X_i
1	1/25/2016		1230	39.8	2490	222
2	1/27/2016	1350				
3	7/12/2016	1820	1090			
4	7/13/2016			35.3	2020	169
5	1/23/2017		2240	49.5	2450	274
6	1/24/2017	2620				
7	7/12/2017	2910	1620	46.1	1400	264
8	1/9/2018		1400	40.6	994	232
9	1/10/2018	3160				
10	8/20/2018	5260	1690	53.3	1000	476
11	1/15/2019		2380			601
12	1/16/2019	5580		69.9	1000	
13	7/22/2019	2000	1850	55.7	789	600

Table B1.29. Trichloroethene Dataset Information (Continued)

Trichloroethene (µg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
14	1/14/2020	2930	2580	92.9	1360	1090
15	7/14/2020	3230	3090	52	2220	1340
16	1/12/2021	2630	2570	99.6	3120	1690
17	7/14/2021	5290	2410	148	3170	1790
18	1/6/2022	6560	1890	146	2550	2100
19	7/11/2022	6570				
20	8/15/2022		1400	222	1630	1620
21	1/4/2023	7000	2140	296	1960	2110
22	7/11/2023	5870	2160		1880	2090
23	7/12/2023			267		
24	1/3/2024	6090	1690	313	1320	2600
25	7/9/2024	5110	1000	177	554	1790
26	1/7/2025	5340	172	121	658	2670
27	7/9/2025	4020	97.1	13.4	458	2070
28	1/5/2026	4680	80.4	10.9	701	2510
n = number of background samples =					42	
Background nondetects =					0	
Percentage of background nondetects =					0	

Table B1.29 shows the percentage of background nondetects is 0%. The background values were used in the Dixon's outlier and Shapiro-Wilk test of normality tests for Tables B1.30 and B1.31. These tables include decimal places not shown when rounding.

Notes for Table B1.30:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.30. TCE Dixon's Outlier Test

Rank	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1350	80.4	10.9	458	169
2	1820	97.1	13.4	554	222
3	2000	172	35.3	658	232
4	2620	1000	39.8	701	264
5	2630	1090	40.6	789	274
6	2910	1230	46.1	994	476
7	2930	1400	49.5	1000	600
8	3160	1400	52	1000	601
9	3230	1620	53.3	1320	1090
10	4020	1690	55.7	1360	1340
11	4680	1690	69.9	1400	1620
12	5110	1850	92.9	1630	1690
13	5260	1890	99.6	1880	1790
14	5290	2140	121	1960	1790
15	5340	2160	146	2020	2070
16	5580	2240	148	2220	2090
17	5870	2380	177	2450	2100
18	6090	2410	222	2490	2110
19	6560	2570	267	2550	2510
20	6570	2580	296	3120	2600
21	7000	3090	313	3170	2670
low outlier = C_{low} =	0.1248	0.0368	0.0953	0.0956	0.0269
Results less than C?	Yes	Yes	Yes	Yes	Yes
high outlier = C_{high} =	0.0880	0.1782	0.1656	0.2468	0.0656
Results less than C?	Yes	Yes	Yes	Yes	Yes

Dixon's test identified no observations as statistical outliers.

Notes for Table B1.31:

1. Number of observations = $n = 42$
2. Significance level = $\alpha = 0.01$
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the $i * \text{Differences column} = b$
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.31. TCE Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	169	i1	0.3917	x42 - x1	3001	1175.4917
2	222	i2	0.2701	x41 - x2	2898	782.7498
3	232	i3	0.2345	x40 - x3	2438	571.711
4	264	i4	0.2085	x39 - x4	2336	487.056
5	274	i5	0.1874	x38 - x5	2276	426.5224
6	458	i6	0.1694	x37 - x6	2052	347.6088
7	476	i7	0.1535	x36 - x7	2014	309.149
8	554	i8	0.1392	x35 - x8	1896	263.9232
9	600	i9	0.1259	x34 - x9	1620	203.958
10	601	i10	0.1136	x33 - x10	1509	171.4224
11	658	i11	0.1020	x32 - x11	1442	147.084
12	701	i12	0.0909	x31 - x12	1389	126.2601
13	789	i13	0.0804	x30 - x13	1281	102.9924
14	994	i14	0.0701	x29 - x14	1026	71.9226
15	1000	i15	0.0602	x28 - x15	960	57.792
16	1000	i16	0.0506	x27 - x16	880	44.528
17	1090	i17	0.0411	x26 - x17	700	28.77
18	1320	i18	0.0318	x25 - x18	470	14.946
19	1340	i19	0.0227	x24 - x19	350	7.945
20	1360	i20	0.0136	x23 - x20	270	3.672
21	1400	i21	0.0045	x22 - x21	220	0.99
22	1620				b =	5346.4944
23	1630					
24	1690					
25	1790					
26	1790					
27	1880					
28	1960					
29	2020					
30	2070					
31	2090					
32	2100					
33	2110					
34	2220					
35	2450					
36	2490					
37	2510					
38	2550					
39	2600					
40	2670					
41	3120					
42	3170					
mean =		1477				
standard deviation =		859.9				

The Shapiro-Wilk test of normality value shown in Table B1.31 is 0.9429. Because 0.9429 is greater than the critical value of 0.922, normality is confirmed and a parametric PL is determined.

The parametric PL is determined using Unified Guidance Equation 18.3, which is shown below.

$$PL = \text{mean} + \text{standard deviation} * \sqrt{1/m + 1/n} * t\text{-quantile}$$

where:

mean = average of background values = 1477

standard deviation = standard deviation of background values = 859.9

m = 1

n = observations = 42

degrees of freedom = n – 1 = 41

t-quantile is from Unified Guidance Appendix D, Table 16 -1. The t-quantile for 41° of freedom at a 95% confidence level = 1.683

$$PL = 1477 + 859.9 * \text{square root } (1/1 + 1/42) * 1.683 = 2941$$

Table B1.32 shows the data used to plot the comparison of the compliance wells to the PL.

Table B1.32. TCE Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		1230	39.8	2941
1/27/2016	1350			2941
7/12/2016	1820	1090		2941
7/13/2016			35.3	2941
1/23/2017		2240	49.5	2941
1/24/2017	2620			2941
7/12/2017	2910	1620	46.1	2941
1/9/2018		1400	40.6	2941
1/10/2018	3160			2941
8/20/2018	5260	1690	53.3	2941
1/15/2019		2380		2941
1/16/2019	5580		69.9	2941
7/22/2019	2000	1850	55.7	2941
1/14/2020	2930	2580	92.9	2941
7/14/2020	3230	3090	52	2941
1/12/2021	2630	2570	99.6	2941
7/14/2021	5290	2410	148	2941
1/6/2022	6560	1890	146	2941
7/11/2022	6570			2941
8/15/2022		1400	222	2941
1/4/2023	7000	2140	296	2941
7/11/2023	5870	2160		2941
7/12/2023			267	2941
1/3/2024	6090	1690	313	2941
7/9/2024	5110	1000	177	2941
1/7/2025	5340	172	121	2941
7/9/2025	4020	97.1	13.4	2941
1/5/2026	4680	80.4	10.9	2941

Figure B1.8 shows the chart for Table 32 and indicates MW84-84A exceeds the PL.

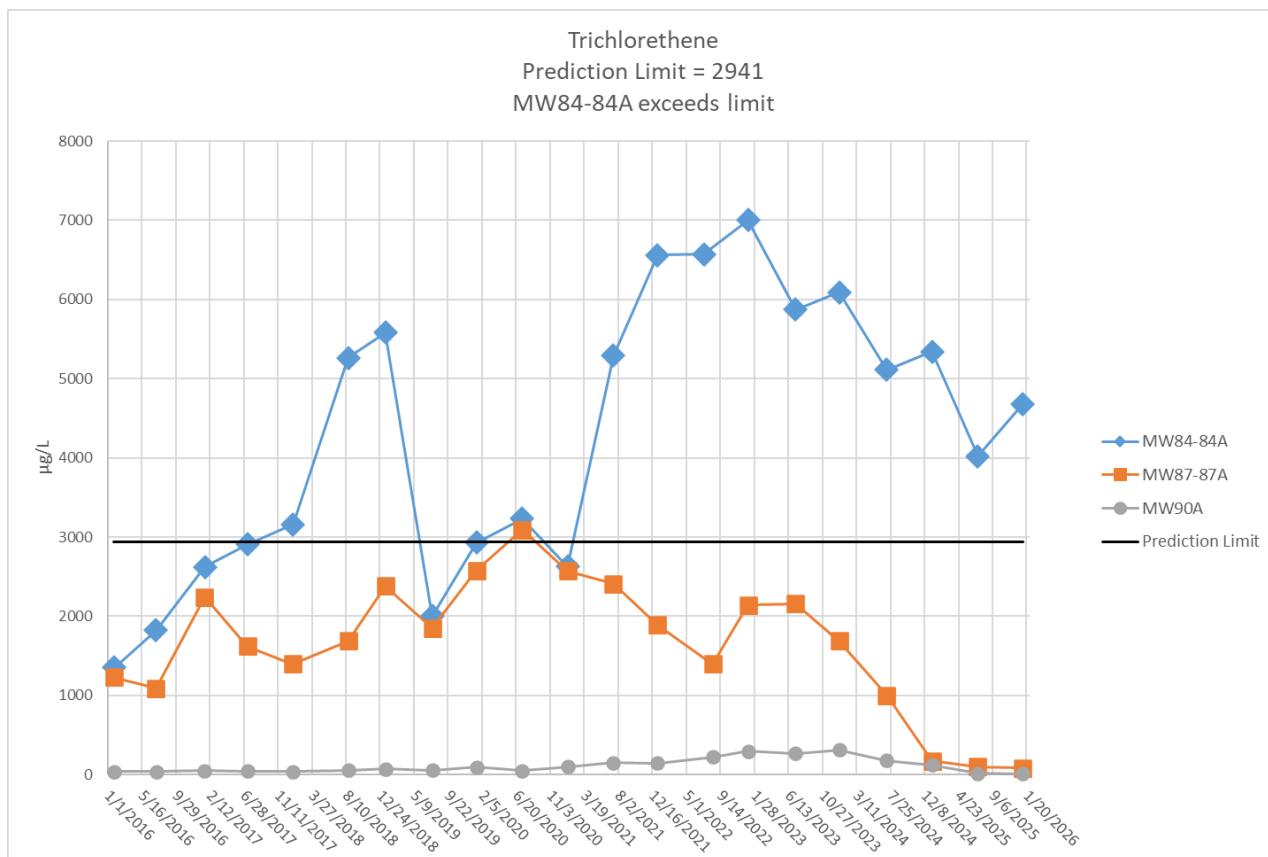


Figure B1.8. Trichloroethene PL Chart

URANIUM DATASET

Table B1.33 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.33 have been changed to less than the detection limit value.

Table B1.33. Uranium Dataset Information

Uranium (mg/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A X_i	MW87-87A X_i	MW90A X_i	MW93-93A X_i	MW420 X_i
1	1/25/2016		< 0.0002	< 0.0002	< 0.0002	< 0.0002
2	1/27/2016	< 0.0002				
3	7/12/2016	0.000345	0.000559			
4	7/13/2016			< 0.0002	0.000165	< 0.0002
5	1/23/2017		0.000522	< 0.0002	0.000223	< 0.0002
6	1/24/2017	0.000618				
7	7/12/2017	0.000355	0.000571	< 0.0002	0.000224	< 0.0002
8	1/9/2018		0.000681	< 0.0002	< 0.0002	< 0.0002
9	1/10/2018	0.0002				
10	8/20/2018	0.000302	0.000722	< 0.0002	0.000113	< 0.0002

Table B1.33. Uranium Dataset Information (Continued)

Number	Date	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
11	1/15/2019		0.00042			< 0.0002
12	1/16/2019	0.000193		< 0.0002	< 0.0002	
13	7/22/2019	0.00089	< 0.0002	< 0.0002	0.00056	< 0.0002
14	1/14/2020	0.000305	< 0.0002	< 0.0002	< 0.0002	< 0.0002
15	7/14/2020	0.000219	< 0.0002	< 0.0002	0.000089	< 0.0002
16	1/12/2021	0.000156	< 0.0002	< 0.0002	0.0001	< 0.0002
17	7/14/2021	< 0.0002	< 0.0002	< 0.0002	0.000079	< 0.0002
18	1/6/2022	< 0.0002	< 0.0002	< 0.0002	0.000126	0.0002
19	7/11/2022	0.000068	< 0.0002	< 0.0002	0.000076	< 0.0002
20	1/4/2023	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
21	7/11/2023	< 0.0002	< 0.0002		< 0.0002	< 0.0002
22	7/12/2023			< 0.0002		
23	1/3/2024	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
24	7/9/2024	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
25	1/7/2025	< 0.0002	< 0.0002	< 0.0002	0.000068	< 0.0002
26	7/9/2025	0.000069	< 0.0002	< 0.0002	< 0.0002	< 0.0002
27	1/5/2026	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
n = number of background samples =					42	
Background nondetects =					31	
Percentage of background nondetects =					73.81	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.34 and B1.35 and include decimal places not shown when rounding.

Notes for Table B1.34:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.34. Uranium Dixon's Outlier Test

Rank	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
1	0.000068	0.0002	0.0002	0.000068	0.0002
2	0.000069	0.0002	0.0002	0.000076	0.0002
3	0.000156	0.0002	0.0002	0.000079	0.0002
4	0.000193	0.0002	0.0002	0.000089	0.0002
5	0.0002	0.0002	0.0002	0.0001	0.0002
6	0.0002	0.0002	0.0002	0.000113	0.0002
7	0.0002	0.0002	0.0002	0.000126	0.0002
8	0.0002	0.0002	0.0002	0.000165	0.0002
9	0.0002	0.0002	0.0002	0.0002	0.0002
10	0.0002	0.0002	0.0002	0.0002	0.0002
11	0.0002	0.0002	0.0002	0.0002	0.0002

Table B1.34. Uranium Dixon's Outlier Test (Continued)

Rank	MW84-84A X_i	MW87-87A X_i	MW90A X_i	MW93-93A X_i	MW420 X_i
12	0.0002	0.0002	0.0002	0.0002	0.0002
13	0.0002	0.0002	0.0002	0.0002	0.0002
14	0.0002	0.0002	0.0002	0.0002	0.0002
15	0.000219	0.0002	0.0002	0.0002	0.0002
16	0.000302	0.00042	0.0002	0.0002	0.0002
17	0.000305	0.000522	0.0002	0.0002	0.0002
18	0.000345	0.000559	0.0002	0.0002	0.0002
19	0.000355	0.000571	0.0002	0.000223	0.0002
20	0.000618	0.000681	0.0002	0.000224	0.0002
21	0.00089	0.000722	0.0002	0.00056	0.0002
low outlier = C _{low} =	0.3066	0.0000	#DIV/0!	0.0710	#DIV/0!
Results less than C?	Yes	Yes	#DIV/0!	Yes	#DIV/0!
high outlier = C _{high} =	0.7289	0.2893	#DIV/0!	0.7006	#DIV/0!
Results less than C?	No	Yes	#DIV/0!	No	#DIV/0!

Dixon's test identified observations in MW84-84A and MW93-93A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Table B1.35 shows the Shapiro-Wilk test of normality of the background data.

Notes for Table B1.35:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = W_{critical} and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated W > W_{critical} then distribution is normal.

Table B1.35. Uranium Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.000068	i1	0.3917	x42 - x1	0.000492	0.000192716
2	0.000076	i2	0.2701	x41 - x2	0.000148	3.99748E-05
3	0.000079	i3	0.2345	x40 - x3	0.000144	0.000033768
4	0.000089	i4	0.2085	x39 - x4	0.000111	2.31435E-05
5	0.0001	i5	0.1874	x38 - x5	0.000100	0.00001874
6	0.000113	i6	0.1694	x37 - x6	0.000087	1.47378E-05
7	0.000126	i7	0.1535	x36 - x7	0.000074	0.000011359
8	0.000165	i8	0.1392	x35 - x8	0.000035	0.000004872
9	0.0002	i9	0.1259	x34 - x9	0	0
10	0.0002	i10	0.1136	x33 - x10	0	0
11	0.0002	i11	0.1020	x32 - x11	0	0
12	0.0002	i12	0.0909	x31 - x12	0	0
13	0.0002	i13	0.0804	x30 - x13	0	0
14	0.0002	i14	0.0701	x29 - x14	0	0
15	0.0002	i15	0.0602	x28 - x15	0	0
16	0.0002	i16	0.0506	x27 - x16	0	0
17	0.0002	i17	0.0411	x26 - x17	0	0
18	0.0002	i18	0.0318	x25 - x18	0	0
19	0.0002	i19	0.0227	x24 - x19	0	0
20	0.0002	i20	0.0136	x23 - x20	0	0
21	0.0002	i21	0.0045	x22 - x21	0	0
22	0.0002				b =	0.00033931
23	0.0002					
24	0.0002					
25	0.0002					
26	0.0002					
27	0.0002					
28	0.0002					
29	0.0002					
30	0.0002					
31	0.0002					
32	0.0002					
33	0.0002					
34	0.0002					
35	0.0002					
36	0.0002					
37	0.0002					
38	0.0002					
39	0.0002					
40	0.000223					
41	0.000224					
42	0.00056					
mean =			0.0002			
standard deviation =			0.000072			

SS =	2.114E-07	sum of the squares of the concentrations
b =	0.00033931	sum of the i * differences column
W = b ² / SS =	0.5447	Distribution not normal.
W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.35 is 0.5477. Because 0.5477 is less than the critical value of 0.922, normality cannot be confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 0.00056.

Table B1.36 shows the data used to plot the comparison of the compliance wells to the PL. All values < 0.0002 shown in Table B1.33 have been changed to the value of 0.0002 in Table B1.36.

Table B1.36. Uranium Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/25/2016		0.0002	0.0002	0.00056
1/27/2016	0.0002			0.00056
7/12/2016	0.000345	0.000559		0.00056
7/13/2016			0.0002	0.00056
1/23/2017		0.000522	0.0002	0.00056
1/24/2017	0.000618			0.00056
7/12/2017	0.000355	0.000571	0.0002	0.00056
1/9/2018		0.000681	0.0002	0.00056
1/10/2018	0.0002			0.00056
8/20/2018	0.000302	0.000722	0.0002	0.00056
1/15/2019		0.00042		0.00056
1/16/2019	0.000193		0.0002	0.00056
7/22/2019	0.00089	0.0002	0.0002	0.00056
1/14/2020	0.000305	0.0002	0.0002	0.00056
7/14/2020	0.000219	0.0002	0.0002	0.00056
1/12/2021	0.000156	0.0002	0.0002	0.00056
7/14/2021	0.0002	0.0002	0.0002	0.00056
1/6/2022	0.0002	0.0002	0.0002	0.00056
7/11/2022	0.000068	0.0002	0.0002	0.00056
1/4/2023	0.0002	0.0002	0.0002	0.00056
7/11/2023	0.0002	0.0002		0.00056
7/12/2023			0.0002	0.00056
1/3/2024	0.0002	0.0002	0.0002	0.00056
7/9/2024	0.0002	0.0002	0.0002	0.00056
1/7/2025	0.0002	0.0002	0.0002	0.00056
7/9/2025	0.000069	0.0002	0.0002	0.00056
1/5/2026	0.0002	0.0002	0.0002	0.00056

Figure B1.9 shows the chart for Table B1.36 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

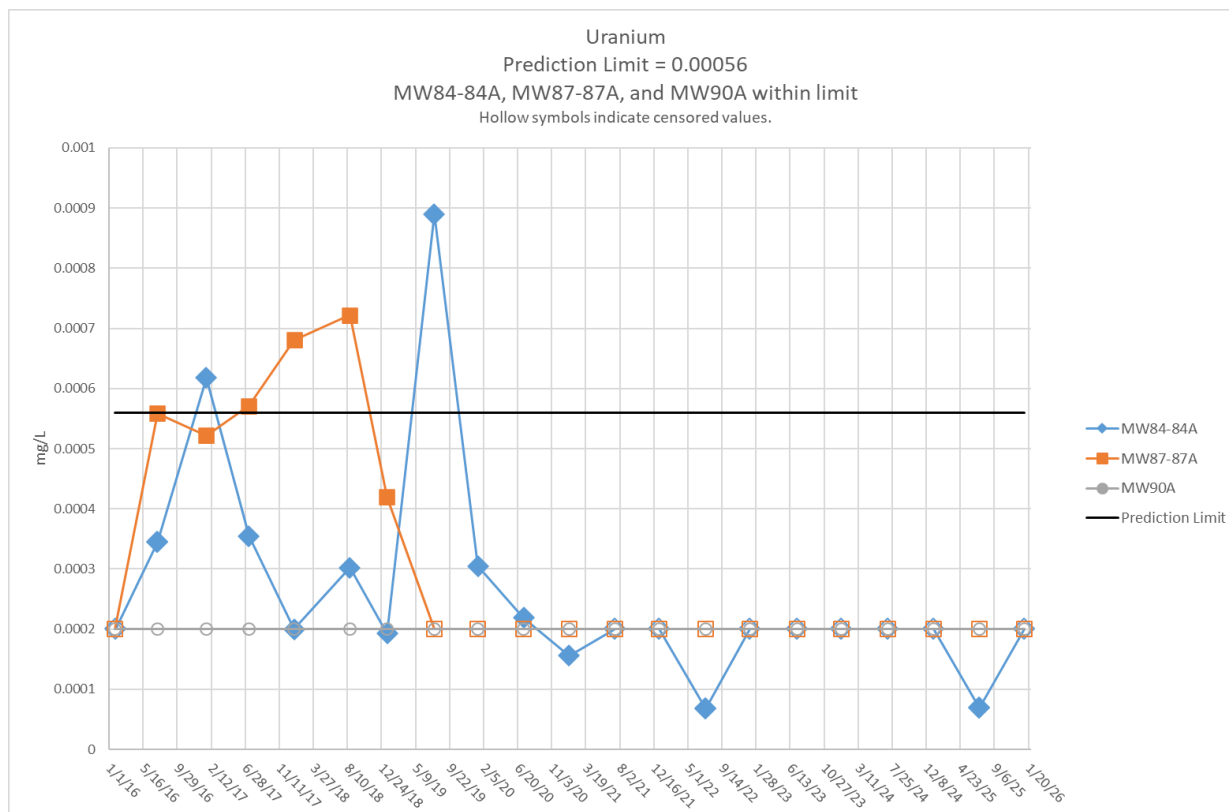


Figure B1.9. Uranium PL Chart

URANIUM-234 DATASET

Table B1.37 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.37 have been changed to less than the detection limit value.

Table B1.37. Uranium-234 Dataset Information

Uranium-234 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/15/2019		< 2.38			< 2.23
2	1/16/2019	< 1.43		1.89	< 1.37	
3	7/22/2019	1.77	< 2.02	1.67	2.38	< 1.42
4	1/14/2020	< 1.39	< 1.35	< 1.31	< 1.51	< 1.12
5	7/14/2020	< 1.88	< 1.65	< 1.84	< 1.66	< 1.91
6	1/12/2021	< 1.28	< 1.26	< 1.4	< 1.19	< 1.14
7	4/29/2021	< 1.37	< 1.42	< 1.67	< 1.99	< 2.16
8	7/14/2021	< 2.45	< 1.75	< 1.79	< 2.36	< 1.76

Table B1.37. Uranium-234 Dataset Information (Continued)

Uranium-234 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
9	11/29/2021	< 1.96	< 1.43	< 1.19	< 2.01	< 1.49
10	1/6/2022	< 1.08	< 1.09	< 0.91	< 2.71	< 0.936
11	5/11/2022	< 0.6	< 0.605	< 0.539	< 0.552	< 0.723
12	7/11/2022	< 2.37	< 1.64	< 1.83	< 1.78	< 2.39
13	11/7/2022	< 1.05	< 1.34	< 1.52	< 1.28	< 1.17
14	1/4/2023	< 1.42	< 1.4	< 1.56	< 1.05	< 1.56
15	7/11/2023	< 1.18	< 1.33		< 1.37	< 1.03
16	7/12/2023			< 1.61		
17	1/3/2024	< 2.26	< 2.35	< 2.5	< 3.2	< 2.32
18	7/9/2024	< 1.11	< 1.26	< 1.42	< 2.14	< 2.28
19	1/7/2025	< 1.29	< 1.11	< 1.89	< 2.14	< 1.18
20	5/29/2025	< 1.33	< 1.63	< 2.43	< 1.46	< 1.65
21	7/9/2025	< 1.37	< 1.27	< 1.39	< 1.28	< 1.4
22	10/21/2025	< 0.632	< 0.71	< 0.593	< 0.693	< 0.605
23	1/5/2026	< 1.47	< 1.78	< 1.66	< 1.45	< 1.62
n = number of background samples =					42	
Background nondetects =					41	
Percentage of background nondetects =					97.62	

Table B1.37 shows the percentage of background nondetects is 97.62%. The background values were used in the Dixon's outlier and Shapiro-Wilk test of normality for Tables B1.38 and B1.39. These tables include decimal places not shown when rounding.

Notes for Table B1.38:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.38. Uranium-234 Dixon's Outlier Test

Rank	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
1	0.6	0.605	0.539	0.552	0.605
2	0.632	0.71	0.593	0.693	0.723
3	1.05	1.09	0.91	1.05	0.936
4	1.08	1.11	1.19	1.19	1.03
5	1.11	1.26	1.31	1.28	1.12
6	1.18	1.26	1.39	1.28	1.14
7	1.28	1.27	1.4	1.37	1.17
8	1.29	1.33	1.42	1.37	1.18
9	1.33	1.34	1.52	1.45	1.4

Table B1.38. Uranium-234 Dixon's Outlier Test (Continued)

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
X_i	X_i	X_i	X_i	X_i	X_i
10	1.37	1.35	1.56	1.46	1.42
11	1.37	1.4	1.61	1.51	1.49
12	1.39	1.42	1.66	1.66	1.56
13	1.42	1.43	1.67	1.78	1.62
14	1.43	1.63	1.67	1.99	1.65
15	1.47	1.64	1.79	2.01	1.76
16	1.77	1.65	1.83	2.14	1.91
17	1.88	1.75	1.84	2.14	2.16
18	1.96	1.78	1.89	2.36	2.23
19	2.26	2.02	1.89	2.38	2.28
20	2.37	2.35	2.43	2.71	2.32
21	2.45	2.38	2.5	3.2	2.39
low outlier = C_{low} =	0.2711	0.3428	0.2746	0.2724	0.1976
Results less than C?	Yes	Yes	Yes	Yes	Yes
high outlier = C_{high} =	0.1357	0.2791	0.3836	0.3814	0.0757
Results less than C?	Yes	Yes	Yes	Yes	Yes

Dixon's test identified no observations as statistical outliers.

Notes for Table B1.39:

1. Number of observations = $n = 42$
2. Significance level = $\alpha = 0.01$
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.39. Uranium-234 Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.552	i1	0.3917	x42 - x1	2.648	1.0372216
2	0.605	i2	0.2701	x41 - x2	2.105	0.5685605
3	0.693	i3	0.2345	x40 - x3	1.697	0.3979465
4	0.723	i4	0.2085	x39 - x4	1.657	0.3454845
5	0.936	i5	0.1874	x38 - x5	1.424	0.2668576
6	1.03	i6	0.1694	x37 - x6	1.290	0.218526
7	1.05	i7	0.1535	x36 - x7	1.230	0.188805
8	1.12	i8	0.1392	x35 - x8	1.110	0.154512
9	1.14	i9	0.1259	x34 - x9	1.020	0.128418
10	1.17	i10	0.1136	x33 - x10	0.970	0.110192
11	1.18	i11	0.1020	x32 - x11	0.960	0.09792
12	1.19	i12	0.0909	x31 - x12	0.820	0.074538
13	1.28	i13	0.0804	x30 - x13	0.710	0.057084
14	1.28	i14	0.0701	x29 - x14	0.630	0.044163
15	1.37	i15	0.0602	x28 - x15	0.410	0.024682
16	1.37	i16	0.0506	x27 - x16	0.390	0.019734
17	1.4	i17	0.0411	x26 - x17	0.260	0.010686
18	1.42	i18	0.0318	x25 - x18	0.230	0.007314
19	1.45	i19	0.0227	x24 - x19	0.170	0.003859
20	1.46	i20	0.0136	x23 - x20	0.100	0.00136
21	1.49	i21	0.0045	x22 - x21	0.020	9E-05
22	1.51				b =	3.7579537
23	1.56					
24	1.62					
25	1.65					
26	1.66					
27	1.76					
28	1.78					
29	1.91					
30	1.99					
31	2.01					
32	2.14					
33	2.14					
34	2.16					
35	2.23					
36	2.28					
37	2.32					
38	2.36					
39	2.38					
40	2.39					
41	2.71					
42	3.2					
mean =		1.611				
standard deviation =		0.595				

SS =	14.518966	sum of the squares of the concentrations
b =	3.7579537	sum of the i * differences column
W = b ² / SS =	0.9727	Normal Distribution
W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1-39 is 0.9727. Because 0.9727 is greater than the critical value of 0.922, normality is confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 3.2.

Table B1.40 shows the data used to plot the comparison of the compliance wells to the PL. All less than values shown in Table B1.37 have been changed to the value without the less than symbol in Table B1.40.

Table B1.40. Uranium-234 Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/15/2019		2.38		3.2
1/16/2019	1.43		1.89	3.2
7/22/2019	1.77	2.02	1.67	3.2
1/14/2020	1.39	1.35	1.31	3.2
7/14/2020	1.88	1.65	1.84	3.2
1/12/2021	1.28	1.26	1.4	3.2
4/29/2021	1.37	1.42	1.67	3.2
7/14/2021	2.45	1.75	1.79	3.2
11/29/2021	1.96	1.43	1.19	3.2
1/6/2022	1.08	1.09	0.91	3.2
5/11/2022	0.6	0.605	0.539	3.2
7/11/2022	2.37	1.64	1.83	3.2
11/7/2022	1.05	1.34	1.52	3.2
1/4/2023	1.42	1.4	1.56	3.2
7/11/2023	1.18	1.33		3.2
7/12/2023			1.61	3.2
1/3/2024	2.26	2.35	2.5	3.2
7/9/2024	1.11	1.26	1.42	3.2
1/7/2025	1.29	1.11	1.89	3.2
5/29/2025	1.33	1.63	2.43	3.2
7/9/2025	1.37	1.27	1.39	3.2
10/21/2025	0.632	0.71	0.593	3.2
1/5/2026	1.47	1.78	1.66	3.2

Figure B1.10 shows the chart for Table B1.40 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

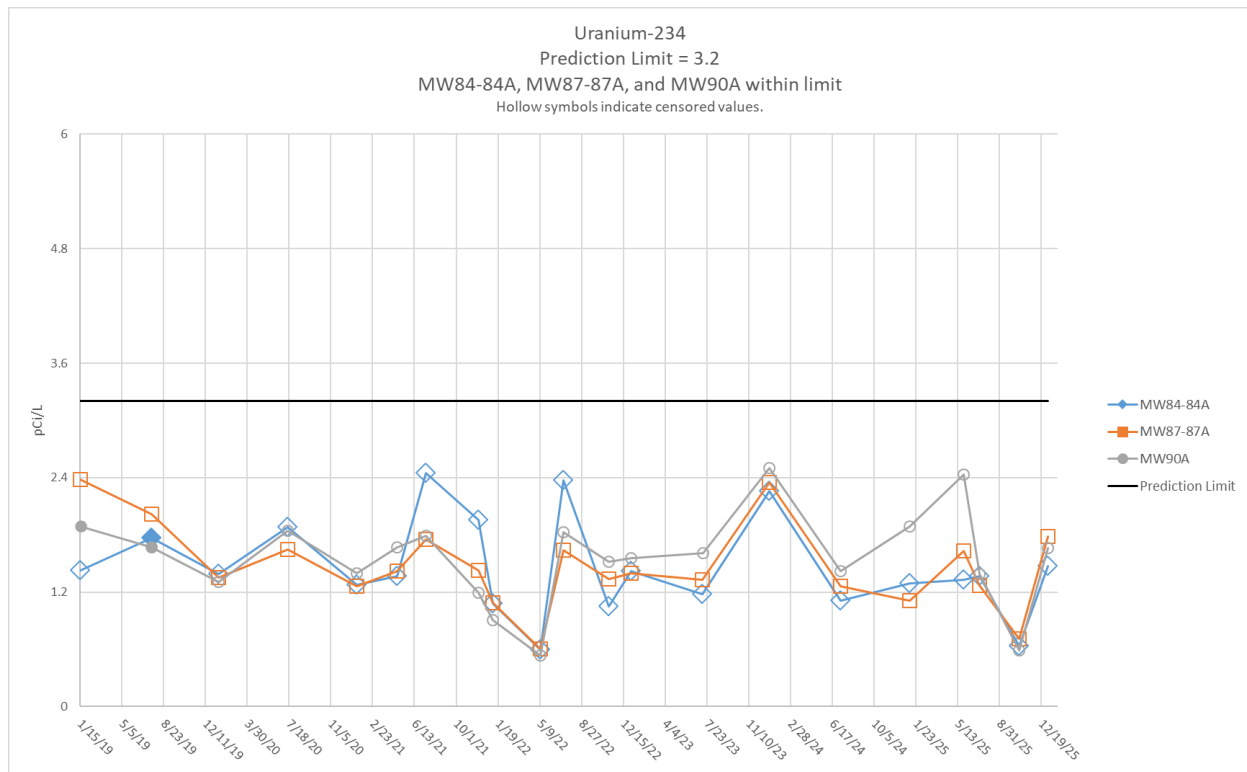


Figure B1.10. Uranium-234 PL Chart

URANIUM-235 DATASET

Table B1.41 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.41 have been changed to less than the detection limit value.

Table B1.41. Uranium-235 Dataset Information

Uranium-235 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A Xi	MW87-87A Xi	MW90A Xi	MW93-93A Xi	MW420 Xi
1	1/15/2019		< 1.63			< 1.63
2	1/16/2019	< 1.26		< 1.28	< 0.597	
3	7/22/2019	< 0.978	< 1.52	< 1.45	< 1.42	< 1.14
4	1/14/2020	< 1.05	< 0.61	< 1.28	< 1.23	< 0.995
5	7/14/2020	< 1.28	< 0.708	< 1.42	< 1.44	< 1.32
6	1/12/2021	< 1.01	< 0.99	< 1.12	< 1.06	< 0.833
7	4/29/2021	< 0.648	< 1.08	< 1.43	< 1.31	< 1.37
8	7/14/2021	< 1.7	< 1.55	< 0.702	< 0.719	< 1.13

Table B1.41. Uranium-235 Dataset Information (Continued)

Uranium-235 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
9	11/29/2021	< 1.45	< 1.07	< 0.981	< 1.7	< 1.04
10	1/6/2022	< 0.436	< 0.52	< 0.442	< 2.06	< 0.435
11	5/11/2022	< 0.369	< 0.409	< 0.25	< 0.224	< 0.43
12	7/11/2022	< 1.36	< 1.34	< 1.74	< 0.833	< 1.98
13	11/7/2022	< 0.561	< 1.31	< 0.771	< 1.07	< 0.998
14	1/4/2023	< 1.14	< 0.702	< 0.752	< 0.527	< 0.756
15	7/11/2023	< 0.914	< 1.13		< 1.09	< 1.05
16	7/12/2023			< 0.824		
17	1/3/2024	< 2.03	< 1.36	< 3.11	< 2.73	< 2.07
18	7/9/2024	< 1.29	< 0.998	< 0.993	< 2.27	< 1.97
19	1/7/2025	< 1.17	< 0.896	< 1.28	< 1.35	< 0.865
20	5/29/2025	< 0.556	< 0.797	< 0.677	< 0.667	< 0.704
21	7/9/2025	< 0.685	< 0.842	< 0.929	< 1.02	< 1.01
22	10/21/2025	< 0.758	< 0.38	< 0.633	< 0.426	< 0.65
23	1/5/2026	< 1.28	< 1.28	< 0.961	< 0.812	< 1.19
n = number of background samples =					42	
Background nondetects =					42	
Percentage of background nondetects =					100	

Dixon's outlier and Shapiro-Wilk test of normality tests are shown in Tables B1.42 and B1.43. These tables include decimal places not shown when rounding.

Notes for Table B1.42:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.42. Uranium-235 Dixon's Outlier Test

Rank	MW84-84A x_i	MW87-87A x_i	MW90A x_i	MW93-93A x_i	MW420 x_i
1	0.369	0.38	0.25	0.224	0.43
2	0.436	0.409	0.442	0.426	0.435
3	0.556	0.52	0.633	0.527	0.65
4	0.561	0.61	0.677	0.597	0.704
5	0.648	0.702	0.702	0.667	0.756
6	0.685	0.708	0.752	0.719	0.833
7	0.758	0.797	0.771	0.812	0.865
8	0.914	0.842	0.824	0.833	0.995

Table B1.42. Uranium-235 Dixon's Outlier Test (Continued)

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
9	0.978	0.896	0.929	1.02	0.998
10	1.01	0.99	0.961	1.06	1.01
11	1.05	0.998	0.981	1.07	1.04
12	1.14	1.07	0.993	1.09	1.05
13	1.17	1.08	1.12	1.23	1.13
14	1.26	1.13	1.28	1.31	1.14
15	1.28	1.28	1.28	1.35	1.19
16	1.28	1.31	1.28	1.42	1.32
17	1.29	1.34	1.42	1.44	1.37
18	1.36	1.36	1.43	1.7	1.63
19	1.45	1.52	1.45	2.06	1.97
20	1.7	1.55	1.74	2.27	1.98
21	2.03	1.63	3.11	2.73	2.07
low outlier = C _{low} =	0.1730	0.1228	0.3192	0.1650	0.1429
Results less than C?	Yes	Yes	Yes	Yes	Yes
high outlier = C _{high} =	0.3935	0.0991	0.6702	0.3041	0.0704
Results less than C?	Yes	Yes	No	Yes	Yes

Dixon's test identified observations in MW90A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Notes for Table B1.43:

1. Number of observations = n = 42
2. Significance level = α = 0.01
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the i * Differences column = b
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = $W_{critical}$ and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{critical}$ then distribution is normal.

Table B1.43. Uranium-235 Shapiro-Wilk Test of Normality

Rank	Concentration	
1	0.224	
2	0.426	
3	0.43	
4	0.435	
5	0.527	
6	0.597	
7	0.65	
8	0.667	
9	0.704	
10	0.719	
11	0.756	
12	0.812	
13	0.833	
14	0.833	
15	0.865	
16	0.995	
17	0.998	
18	1.01	
19	1.02	
20	1.04	
21	1.05	
22	1.06	
23	1.07	
24	1.09	
25	1.13	
26	1.14	
27	1.19	
28	1.23	
29	1.31	
30	1.32	
31	1.35	
32	1.37	
33	1.42	
34	1.44	
35	1.63	
36	1.7	
37	1.97	
38	1.98	
39	2.06	
40	2.07	
41	2.27	
42	2.73	
mean =		1.146
standard deviation =		0.547

Shapiro-Wilk Coefficients	
i1	0.3917
i2	0.2701
i3	0.2345
i4	0.2085
i5	0.1874
i6	0.1694
i7	0.1535
i8	0.1392
i9	0.1259
i10	0.1136
i11	0.1020
i12	0.0909
i13	0.0804
i14	0.0701
i15	0.0602
i16	0.0506
i17	0.0411
i18	0.0318
i19	0.0227
i20	0.0136
i21	0.0045

x42 - x1
 x41 - x2
 x40 - x3
 x39 - x4
 x38 - x5
 x37 - x6
 x36 - x7
 x35 - x8
 x34 - x9
 x33 - x10
 x32 - x11
 x31 - x12
 x30 - x13
 x29 - x14
 x28 - x15
 x27 - x16
 x26 - x17
 x25 - x18
 x24 - x19
 x23 - x20
 x22 - x21

Difference	i*Differences
2.506	0.9816002
1.844	0.4980644
1.640	0.38458
1.625	0.3388125
1.453	0.2722922
1.373	0.2325862
1.050	0.161175
0.963	0.1340496
0.736	0.0926624
0.701	0.0796336
0.614	0.062628
0.538	0.0489042
0.487	0.0391548
0.477	0.0334377
0.365	0.021973
0.195	0.009867
0.142	0.0058362
0.120	0.003816
0.070	0.001589
0.030	0.000408
0.010	0.000045
b =	3.403115

SS =	12.27583
b =	3.403115
W = b ² / SS =	0.9434
W _{critical} =	0.922

sum of the squares of the concentrations
sum of the i * differences column
Normal Distribution
Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.43 is 0.9434. Because 0.9434 is greater than the critical value of 0.922, normality is confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 2.73.

Table B1.44 shows the data used to plot the comparison of the compliance wells to the PL. All less than values shown in Table B1.42 have been changed to the value without the less than symbol in Table B1.44.

Table B1.44. Uranium-235 Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/15/2019		1.63		2.73
1/16/2019	1.26		1.28	2.73
7/22/2019	0.978	1.52	1.45	2.73
1/14/2020	1.05	0.61	1.28	2.73
7/14/2020	1.28	0.708	1.42	2.73
1/12/2021	1.01	0.99	1.12	2.73
4/29/2021	0.648	1.08	1.43	2.73
7/14/2021	1.7	1.55	0.702	2.73
11/29/2021	1.45	1.07	0.981	2.73
1/6/2022	0.436	0.52	0.442	2.73
5/11/2022	0.369	0.409	0.25	2.73
7/11/2022	1.36	1.34	1.74	2.73
11/7/2022	0.561	1.31	0.771	2.73
1/4/2023	1.14	0.702	0.752	2.73
7/11/2023	0.914	1.13		2.73
7/12/2023			0.824	2.73
1/3/2024	2.03	1.36	3.11	2.73
7/9/2024	1.29	0.998	0.993	2.73
1/7/2025	1.17	0.896	1.28	2.73
5/29/2025	0.556	0.797	0.677	2.73
7/9/2025	0.685	0.842	0.929	2.73
10/21/2025	0.758	0.38	0.633	2.73
1/5/2026	1.28	1.28	0.961	2.73

Figure B1.11 shows the chart for Table B1.44 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

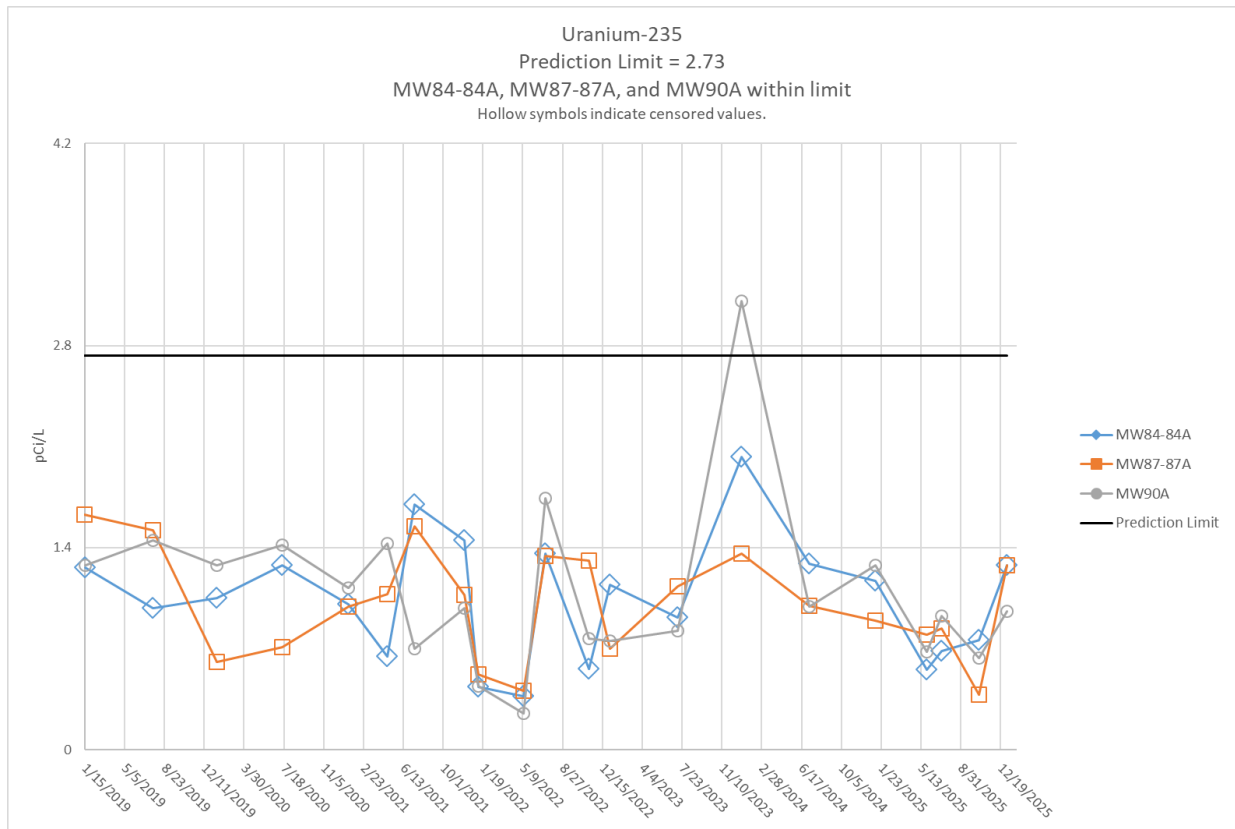


Figure B1.11. Uranium-235 PL Chart

URANIUM-238 DATASET

Table B1.45 shows the dataset information, number of background samples, number of background nondetects, percentage of background nondetects, and includes decimal places not shown when rounding. Nondetect results shown in Table B1.45 have been changed to less than the detection limit value.

Table B1.45. Uranium-238 Dataset Information

Uranium-238 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		X_i	X_i	X_i	X_i	X_i
1	1/15/2019		< 2.3			< 1.68
2	1/16/2019	< 1.78		< 1.52	< 1.06	
3	7/22/2019	1.12	< 1.64	2.31	< 1.04	< 1.35
4	1/14/2020	< 1.17	< 1.15	< 0.894	< 1.27	< 1.02
5	7/14/2020	< 1.47	< 1.34	< 1.54	< 1.41	< 1.17
6	1/12/2021	< 1.6	< 0.801	< 1.15	< 0.988	< 0.858
7	4/29/2021	< 1.07	< 0.873	< 1.16	< 1.85	< 1.32
8	7/14/2021	< 2.17	< 1.65	< 1.16	< 1.5	< 1.33
9	11/29/2021	< 1.02	< 1.24	< 1.05	< 1.68	< 0.658
10	1/6/2022	< 0.774	< 0.421	< 0.66	< 2.02	< 0.716
11	5/11/2022	< 0.38	< 0.463	< 0.544	< 0.368	< 0.563

Table B1.45. Uranium-238 Dataset Information (Continued)

Uranium-238 (pCi/L)		Compliance	Compliance	Compliance	Background	Background
Number	Date	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
		X_i	X_i	X_i	X_i	X_i
12	7/11/2022	< 1.52	< 0.588	< 1.73	< 0.779	< 1.26
13	11/7/2022	< 0.453	< 0.915	< 1.27	< 1.11	< 0.808
14	1/4/2023	< 0.579	< 0.908	< 0.973	< 0.426	< 0.977
15	7/11/2023	< 0.854	< 1.05		< 0.885	< 0.851
16	7/12/2023			< 1.23		
17	1/3/2024	< 1.6	< 1.57	< 1.76	< 3.15	< 1.68
18	7/9/2024	< 0.875	< 1.02	< 1.1	< 1.59	< 1.25
19	1/7/2025	< 0.749	< 0.393	< 1.44	< 1.91	< 0.886
20	5/29/2025	< 0.915	< 1.03	< 1.28	< 0.539	< 1.47
21	7/9/2025	< 1.22	< 0.968	< 1.07	< 0.745	< 0.821
22	10/21/2025	< 0.767	< 0.445	< 0.558	< 0.638	< 0.573
23	1/5/2026	< 0.99	< 1.03	< 1.33	< 1.15	< 0.965
n = number of background samples =					42	
Background nondetects =					42	
Percentage of background nondetects =					100	

Dixon's outlier and Shapiro-Wilk test of normality are shown in Tables B1.46 and B1.47. These tables include decimal places not shown when rounding.

Notes for Table B1.46:

1. Number of observations = $n = 21$
2. Significance level = $\alpha = 0.05$
3. Critical point = $C = 0.440$ from Unified Guidance Appendix D, Table 12-1
4. low outlier = $C_{\text{low}} = (x_{(3)} - x_{(1)}) / (x_{(n-2)} - x_{(1)})$ from Unified Guidance equation 12.5
5. high outlier = $C_{\text{high}} = (x_{(n)} - x_{(n-2)}) / (x_{(n)} - x_{(3)})$ from Unified Guidance equation 12-6
6. If C_{low} or C_{high} is **not less than** C , which is the critical point, then this indicates there is a potential outlier in the dataset.

Table B1.46. Uranium-238 Dixon's Outlier Test

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
1	0.38	0.393	0.544	0.368	0.563
2	0.453	0.421	0.558	0.426	0.573
3	0.579	0.445	0.66	0.539	0.658
4	0.749	0.463	0.894	0.638	0.716
5	0.767	0.588	0.973	0.745	0.808
6	0.774	0.801	1.05	0.779	0.821
7	0.854	0.873	1.07	0.885	0.851
8	0.875	0.908	1.1	0.988	0.858
9	0.915	0.915	1.15	1.04	0.886
10	0.99	0.968	1.16	1.06	0.965
11	1.02	1.02	1.16	1.11	0.977
12	1.07	1.03	1.23	1.15	1.02
13	1.12	1.03	1.27	1.27	1.17
14	1.17	1.05	1.28	1.41	1.25
15	1.22	1.15	1.33	1.5	1.26
16	1.47	1.24	1.44	1.59	1.32

Table B1.46. Uranium-238 Dixon's Outlier Test (Continued)

Rank	MW84-84A	MW87-87A	MW90A	MW93-93A	MW420
	X_i	X_i	X_i	X_i	X_i
17	1.52	1.34	1.52	1.68	1.33
18	1.6	1.57	1.54	1.85	1.35
19	1.6	1.64	1.73	1.91	1.47
20	1.78	1.65	1.76	2.02	1.68
21	2.17	2.3	2.31	3.15	1.68
low outlier = C _{low} =	0.1631	0.0417	0.0978	0.1109	0.1047
Results less than C?	Yes	Yes	Yes	Yes	Yes
high outlier = C _{high} =	0.3583	0.3558	0.3515	0.4749	0.2055
Results less than C?	Yes	Yes	Yes	No	Yes

Dixon's test identified observations in MW93-93A as statistical outliers. The Unified Guidance states that the measurements should not be treated as such until a specific physical reason for the abnormal values can be determined. Because a specific physical reason for the abnormal values has not been determined, no outliers were excluded from the dataset.

Notes for Table B1.47:

1. Number of observations = $n = 42$
2. Significance level = $\alpha = 0.01$
3. Shapiro-Wilk coefficients = i and are from Unified Guidance Appendix D, Table 10-2
4. Concentration = x and is ranked from lowest to highest
5. Difference = $x_{42} - x_1, x_{41} - x_2, \dots, x_{22} - x_{21}$
6. Sum of the $i * \text{Differences column} = b$
7. Sum of the squares of the concentrations = SS
8. Calculated Shapiro-Wilk = W
9. Critical Shapiro-Wilk = W_{critical} and is from Unified Guidance Appendix D, Table 10-3
10. If the calculated $W > W_{\text{critical}}$ then distribution is normal.

Table B1.47. Uranium-238 Shapiro-Wilk Test of Normality

Rank	Concentration	Shapiro-Wilk Coefficients			Difference	i*Differences
1	0.368	i1	0.3917	x42 - x1	2.782	1.0897094
2	0.426	i2	0.2701	x41 - x2	1.594	0.4305394
3	0.539	i3	0.2345	x40 - x3	1.371	0.3214995
4	0.563	i4	0.2085	x39 - x4	1.287	0.2683395
5	0.573	i5	0.1874	x38 - x5	1.107	0.2074518
6	0.638	i6	0.1694	x37 - x6	1.042	0.1765148
7	0.658	i7	0.1535	x36 - x7	1.022	0.156877
8	0.716	i8	0.1392	x35 - x8	0.874	0.1216608
9	0.745	i9	0.1259	x34 - x9	0.755	0.0950545
10	0.779	i10	0.1136	x33 - x10	0.691	0.0784976
11	0.808	i11	0.1020	x32 - x11	0.602	0.061404
12	0.821	i12	0.0909	x31 - x12	0.529	0.0480861
13	0.851	i13	0.0804	x30 - x13	0.479	0.0385116
14	0.858	i14	0.0701	x29 - x14	0.462	0.0323862
15	0.885	i15	0.0602	x28 - x15	0.385	0.023177
16	0.886	i16	0.0506	x27 - x16	0.374	0.0189244
17	0.965	i17	0.0411	x26 - x17	0.285	0.0117135
18	0.977	i18	0.0318	x25 - x18	0.193	0.0061374
19	0.988	i19	0.0227	x24 - x19	0.162	0.0036774
20	1.02	i20	0.0136	x23 - x20	0.090	0.001224
21	1.04	i21	0.0045	x22 - x21	0.020	9E-05
22	1.06				b =	3.1914759
23	1.11					
24	1.15					
25	1.17					
26	1.25					
27	1.26					
28	1.27					
29	1.32					
30	1.33					
31	1.35					
32	1.41					
33	1.47					
34	1.5					
35	1.59					
36	1.68					
37	1.68					
38	1.68					
39	1.85					
40	1.91					
41	2.02					
42	3.15					
mean =		1.150				
standard deviation =		0.521				

SS =	11.141133	sum of the squares of the concentrations
b =	3.1914759	sum of the i * differences column
W = b ² / SS =	0.9142	Distribution not normal
W _{critical} =	0.922	Unified Guidance Appendix D Table 10-3

The Shapiro-Wilk test of normality value shown in Table B1.47 is 0.9142. Because 0.9142 is less than the critical value of 0.922, normality is not confirmed. Because the percentage of background nondetects is > 50%, the permit states a nonparametric test is conducted and the PL is equal to the highest background value which is 3.15.

Table B1.48 shows the data used to plot the comparison of the compliance wells to the PL. All less than values shown in Table B1.45 have been changed to the value without the less than symbol in Table B1.48.

Table B1.48. Uranium-238 Compliance Well Sample Dataset Comparison to PL

Date	MW84-84A	MW87-87A	MW90A	Prediction Limit
1/15/2019		2.3		3.15
1/16/2019	1.78		1.52	3.15
7/22/2019	1.12	1.64	2.31	3.15
1/14/2020	1.17	1.15	0.894	3.15
7/14/2020	1.47	1.34	1.54	3.15
1/12/2021	1.6	0.801	1.15	3.15
4/29/2021	1.07	0.873	1.16	3.15
7/14/2021	2.17	1.65	1.16	3.15
11/29/2021	1.02	1.24	1.05	3.15
1/6/2022	0.774	0.421	0.66	3.15
5/11/2022	0.38	0.463	0.544	3.15
7/11/2022	1.52	0.588	1.73	3.15
11/7/2022	0.453	0.915	1.27	3.15
1/4/2023	0.579	0.908	0.973	3.15
7/11/2023	0.854	1.05		3.15
7/12/2023			1.23	3.15
1/3/2024	1.6	1.57	1.76	3.15
7/9/2024	0.875	1.02	1.1	3.15
1/7/2025	0.749	0.393	1.44	3.15
5/29/2025	0.915	1.03	1.28	3.15
7/9/2025	1.22	0.968	1.07	3.15
10/21/2025	0.767	0.445	0.558	3.15
1/5/2026	0.99	1.03	1.33	3.15

Figure B1.12 shows the chart for Table B1.48 and indicates MW84-84A, MW87-87A, and MW90A are within the PL.

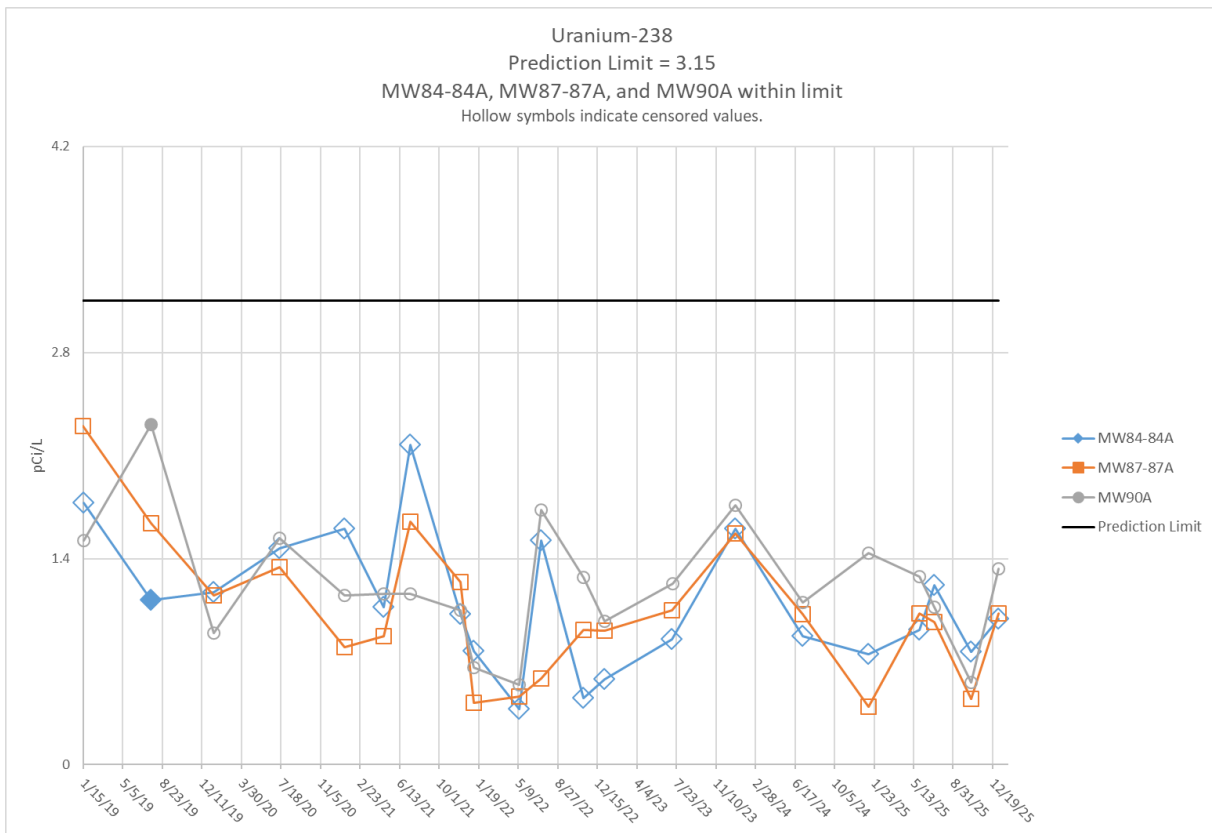


Figure B1.12. Uranium-238 PL Chart

SUMMARY OF RESULTS

Table B1.49 shows a summary of results for the percentage of background nondetects, the PL and compliance well comparison to the PL for each constituent and includes decimal places not shown when rounding.

Table B1.49. Summary

Constituent	Percentage of background nondetects	Prediction Limit	Compliance Well comparison to Prediction Limit
Arsenic	9.52	1.70E-02	MW84-84A exceeded PL
Cadmium	95.24	1.00E-03	Within PL
Chromium	71.43	4.28E-01	Within PL
Lead	83.33	2.13E-03	Within PL
Mercury	100	2.00E-04	Within PL
Selenium	97.62	5.00E-03	Within PL
Technetium-99	95.24	2.69E+01	MW84-84A and MW90A exceeded PL
Trichloroethene	0	2.94E+03	MW84-84A exceeded PL
Uranium	73.81	5.60E-04	Within PL
Uranium-234	97.62	3.20E+00	Within PL
Uranium-235	100	2.73E+00	Within PL
Uranium-238	100	3.15E+00	Within PL

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ATTACHMENT B2
STATISTICIAN'S STATEMENT

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May 13, 2026

Ms. Katrina Hall
Four Rivers Nuclear Partnership, LLC
5511 Hobbs Road
Kevil, KY 42053

Dear Ms. Hall:

I am submitting this statement as a supplementary document to the completed statistical analysis I performed on the groundwater data for the C-404 Hazardous Waste Landfill at the Paducah Site.

As an Environmental Scientist, with a bachelor's degree in Earth Sciences/Geology, I have over 30 years of experience in reviewing and assessing laboratory analytical results associated with environmental sampling and investigation activities.

For this project, the statistical analyses on groundwater data from January 2016 through January 2026 were performed in accordance with the Appendix E of the *Hazardous Waste Management Facility Permit, reissued by the Kentucky Division of Waste Management* in November 2025. The Statistical approach was to determine Prediction Limits, without a retesting strategy.

The statistical analyses procedures were based on U.S. Environmental Protection Agency guidance document, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*, now referred to as Unified Guidance (EPA 2009).

Sincerely,



Bryan Smith

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