

Annual Groundwater Monitoring Report

Southwestern Electric Power Company
H. W. Pirkey Power Plant
FGD Stackout Area CCR Management Unit
CN600126767; RN100214287
Registration No: CCR104
Hallsville, Texas

January 31, 2024

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Abbreviations:

- ASD - Alternate Source Demonstration
- CCR – Coal Combustion Residual
- GWPS - Groundwater protection standards
- SSI - Statistically Significant Increase
- SSL - Statistically Significant Level
- TCEQ – Texas Commission on Environmental Quality

I. Summary

This *Annual Groundwater Monitoring Report* (Report) has been prepared to report the status of activities for the preceding year at the FGD Stackout Area (FGDSA) Coal Combustion Residual (CCR) unit at Pirkey Power Plant. Southwestern Electric Power Company is wholly-owned subsidiary of American Electric Power Company (AEP). The Texas Commission on Environmental Quality's (TCEQ's) CCR rules require that the Annual Groundwater Monitoring Report be posted to the operating record for the preceding year no later than January 31, 2024.

In general, the following activities were completed:

- At the start of the current annual reporting period, the FGDSA was operating under the Assessment monitoring program.
- At the end of the current annual reporting period, the FGDSA was operating under the Assessment monitoring program.
- The FGDSA initiated an assessment monitoring program on April 3, 2018.
- Groundwater samples were collected for AD-7, AD-7R, AD-12, AD-13, AD-22, and AD-33 in February, June, and October 2023 analyzed for 30 TAC §352 Appendix III and Appendix IV constituents, as specified in 30 TAC §352.951 *et seq.* and AEP's *Groundwater Sampling and Analysis Plan (2021)*;
- Groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units;
- Data and statistical analysis not available for the previous reporting period indicates that during the 2nd semi-annual 2022 sampling event (November 2022):

The following Appendix IV parameters exceeded established groundwater protection standards (GWPS):

- Cobalt at AD-22
- Beryllium at AD-22
- Mercury at AD-33

The following Appendix III parameters exceeded background:

- Boron at AD-7 and AD-33
 - Chloride at AD-7 and AD-22
 - Sulfate at AD-22
- A successful ASD for the 2nd semi-annual 2022 potential SSLs cobalt, beryllium, and mercury was certified on June 27, 2023 and submitted to TCEQ June 27, 2023 for approval.

- During the 1st semi-annual sampling event held in June 2023:

The following Appendix IV parameters exceeded established GWPS:

- Cobalt at AD-22
- Beryllium at AD-7 and AD-22
- Mercury at AD-33

The following Appendix III parameters exceeded background:

- Boron at AD-7 and AD-33
- Chloride at AD-22
- Sulfate at AD-22

- A successful ASD for 1st semi-annual 2023 potential SSLs for cobalt, beryllium, and mercury was certified January 12, 2024 and submitted to TCEQ January 24, 2024 for approval.
- During the 2nd semi-annual sampling event held in October 2023:

The following Appendix IV parameters exceeded established GWPS:

- Cobalt at AD-22
- Beryllium at AD-22
- Mercury at AD-33

The following Appendix III parameters exceeded background:

- Boron at AD-7R and AD-33
- Chloride at AD-22
- pH at AD-7R
- Sulfate at AD-22

- Pirkey Power Plant intends to submit an alternative source demonstration for the 2nd semi-annual 2023 potential SSLs cobalt, beryllium, and mercury.
- Because an alternate source for the SSL(s) was identified, but no alternate source for the SSI(s) was identified, FGDSA remained in Assessment Monitoring.
- A statistical process in accordance with 30 TAC §352.931 to evaluate groundwater data was updated, certified, and posted to AEP's CCR website in 2021 titled: AEP's *Statistical Analysis Plan* (Geosyntec 2021). The statistical process was guided by USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* ("Unified Guidance," USEPA, 2009).

- On September 1, 2023, FGD Stackout Area removed the last known final volume of CCR from the CCR unit for the purpose of beneficial reuse and commenced closure by removal for this CCR Unit in accordance with the certified closure plan.
- An additional 12 inches of soil was then removed, finishing in September of 2023. The last inspection for the removal was completed on September 18, 2023.

The major components of this annual report, to the extent applicable at this time, are presented in sections that follow:

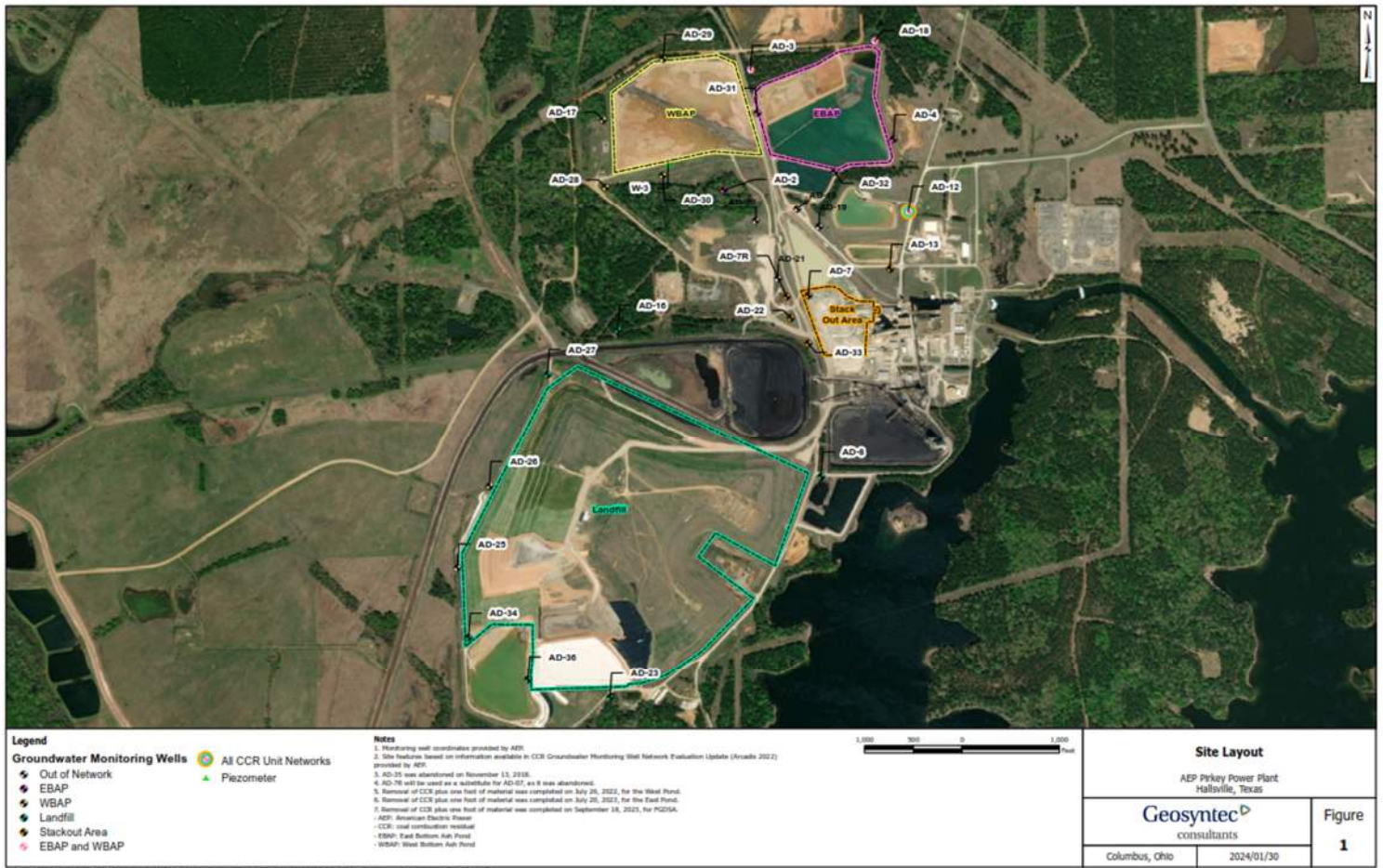
- A map, aerial photograph or a drawing showing the CCR management unit(s), all groundwater monitoring wells and monitoring well identification numbers;
- All of the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected per monitoring well, the dates the samples were collected and whether the sample was collected as part of detection monitoring or assessment monitoring programs (Attached as **Appendix 1**);
- Statistical comparison of monitoring data to determine if there have been SSI(s) or SSL(s) (Attached as **Appendix 2**);
- A discussion of whether any alternate source demonstrations were performed, and the conclusions (Attached as **Appendix 3**);
- A summary of any transition between monitoring programs, or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituents detected at a SSI over background concentrations (where applicable);
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened (Attached as **Appendix 6**);
- Other information required to be included in the annual report such as field sheets, analytical reports, etc. (Attached as **Appendix 4 and 5**)

In addition, this report summarizes key actions completed, and where applicable, describes any problems encountered and actions taken to resolve those problems. The report includes a projection of key activities for the upcoming year.

II. Groundwater Monitoring Well Locations and Identification Numbers

The figure that follows depicts the PE-certified groundwater monitoring network, the monitoring well locations and their corresponding identification numbers.

FGD Stackout Area Monitoring Wells	
Upgradient	Downgradient
AD-12	AD-7 (Plugged Sept 2023)
AD-13	AD-7R
	AD-22
	AD-33



III. Monitoring Wells Installed or Decommissioned

Pirkey Power Plant ceased operation of its coal-fired boilers on March 31, 2023. The Plant is currently being demolished, and one the designated downgradient monitoring wells (AD-7) for the

FGD Stack Out Area was decommissioned during September 2023 because it was located within the boundary (footprint) of the Stack Out Area where demolition activities are occurring.

There were no new groundwater monitoring wells installed during 2023. The network design, as summarized in the *Groundwater Monitoring Network Design Report* (May 25, 2016) and as posted at the CCR website for Pirkey Power Plant's FGDSA, was updated to include AD-7R as a replacement for AD-7. That network design report *Groundwater Monitoring Network Design Report* (December 11, 2023), viewable on the AEP CCR web site, discusses the facility location, the hydrogeological setting, the hydrostratigraphic units, the uppermost aquifer, downgradient monitoring well locations and the upgradient monitoring well locations.

IV. Groundwater Quality Data and Static Water Elevation Data, With Flow Rate and Direction and Discussion

Appendix 1 contains tables showing the groundwater quality data collected during the establishment of background quality, and during detection and assessment monitoring. Static water elevation data from each monitoring event also are shown in **Appendix 1**, along with the groundwater velocity calculations, groundwater flow direction and potentiometric maps developed after each sampling event.

The sampling event conducted February 2023 satisfies the annual screening sampling requirements of 30 TAC §352.951.

V. Groundwater Quality Data Statistical Analysis

Appendix 2 contains the statistical analysis report(s).

Data and statistical analysis not available for the previous reporting period indicates that during the 2nd semi-annual 2022 sampling event (November 2022):

The following Appendix IV parameters exceeded established groundwater protection standards (GWPS):

- Cobalt at AD-22
- Beryllium at AD-22
- Mercury at AD-33

The following Appendix III parameters exceeded background:

- Boron at AD-33 and AD-7
- Chloride at AD-7 and AD-22
- Sulfate at AD-22

During the 1st semi-annual sampling event held in June 2023:

The following Appendix IV parameters exceeded established GWPS:

- Cobalt at AD-22
- Beryllium at AD-7 and AD-22
- Mercury at AD-33

The following Appendix III parameters exceeded background:

- Boron at AD-7 and AD-33
- Chloride at AD-22
- Sulfate at AD-22

During the 2nd semi-annual sampling event held in October 2023:

The following Appendix IV parameters exceeded established GWPS:

- Cobalt at AD-22
- Beryllium at AD-22
- Mercury at AD-33

The following Appendix III parameters exceeded background:

- Boron at AD-7R and AD-33
- Chloride at AD-22
- pH at AD-7R
- Sulfate at AD-22

VI. Alternate Source Demonstration

A successful ASD for the 2nd semi-annual 2022 potential SSLs cobalt, beryllium, and mercury was certified on June 27, 2023 and submitted to TCEQ June 27, 2023 for approval.

A successful ASD for 1st semi-annual 2023 potential SSLs for cobalt, beryllium, and mercury was certified January 12, 2024 and submitted to TCEQ January 24, 2024 for approval.

Pirkey Power Plant intends to submit an alternative source demonstration for the 2nd semi-annual 2023 potential SSLs cobalt, beryllium, and mercury.

The successful ASDs are found in **Appendix 3**.

Because an alternate source for the SSL(s) was identified, but no alternate source for the SSI(s) was identified, FGDSA remained in Assessment Monitoring.

VII. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency

The FGDSA will remain in assessment monitoring unless all Appendix III and IV parameters are below background values for two consecutive monitoring events (return to detection monitoring) as prescribed by 30 TAC §352.951(c). If an Appendix IV parameter exceeds its respective GWPS due to a release from the FGDSA, an assessment of corrective measures will be undertaken as required by 30 TAC §352.961.

Regarding defining an alternate monitoring frequency, the groundwater velocity and monitoring well production are high enough at this facility that no modification to the semiannual assessment monitoring frequency is needed.

VIII. Other Information Required

As required by the CCR assessment monitoring rules in 30 TAC §352.951, sampling all CCR wells for the required Appendix III and IV parameters was completed in 2023.

A statistical process in accordance with 30 TAC §352.931 to evaluate groundwater data was updated, certified, and posted to AEP's CCR website in 2021 titled: AEP's *Statistical Analysis Plan* (Geosyntec 2021). The statistical process was guided by USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* ("Unified Guidance," USEPA, 2009).

Appendix 2 also contains a memorandum that explains the reissuance of select analytical laboratory reports to correct laboratory equipment data quality assurance/quality control issues.

On September 1, 2023, FGD Stackout Area removed the last known final volume of CCR from the CCR unit for the purpose of beneficial reuse and commenced closure by removal for this CCR Unit in accordance with the certified closure plan.

An additional 12 inches of soil was then removed, finishing in September of 2023. The last inspection for the removal was completed on September 18, 2023.

IX. Description of Any Problems Encountered in 2023 and Actions Taken

No significant problems were encountered. The low flow sampling effort went smoothly and the schedule was met to support the annual groundwater report preparation covering the year 2023 groundwater monitoring activities.

X. A Projection of Key Activities for the Upcoming Year

Key activities for next year will include:

- Assessment monitoring sampling will be conducted.
- Conduct the annual groundwater sampling event for all constituents listed in 30 TAC §352 Appendix III and IV as required by 30 TAC §352.951.

- Perform statistical analysis on the sampling results for the 30 TAC §352 Appendix III and Appendix IV parameters as required by 30 TAC §352.951.
- Determine applicable GWPSs for the 30 TAC §352 Appendix IV parameters and compare the calculated confidence limits for the Appendix IV constituents to the GWPSs.
- If no GWPSs are exceeded, the FGDSA will remain in assessment monitoring.
- If any SSL are identified, then an alternate source demonstration will be completed.
- Responding to any new data received in light of TCEQ CCR rule requirements.
- Preparation of the next annual groundwater report until TCEQ's Executive Director issues a closure certification.

APPENDIX 1- Groundwater Data Tables and Figures

Figures and Tables follow, showing the groundwater monitoring data collected, the rate and direction of groundwater flow, and a summary showing the number of samples collected per monitoring well. The dates that the samples were collected also is shown.

**Table 1. Groundwater Data Summary: AD-7
Pirkey - Stackout
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/11/2016	Background	2.39	6.58	28	0.6493 J1	4.0	92	302
7/13/2016	Background	0.716	2.97	16	< 0.083 U1	3.6	40	204
9/7/2016	Background	0.978	3.15	18	< 0.083 U1	4.1	42	208
10/13/2016	Background	0.67	2.81	17	< 0.083 U1	3.8	38	212
11/14/2016	Background	0.682	2.63	16	< 0.083 U1	4.0	38	216
1/11/2017	Background	1.39	3.92	19	< 0.083 U1	3.5	46	204
2/28/2017	Background	1.51	4.78	20	< 0.083 U1	3.7	46	240
4/10/2017	Background	3.24	5.06	28	0.4117 J1	3.6	65	322
8/24/2017	Detection	0.943	2.99	18	2.994	3.7	51	176
12/21/2017	Detection	0.718	3.26	19	< 0.083 U1	--	39	176
3/21/2018	Assessment	2.47	5.37	20	< 0.083 U1	3.6	90	266
8/20/2018	Assessment	1.36	3.76	33	< 0.083 U1	4.3	54	180
2/27/2019	Assessment	2.10	5.20	29.9	0.50	2.9	69.1	268
5/22/2019	Assessment	0.195	5.77	28.0	0.58	3.4	91.6	334
8/12/2019	Assessment	3.54	4.20	36.7	0.30	4.0	59.6	266
3/10/2020	Assessment	1.99	4.86	28.7	0.57	3.5	88.5	254
6/2/2020	Assessment	1.93	4.98	29.1	0.58	3.3	74.4	303
11/3/2020	Assessment	4.19	4.10	38.2	0.27	3.3	60.2	236
3/9/2021	Assessment	2.12	4.54	29.3	0.55	3.6	71.5	283
5/25/2021	Assessment	1.84	4.4	28.4	0.54	3.2	64.6	250
11/16/2021	Assessment	2.24	4.56	33.6	0.44	3.1	62.6	260
3/28/2022	Assessment	3.78	4.33	40.8	0.36	3.6	49.9	230 L1
6/21/2022	Assessment	6.13	5.4	53.1	0.30	3.5	71.1	290
11/16/2022	Assessment	9.38	5.20	69.7	0.23	3.6	60.5	300
2/28/2023	Assessment	1.90	5.06	30.9	0.53	3.6	77.5	270
6/27/2023	Assessment	2.02	5.73	31.2	0.40	3.8	74.6	290

Table 1. Groundwater Data Summary: AD-7

Pirkey - Stackout

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/11/2016	Background	< 0.93 U1	1.38216 J1	37	8	0.87394 J1	0.766043 J1	52	4.344	0.6493 J1	< 0.68 U1	0.044	0.309	< 0.29 U1	1.04661 J1	< 0.86 U1
7/13/2016	Background	< 0.93 U1	1.18444 J1	50	3	0.66774 J1	1	24	0.942	< 0.083 U1	< 0.68 U1	0.099	0.261	< 0.29 U1	< 0.99 U1	1.03212 J1
9/7/2016	Background	< 0.93 U1	< 1.05 U1	50	4	0.730872 J1	0.316008 J1	27	3.132	< 0.083 U1	< 0.68 U1	0.099	0.059	< 0.29 U1	< 0.99 U1	< 0.86 U1
10/13/2016	Background	< 0.93 U1	1.08028 J1	61	4	0.858417 J1	1	23	3.81	< 0.083 U1	< 0.68 U1	0.101	0.154	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/14/2016	Background	< 0.93 U1	< 1.05 U1	60	4	1	< 0.23 U1	22	3.538	< 0.083 U1	< 0.68 U1	0.099	0.039	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/11/2017	Background	< 0.93 U1	< 1.05 U1	58	5	0.756968 J1	< 0.23 U1	31	3.77	< 0.083 U1	< 0.68 U1	0.101	0.02275 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
2/28/2017	Background	< 0.93 U1	< 1.05 U1	53	5	0.838869 J1	< 0.23 U1	34	3.92	< 0.083 U1	< 0.68 U1	0.101	0.185	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/10/2017	Background	< 0.93 U1	< 1.05 U1	51	7	0.723565 J1	0.295188 J1	44	4.35	0.4117 J1	< 0.68 U1	0.111	0.191	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/21/2018	Assessment	< 0.93 U1	< 1.05 U1	40.31	6.81	0.82 J1	< 0.23 U1	45.34	3.99	< 0.083 U1	< 0.68 U1	0.108	0.117	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/20/2018	Assessment	0.01 J1	0.47	51.6	2.07	0.68	0.075	25.6	0.787	< 0.083 U1	0.362	0.0877	0.006 J1	< 0.02 U1	1.0	0.179
2/27/2019	Assessment	< 0.4 U1	2.12	42.9	7.01	0.73	0.225	41.0	4.75	0.50	1 J1	0.106	0.201	< 0.4 U1	7.1	< 2 U1
5/22/2019	Assessment	< 0.4 U1	2 J1	37.8	6.47	0.6 J1	< 0.8 U1	46.0	4.72	0.58	0.8 J1	0.0975	0.26	< 8 U1	3 J1	< 0.1 U1
8/12/2019	Assessment	< 0.02 U1	0.64	41.9	3.24	0.75	0.1 J1	29.7	3.278	0.30	0.529	0.102	0.09	< 0.4 U1	1.7	0.2 J1
3/10/2020	Assessment	< 0.02 U1	1.54	31.0	5.29	0.72	0.212	42.1	5.283	0.57	0.943	0.0781	0.179	< 0.4 U1	5.5	0.2 J1
6/2/2020	Assessment	< 0.02 U1	1.29	38.9	5.14	0.69	0.241	39.6	4.10	0.58	0.876	0.0720	0.349	< 0.4 U1	5.0	0.2 J1
11/3/2020	Assessment	< 0.02 U1	0.61	47.9	2.97	0.78	0.236	31.5	2.957	0.27	0.783	0.0752	0.085	< 0.4 U1	2.1	0.2 J1
3/9/2021	Assessment	< 0.02 U1	1.32	44.1	4.80	0.65	0.402	37.5	3.099	0.55	0.997	0.0684	0.341	< 0.1 U1	4.9	0.2 J1
5/25/2021	Assessment	< 0.02 U1	0.82	36.1	4.11	0.642	0.40	36.1	3.30	0.54	0.92	0.0634	0.300 J1	0.1 J1	2.91	0.23
11/16/2021	Assessment	< 0.02 U1	1.05	37.3	4.86	0.734	0.37	38.3	5.59	0.44	0.80	0.0760	0.480	< 0.1 U1	3.47	0.26
3/28/2022	Assessment	< 0.04 U1	1.08	58.8	5.59	0.998	4.78	33.6	4.59	0.36	0.8	0.0967	0.400 J1	< 0.2 U1	3.5	0.20 J1
6/21/2022	Assessment	< 0.1 U1	1.3	58.7	4.66	0.95	0.4 J1	36.4	4.82	0.30	1.0	0.113	< 0.400 U1	< 0.5 U1	2.3 J1	0.2 J1
11/16/2022	Assessment	< 0.02 U1	0.43	55.2	2.49	0.880	0.35	31.8	4.13	0.23	0.27	0.110	0.037	< 0.1 U1	1.49	0.19 J1
2/28/2023	Assessment	< 0.02 U1	1.09	44.6	5.41	0.704	0.37	41.1	4.93	0.53	0.85	0.0804	1.520	< 0.1 U1	3.46	0.20
6/27/2023	Assessment	< 0.008 U1	1.14	40.3	5.11	0.691	0.47	39.3	4.69	0.40	0.88	0.0780	1.220	< 0.1 U1	4.53	0.20

**Table 1. Groundwater Data Summary: AD-7R
Pirkey - Stackout
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/2/2020	Assessment	0.04 J1	3.97	15.6	0.18	5.1	85.6	254
11/2/2020	Assessment	0.04 J1	4.01	20.8	0.14	4.8	40.5	183
5/24/2021	Assessment	0.037 J1	4.0	15.3	0.20	4.3	81.6	240
11/15/2021	Assessment	< 0.05 U1	3.6	23.7	0.15	4.4	43.3	180
6/20/2022	Assessment	0.025 J1	2.80	24.2	0.16	4.6	44.7	200
11/15/2022	Assessment	0.022 J1	2.81	26.1	0.15	4.9	37.2	180
6/26/2023	Assessment	0.029 J1	3.38	20.0	0.10	4.9	60.7	220
10/17/2023	Assessment	0.089	2.70	24.1	0.16	5.6	39.9	190

**Table 1. Groundwater Data Summary: AD-7R
Pirkey - Stackout
Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/2/2020	Assessment	0.05 J1	1.95	34.0	1.71	0.23	1.37	18.8	0.939	0.18	0.308	0.0722	0.012	< 0.4 U1	0.5	< 0.1 U1
11/2/2020	Assessment	0.02 J1	0.37	72.8	2.11	0.34	0.200	20.0	3.114	0.14	< 0.05 U1	0.0563	0.025	< 0.4 U1	0.4	< 0.1 U1
5/24/2021	Assessment	< 0.02 U1	0.63	42.2	1.73 M1	0.217	0.29	21.3	3.83	0.20	< 0.05 U1	0.0635 M1	0.002 J1	< 0.1 U1	0.22 J1	0.10 J1
11/15/2021	Assessment	< 0.1 U1	1.4	65.4	2.35	0.34	0.4 J1	18.5	2.70	0.15	< 0.3 U1	0.0547	0.182	< 0.5 U1	1 J1	< 0.2 U1
6/20/2022	Assessment	0.03 J1	2.59	61.4	2.28	0.393	2.92	17.8	3.41	0.16	0.68	0.0437	0.042	0.1 J1	1.36	0.14 J1
11/15/2022	Assessment	< 0.02 U1	0.72	67.2	1.77	0.378	0.39	16.3	3.19	0.15	0.25	0.0424	0.011	< 0.1 U1	2.15	0.14 J1
6/26/2023	Assessment	0.009 J1	0.53	36.8	1.05	0.213	0.36	19.3	1.83	0.10	0.07 J1	0.0558	0.039	< 0.1 U1	0.68	0.13 J1
10/17/2023	Assessment	0.009 J1	1.22	64.2	1.64	0.324	0.64	14.2	3.25	0.16	0.22	0.0402	0.041	< 0.1 U1	2.90	0.14 J1

**Table 1. Groundwater Data Summary: AD-12
Pirkey - Stackout
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/11/2016	Background	0.03	0.362	5	< 0.083 U1	4.4	4	94
7/13/2016	Background	0.03	0.26	6	< 0.083 U1	3.1	4	75
9/7/2016	Background	0.04	0.343	6	< 0.083 U1	3.9	7	63
10/12/2016	Background	0.03	0.271	7	1	3.4	8	92
11/14/2016	Background	0.04	0.331	8	< 0.083 U1	2.6	6	80
1/11/2017	Background	0.03	0.315	7	< 0.083 U1	4.8	6	76
2/28/2017	Background	0.04	0.434	5	< 0.083 U1	3.6	4	50
4/11/2017	Background	0.05	0.299	6	0.2565 J1	4.7	7	72
8/23/2017	Detection	0.0495	0.245	6	0.213 J1	4.8	6	52
3/21/2018	Assessment	0.01397	0.269	5	< 0.083 U1	4.2	3	< 2 U1
8/20/2018	Assessment	0.017	0.338	10	< 0.083 U1	4.4	4	94
2/27/2019	Assessment	0.03 J1	0.4 J1	6.08	0.09	5.2	3.6	36
5/21/2019	Assessment	0.020	0.3 J1	6.30	0.09	4.1	4.0	80
8/12/2019	Assessment	< 0.02 U1	0.278	7.24	0.06 J1	4.9	2.6	90
3/10/2020	Assessment	0.02 J1	0.3 J1	6.08	0.10	4.9	3.7	62
6/2/2020	Assessment	< 0.02 U1	0.2 J1	5.63	0.10	4.0	3.9	91
11/2/2020	Assessment	0.03 J1	0.3 J1	4.65	0.08	4.3	3.3	74
3/8/2021	Assessment	0.01 J1	0.2 J1	6.46	0.11	4.1	3.8	68
5/24/2021	Assessment	0.032 J1	0.2 J1	5.54	0.12	4.2	5.46	70
11/15/2021	Assessment	0.012 J1	0.28	8.03	0.07	3.5	2.90	90
3/28/2022	Assessment	0.021 J1	0.20	6.10	0.07	3.9	3.80	60 L1
6/20/2022	Assessment	0.042 J1	0.32	7.59	0.09	4.3	4.81	80
11/15/2022	Assessment	0.013 J1	0.36	8.03	0.08	4.7	3.39	70
2/27/2023	Assessment	0.021 J1	0.34	6.51	0.07	3.8	3.90	70
6/26/2023	Assessment	0.019 J1	0.21	4.68	0.06	4.6	2.9	80
8/23/2023	Assessment	0.017 J1	0.22	4.74	0.07	3.8	3.5	75
10/17/2023	Assessment	0.015 J1	0.27	6.74	0.07	3.8	2.7	58

Table 1. Groundwater Data Summary: AD-12

Pirkey - Stackout

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/11/2016	Background	< 0.93 U1	< 1.05 U1	26	0.219521 J1	< 0.07 U1	0.710981 J1	1.58207 J1	0.2073	< 0.083 U1	< 0.68 U1	< 0.00013 U1	< 0.005 U1	< 0.29 U1	1.73953 J1	< 0.86 U1
7/13/2016	Background	< 0.93 U1	< 1.05 U1	23	0.190337 J1	< 0.07 U1	0.68835 J1	1.29444 J1	2.909	< 0.083 U1	< 0.68 U1	0.008	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
9/7/2016	Background	< 0.93 U1	< 1.05 U1	30	0.232192 J1	< 0.07 U1	0.353544 J1	1.66591 J1	0.881	< 0.083 U1	< 0.68 U1	0.01	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
10/12/2016	Background	< 0.93 U1	< 1.05 U1	27	0.149553 J1	< 0.07 U1	0.529033 J1	1.56632 J1	0.257	1	< 0.68 U1	0.012	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/14/2016	Background	< 0.93 U1	< 1.05 U1	28	0.152375 J1	< 0.07 U1	0.32826 J1	1.47282 J1	0.767	< 0.083 U1	< 0.68 U1	0.013	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/11/2017	Background	< 0.93 U1	< 1.05 U1	23	0.126621 J1	< 0.07 U1	0.650158 J1	1.09495 J1	1.536	< 0.083 U1	< 0.68 U1	0.01	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
2/28/2017	Background	< 0.93 U1	< 1.05 U1	26	0.149219 J1	< 0.07 U1	0.325811 J1	1.29984 J1	0.416	< 0.083 U1	< 0.68 U1	0.009	< 0.005 U1	< 0.29 U1	< 0.99 U1	0.994913 J1
4/11/2017	Background	< 0.93 U1	< 1.05 U1	24	0.159412 J1	< 0.07 U1	0.416007 J1	1.33344 J1	0.3895	0.2565 J1	< 0.68 U1	0.008	0.01364 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/21/2018	Assessment	< 0.93 U1	< 1.05 U1	25.82	0.16 J1	< 0.07 U1	1.05	1.49 J1	0.784	< 0.083 U1	< 0.68 U1	0.00722	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/20/2018	Assessment	< 0.01 U1	0.11	27.8	0.159	0.01 J1	0.330	1.72	1.128	< 0.083 U1	0.089	0.0143	< 0.005 U1	0.04 J1	0.1	0.04 J1
2/27/2019	Assessment	< 0.4 U1	< 0.6 U1	22.5	< 0.4 U1	< 0.2 U1	< 0.8 U1	1.37	0.225	0.09	< 0.4 U1	0.00688	< 0.005 U1	< 8 U1	< 0.6 U1	< 2 U1
5/21/2019	Assessment	< 0.4 U1	< 0.6 U1	21.7	< 0.4 U1	< 0.2 U1	< 0.8 U1	1.15	0.201	0.09	< 0.4 U1	0.00576	< 0.005 U1	< 8 U1	< 0.6 U1	< 0.1 U1
8/12/2019	Assessment	< 0.02 U1	0.07 J1	23.8	0.154	< 0.01 U1	0.204	1.30	0.237	0.06 J1	0.08 J1	0.00829	< 0.005 U1	< 0.4 U1	0.2 J1	< 0.1 U1
3/10/2020	Assessment	< 0.02 U1	0.09 J1	21.7	0.139	0.01 J1	0.2 J1	1.21	3.0706	0.10	0.09 J1	0.00547	< 0.002 U1	< 0.4 U1	0.2	< 0.1 U1
6/2/2020	Assessment	< 0.02 U1	0.09 J1	19.0	0.132	< 0.01 U1	0.208	1.02	0.799	0.10	0.09 J1	0.00505	< 0.002 U1	< 0.4 U1	0.3	< 0.1 U1
11/2/2020	Assessment	0.05 J1	0.09 J1	18.9	0.122	< 0.01 U1	0.204	1.04	0.929	0.08	0.09 J1	0.00510	< 0.002 U1	< 0.4 U1	0.3	< 0.1 U1
3/8/2021	Assessment	< 0.02 U1	0.07 J1	22.9	0.150	0.007 J1	0.2 J1	1.19	0.214	0.11	0.07 J1	0.00570	< 0.002 U1	< 0.1 U1	0.2 J1	< 0.04 U1
5/24/2021	Assessment	< 0.02 U1	0.08 J1	23.1	0.136	0.005 J1	0.24	1.19	0.60	0.12	0.07 J1	0.00500	< 0.002 U1	< 0.1 U1	0.31 J1	< 0.04 U1
11/15/2021	Assessment	< 0.02 U1	0.05 J1	26.5	0.148	0.01 J1	0.30	1.38	1.76	0.07	0.07 J1	0.0110	< 0.002 U1	< 0.1 U1	0.10 J1	< 0.04 U1
3/28/2022	Assessment	< 0.02 U1	0.09 J1	20.2	0.127	0.009 J1	0.35	1.01	0.76	0.07	0.09 J1	0.00604	< 0.002 U1	< 0.1 U1	0.33 J1	< 0.04 U1
6/20/2022	Assessment	< 0.02 U1	0.08 J1	24.2	0.135	0.008 J1	0.63	1.35	0.63	0.09	0.08 J1	0.00949	< 0.002 U1	< 0.1 U1	0.16 J1	< 0.04 U1
11/15/2022	Assessment	< 0.02 U1	0.06 J1	30.6	0.153	0.007 J1	0.45	1.59	1.46	0.08	0.08 J1	0.0119	< 0.002 U1	< 0.1 U1	0.23 J1	< 0.04 U1
2/27/2023	Assessment	< 0.02 U1	0.07 J1	27.5	0.155	0.013 J1	0.36	1.50	1.17	0.07	0.1 J1	0.00885	< 0.002 U1	< 0.1 U1	0.35 J1	< 0.04 U1
6/26/2023	Assessment	0.015 J1	0.11	16.3	0.110	0.007 J1	0.45	0.932	0.45	0.06	0.11 J1	0.00487	< 0.002 U1	0.7	0.23 J1	< 0.02 U1
8/23/2023	Assessment	0.013 J1	0.10	15.6	0.129	0.007 J1	0.45	0.855	1.34	0.07	0.11 J1	0.00494	< 0.002 U1	0.5	0.23 J1	< 0.02 U1
10/17/2023	Assessment	0.01 J1	0.06 J1	23.6	0.142	0.006 J1	0.31	1.19	1.08	0.07	0.07 J1	0.00891	< 0.002 U1	< 0.1 U1	0.21 J1	< 0.02 U1

Table 1. Groundwater Data Summary: AD-13

Geosyntec Consultants, Inc.

**Pirkey - Stackout
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/11/2016	Background	0.06	8.77	28	0.748 J1	5.6	52	236
7/13/2016	Background	0.06	9.08	32	0.3474 J1	5.6	59	192
9/7/2016	Background	0.05	8.48	23	< 0.083 U1	5.2	41	228
10/13/2016	Background	0.06	7.53	26	0.6297 J1	5.8	47	236
11/14/2016	Background	0.06	7.21	26	0.3114 J1	6.1	47	250
1/11/2017	Background	0.04	6.14	22	< 0.083 U1	5.8	37	188
2/28/2017	Background	0.07	7.88	28	< 0.083 U1	5.9	56	172
4/11/2017	Background	0.08	9.11	32	0.4278 J1	5.2	58	200
8/23/2017	Detection	0.07408	9.5	21	0.344 J1	6.0	38	160
3/21/2018	Assessment	0.07169	10.3	25	< 0.083 U1	5.9	48	176
8/20/2018	Assessment	0.065	8.40	39	0.0845 J1	5.9	66	210
2/27/2019	Assessment	0.08 J1	11.0	40.8	0.25	5.2	80.8	176
5/21/2019	Assessment	0.061	10.1	34.8	0.40	5.3	69.5	190
8/12/2019	Assessment	0.064	8.68	42.3	0.39	5.9	73.6	310
3/10/2020	Assessment	0.067	10.7	41.1	0.32	6.4	82.7	216
6/2/2020	Assessment	0.065	10.9	41.4	0.45	6.4	83.4	322
11/2/2020	Assessment	0.052	5.90	22.6	0.38	6.4	39.1	204
3/8/2021	Assessment	0.067	13.2	41.2	0.36	4.9	74.6	229
5/24/2021	Assessment	0.078	13.6	41.6	0.48	5.5	78.6	60
11/15/2021	Assessment	0.063	8.61	42.3	0.26	5.5	70.8	220
3/28/2022	Assessment	0.065	13.3	46.5	0.34	5.3	79.2	230 L1
6/20/2022	Assessment	0.075	11.1	54.5	0.26	5.7	138	270
11/15/2022	Assessment	0.095	8.57	41.3	0.36	5.8	69.6	260
2/27/2023	Assessment	0.080	15.1	51.8	0.26	4.8	98.5	250
6/26/2023	Assessment	0.067	10.6	48.7	0.23	5.5	112	280
10/17/2023	Assessment	0.068	9.49	42.9	0.45	5.5	86.9	280

Table 1. Groundwater Data Summary: AD-13

Pirkey - Stackout

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/11/2016	Background	< 0.93 U1	4.25914 J1	38	0.586539 J1	0.293832 J1	< 0.23 U1	42	0.989	0.748 J1	< 0.68 U1	0.081	0.00969 J1	< 0.29 U1	< 0.99 U1	1.11268 J1
7/13/2016	Background	< 0.93 U1	9	44	2	0.0875208 J1	< 0.23 U1	47	2.332	0.3474 J1	< 0.68 U1	0.158	0.01928 J1	< 0.29 U1	3.63671 J1	0.928756 J1
9/7/2016	Background	< 0.93 U1	< 1.05 U1	47	0.631177 J1	0.219799 J1	< 0.23 U1	38	1.219	< 0.083 U1	< 0.68 U1	0.139	< 0.005 U1	< 0.29 U1	< 0.99 U1	1.44332 J1
10/13/2016	Background	< 0.93 U1	7	43	0.963478 J1	< 0.07 U1	< 0.23 U1	42	2.422	0.6297 J1	< 0.68 U1	0.142	< 0.005 U1	< 0.29 U1	2.59885 J1	< 0.86 U1
11/14/2016	Background	< 0.93 U1	2.07189 J1	39	0.717704 J1	0.310257 J1	< 0.23 U1	42	1.723	0.3114 J1	< 0.68 U1	0.136	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/11/2017	Background	< 0.93 U1	2.73936 J1	39	0.302907 J1	0.11238 J1	< 0.23 U1	32	1.844	< 0.083 U1	< 0.68 U1	0.133	0.00732 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
2/28/2017	Background	< 0.93 U1	1.64435 J1	34	0.290018 J1	< 0.07 U1	< 0.23 U1	44	1.728	< 0.083 U1	< 0.68 U1	0.153	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/11/2017	Background	< 0.93 U1	4.43115 J1	45	0.736525 J1	2	< 0.23 U1	56	1.309	0.4278 J1	< 0.68 U1	0.156	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/21/2018	Assessment	< 0.93 U1	3.23 J1	42.23	0.46 J1	0.86 J1	< 0.23 U1	39.91	2.093	< 0.083 U1	< 0.68 U1	0.145	< 0.005 U1	< 0.29 U1	3.86 J1	< 0.86 U1
8/20/2018	Assessment	0.01 J1	5.79	40.9	0.648	< 0.005 U1	0.103	48.8	1.735	0.0845 J1	0.01 J1	0.146	< 0.005 U1	< 0.02 U1	0.2	0.03 J1
2/27/2019	Assessment	< 0.4 U1	2.17	38.5	< 0.4 U1	< 0.2 U1	< 0.8 U1	48.7	0.909	0.25	< 0.4 U1	0.165	< 0.005 U1	< 8 U1	< 0.6 U1	< 2 U1
5/21/2019	Assessment	< 0.4 U1	2 J1	35.0	< 0.4 U1	< 0.2 U1	< 0.8 U1	44.7	0.875	0.40	< 0.4 U1	0.153	< 0.005 U1	< 8 U1	< 0.6 U1	< 0.1 U1
8/12/2019	Assessment	< 0.02 U1	1.64	35.0	0.235	< 0.01 U1	0.06 J1	44.5	1.642	0.39	< 0.05 U1	0.139	< 0.005 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
3/10/2020	Assessment	< 0.02 U1	1.58	38.4	0.327	< 0.01 U1	0.06 J1	44.7	1.382	0.32	< 0.05 U1	0.145	< 0.002 U1	< 0.4 U1	< 0.03 U1	< 0.1 U1
6/2/2020	Assessment	< 0.02 U1	1.39	35.6	0.222	< 0.01 U1	0.07 J1	43.7	1.116	0.45	< 0.05 U1	0.140	< 0.002 U1	< 0.4 U1	0.04 J1	< 0.1 U1
11/2/2020	Assessment	< 0.02 U1	3.40	34.5	0.270	< 0.01 U1	0.2 J1	35.4	1.729	0.38	< 0.05 U1	0.109	< 0.002 U1	< 0.4 U1	0.07 J1	< 0.1 U1
3/8/2021	Assessment	< 0.02 U1	0.44	56.7	1.20	< 0.004 U1	0.2 J1	46.3	1.354	0.36	< 0.05 U1	0.132	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
5/24/2021	Assessment	< 0.02 U1	0.89	36.6	0.119	< 0.004 U1	0.24	43.9	1.44	0.48	< 0.05 U1	0.134	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
11/15/2021	Assessment	< 0.02 U1	4.39	41.7	0.344	< 0.004 U1	0.34	45.9 M1	1.56	0.26	< 0.05 U1	0.135 M1	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
3/28/2022	Assessment	< 0.02 U1	2.18	52.1	0.579	< 0.004 U1	0.52	46.9	2.95	0.34	< 0.05 U1	0.138	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
6/20/2022	Assessment	< 0.02 U1	4.30	41.4	0.409	< 0.004 U1	0.31	56.2 M1	2.22	0.26	< 0.05 U1	0.150 M1	< 0.002 U1	1.1	0.1 J1	< 0.04 U1
11/15/2022	Assessment	< 0.02 U1	1.62	44.2	0.131	< 0.004 U1	0.35	45.9	1.55	0.36	< 0.05 U1	0.141	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
2/27/2023	Assessment	< 0.02 U1	0.39	66.8	1.23	< 0.004 U1	0.26	60.0	3.76	0.26	< 0.05 U1	0.161	< 0.020 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
6/26/2023	Assessment	< 0.008 U1	1.56	39.8	0.234	< 0.004 U1	0.31	51.5	1.61	0.23	< 0.05 U1	0.142	< 0.002 U1	< 0.1 U1	< 0.04 U1	0.03 J1
10/17/2023	Assessment	< 0.008 U1	5.71	41.2	0.559	< 0.004 U1	0.22 J1	47.6	1.05	0.45	< 0.05 U1	0.137	< 0.002 U1	< 0.1 U1	0.13 J1	0.02 J1

Table 1. Groundwater Data Summary: AD-22

Geosyntec Consultants, Inc.

**Pirkey - Stackout
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/11/2016	Background	0.08	15.3	76	1.266	4.0	284	672
7/14/2016	Background	0.04	9.5	52	0.3891 J1	3.9	162	412
9/7/2016	Background	0.04	6.95	42	< 0.083 U1	4.1	114	341
10/12/2016	Background	0.03	7.68	52	0.473 J1	4.7	148	388
11/14/2016	Background	0.04	7.55	48	0.2834 J1	4.4	177	362
1/12/2017	Background	0.02	6.47	51	< 0.083 U1	4.2	137	344
3/1/2017	Background	0.05	13.6	69	< 0.083 U1	4.1	266	624
4/11/2017	Background	0.04	10.8	72	0.5041 J1	4.1	215	446
8/23/2017	Detection	0.05075	7.77	54	1.196	4.6	121	350
12/21/2017	Detection	0.06278	7.29	61	< 0.083 U1	--	120	344
3/21/2018	Assessment	0.0818	15.2	79	< 0.083 U1	3.9	377	656
8/20/2018	Assessment	0.031	9.43	92	< 0.083 U1	4.2	184	476
2/27/2019	Assessment	0.07 J1	15.2	76.7	1.33	4.9	337	584
5/22/2019	Assessment	0.073	16.5	63.3	1.06	5.1	360	506
8/12/2019	Assessment	0.03 J1	8.96	79.6	0.45	4.8	198	484
3/10/2020	Assessment	0.067	12.7	73.6	1.25	3.8	364	654
6/2/2020	Assessment	0.062	13.1	74.0	1.25	3.6	369	682
11/2/2020	Assessment	0.03 J1	8.60	84.0	0.28	4.8	190	468
3/8/2021	Assessment	0.069	12.5	71.1	1.03	4.0	337	692
5/24/2021	Assessment	0.076	12.7	60.6	1.24	3.5	327	290
11/15/2021	Assessment	0.030 J1	11.7	108	0.35	4.4	236	570
3/28/2022	Assessment	0.068	16.4	88.8	0.96	4.3	385	720 L1
6/20/2022	Assessment	0.028 J1	11.9	107	0.32	4.5	293	580
11/14/2022	Assessment	0.021 J1	10.5	101	0.28	4.8	251	570
2/27/2023	Assessment	0.068	14.9	--	--	4.1	--	--
3/22/2023	Assessment	--	--	72.4	0.90	3.8	357	680 S7
6/26/2023	Assessment	0.06 J1	15.5	93.9	0.63	4.1	350	680
10/17/2023	Assessment	0.020 J1	9.26	80.5	0.26	4.0	212	480

Table 1. Groundwater Data Summary: AD-22

Pirkey - Stackout
Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/11/2016	Background	< 0.93 U1	23	71	13	2	24	129	6.994	1.266	0.97266 J1	0.139	13.41	< 0.29 U1	1.97127 J1	1.16089 J1
7/14/2016	Background	< 0.93 U1	12	48	6	0.674427 J1	12	67	2.325	0.3891 J1	< 0.68 U1	0.169	17	< 0.29 U1	< 0.99 U1	0.895409 J1
9/7/2016	Background	< 0.93 U1	23	108	5	0.833408 J1	33	54	3.412	< 0.083 U1	2.72959 J1	0.131	19.829	< 0.29 U1	< 0.99 U1	1.25036 J1
10/12/2016	Background	< 0.93 U1	10	54	4	0.333745 J1	7	54	3.39	0.473 J1	< 0.68 U1	0.14	7.984	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/14/2016	Background	< 0.93 U1	3.69822 J1	66	4	0.596378 J1	2	47	3.63	0.2834 J1	< 0.68 U1	0.115	8.634	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/12/2017	Background	< 0.93 U1	6	67	4	0.385609 J1	2	43	3.173	< 0.083 U1	< 0.68 U1	0.104	13.32	< 0.29 U1	1.09664 J1	< 0.86 U1
3/1/2017	Background	< 0.93 U1	1.61319 J1	29	10	1	< 0.23 U1	105	4.385	< 0.083 U1	< 0.68 U1	0.218	0.22	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/11/2017	Background	< 0.93 U1	11	130	6	2	5	78	3.045	0.5041 J1	1.89388 J1	0.176	7.201	< 0.29 U1	1.86563 J1	< 0.86 U1
3/21/2018	Assessment	< 0.93 U1	3.56 J1	24.13	12.1	1.87	< 0.23 U1	121	6.22	< 0.083 U1	< 0.68 U1	0.277	1.206	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/20/2018	Assessment	0.02 J1	5.18	22.7	3.30	0.46	0.829	62.9	3.088	< 0.083 U1	0.386	0.132	1.448	0.07 J1	2.5	0.162
2/27/2019	Assessment	< 0.4 U1	6.30	17.0	13.3	1.55	0.8 J1	123	5.99	1.33	0.5 J1	0.269	0.642	< 8 U1	16.7	< 2 U1
5/22/2019	Assessment	< 0.4 U1	5.89	16.7	12.5	1.52	< 0.8 U1	129	6.71	1.06	< 0.4 U1	0.288	0.837	< 8 U1	5.9	0.2 J1
8/12/2019	Assessment	< 0.02 U1	2.19	15.3	3.38	0.44	0.2 J1	57.5	3.088	0.45	0.1 J1	0.151	0.325	< 0.4 U1	2.0	0.2 J1
3/10/2020	Assessment	< 0.02 U1	4.26	18.2	10.1	1.41	0.398	108	7.68	1.25	0.346	0.222	1.58	< 0.4 U1	10.5	0.2 J1
6/2/2020	Assessment	< 0.02 U1	3.53	14.4	8.00	1.43	0.376	101	4.334	1.25	0.261	0.185	0.171	< 0.4 U1	10.7	0.3 J1
11/2/2020	Assessment	< 0.02 U1	1.92	20.4	2.39	0.47	0.2 J1	60.0	3.338	0.28	0.2 J1	0.101	0.184	< 0.4 U1	2.4	0.1 J1
3/8/2021	Assessment	< 0.02 U1	3.05	19.2	8.52	1.42	0.395	107	6.007	1.03	0.277	0.164	0.045	< 0.1 U1	11.7	0.2 J1
5/24/2021	Assessment	< 0.02 U1	2.05	16.0	6.83	1.25	0.56	99.1	5.27	1.24	0.24	0.166	0.084	< 0.1 U1	7.43	0.21
11/15/2021	Assessment	< 0.02 U1	1.85	17.9	2.50	0.502	0.27	69.9	2.88	0.35	0.09 J1	0.122	0.056	< 0.1 U1	1.92	0.14 J1
3/28/2022	Assessment	< 0.02 U1	3.21	19.3	8.78	1.27	0.43	109	4.24	0.96	0.15 J1	0.170	< 0.004 U1	< 0.1 U1	9.20	0.19 J1
6/20/2022	Assessment	< 0.02 U1	3.02	16.2	2.11	0.587	0.66	69.6	3.95	0.32	0.18 J1	0.110	0.460	0.1 J1	2.01	0.15 J1
11/14/2022	Assessment	< 0.02 U1	2.40	20.8	2.16	0.494	0.47	60.3	2.70	0.28	0.22	0.0905	0.410	< 0.1 U1	1.93	0.14 J1
2/27/2023	Assessment	< 0.02 U1	3.66	18.0	10.2	1.37	0.46	113	4.86	--	0.21	0.194	0.040 J1	< 0.1 U1	7.39	0.24
3/22/2023	Assessment	--	--	--	--	--	--	--	--	0.90	--	--	--	--	--	--
6/26/2023	Assessment	< 0.04 U1	3.4	13.5	7.71	1.09	0.7 J1	109	3.77	0.63	< 0.3 U1	0.236	0.029	< 0.5 U1	7.0	0.2 J1
10/17/2023	Assessment	< 0.008 U1	1.57	19.1	2.65	0.551	0.33	55.3	2.61	0.26	0.18 J1	0.0772	0.301	< 0.1 U1	4.78	0.15 J1

Table 1. Groundwater Data Summary: AD-33

Geosyntec Consultants, Inc.

**Pirkey - Stackout
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
5/11/2016	Background	0.126	2.44	8	< 0.083 U1	4.1	56	326
7/14/2016	Background	0.173	1.69	16	< 0.083 U1	3.1	108	176
9/7/2016	Background	0.152	1.81	10	< 0.083 U1	3.6	64	176
10/12/2016	Background	0.162	1.39	9	0.357 J1	3.4	46	180
11/14/2016	Background	0.182	1.63	8	< 0.083 U1	3.1	54	190
1/12/2017	Background	0.144	1.26	10	< 0.083 U1	4.3	58	168
2/28/2017	Background	0.14	1.25	7	< 0.083 U1	3.9	51	146
4/10/2017	Background	0.114	1.29	9	< 0.083 U1	3.4	49	178
8/23/2017	Detection	0.07952	1.06	9	0.67 J1	4.4	40	132
12/21/2017	Detection	0.09993	0.946	--	--	--	--	--
3/21/2018	Assessment	0.115	1.42	7	< 0.083 U1	4.4	58	160
8/21/2018	Assessment	0.098	1.09	12	< 0.083 U1	3.6	48	156
2/27/2019	Assessment	0.134	1.73	8.89	0.25	3.3	62.8	146
5/22/2019	Assessment	0.111	1.65	8.57	0.23	4.1	60.4	204
8/12/2019	Assessment	0.097	1.03	8.85	0.19	4.2	44.3	156
3/10/2020	Assessment	0.132	1.61	8.81	0.25	4.0	64.5	172
6/2/2020	Assessment	0.112	1.49	8.89	0.28	3.9	63.1	206
11/2/2020	Assessment	0.115	0.980	8.49	0.16	3.9	44.8	162
3/8/2021	Assessment	0.159	1.96	8.65	0.42	4.1	70.1	213
5/24/2021	Assessment	0.121	1.5	8.56	0.29	4.0	60.4	100
11/15/2021	Assessment	0.093	0.98	8.60	0.17	3.6	41.9	150
3/28/2022	Assessment	0.146	2.28	8.88	0.30	4.0	67.0	190 L1
6/20/2022	Assessment	0.093	1.06	8.49	0.19	4.4	57.7	150
11/15/2022	Assessment	0.086	0.90	9.18	0.16	4.0	42.7	140
2/27/2023	Assessment	0.179	2.48	10.9	0.34	4.1	74.5	190
6/26/2023	Assessment	0.114	1.73	9.50	0.21	4.1	58.4	200
10/17/2023	Assessment	0.094	1.15	9.03	0.18	4.0	41.7	130

Table 1. Groundwater Data Summary: AD-33

Pirkey - Stackout

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
5/11/2016	Background	< 0.93 U1	2.53645 J1	60	2	< 0.07 U1	4	12	1.303	< 0.083 U1	< 0.68 U1	< 0.00013 U1	0.288	< 0.29 U1	< 0.99 U1	< 0.86 U1
7/14/2016	Background	< 0.93 U1	4.91616 J1	64	2	< 0.07 U1	9	12	4.28	< 0.083 U1	< 0.68 U1	0.029	0.707	< 0.29 U1	< 0.99 U1	1.19199 J1
9/7/2016	Background	< 0.93 U1	67	163	4	0.984692 J1	125	33	3.461	< 0.083 U1	14	0.048	1.826	0.736517 J1	1.61343 J1	< 0.86 U1
10/12/2016	Background	< 0.93 U1	2.15866 J1	59	1	< 0.07 U1	4	10	2.208	0.357 J1	< 0.68 U1	0.027	0.145	< 0.29 U1	< 0.99 U1	1.56738 J1
11/14/2016	Background	< 0.93 U1	1.46353 J1	52	1	< 0.07 U1	1	9	1.953	< 0.083 U1	< 0.68 U1	0.024	0.197	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/12/2017	Background	< 0.93 U1	1.12979 J1	56	1	< 0.07 U1	2	9	2.596	< 0.083 U1	< 0.68 U1	0.027	0.36	< 0.29 U1	< 0.99 U1	< 0.86 U1
2/28/2017	Background	< 0.93 U1	1.069 J1	55	1	< 0.07 U1	< 0.23 U1	9	0.942	< 0.083 U1	< 0.68 U1	0.026	0.41	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/10/2017	Background	< 0.93 U1	< 1.05 U1	55	1	< 0.07 U1	3	10	9.024	< 0.083 U1	< 0.68 U1	0.027	0.341	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/21/2018	Assessment	< 0.93 U1	1.78 J1	57.26	1.4	0.15 J1	4.64	10.42	1.643	< 0.083 U1	< 0.68 U1	0.02669	0.825	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/21/2018	Assessment	0.01 J1	0.65	43.8	0.905	0.04	0.147	7.72	6.32	< 0.083 U1	0.151	0.0178	0.745	< 0.02 U1	1.7	0.05 J1
2/27/2019	Assessment	< 0.4 U1	1 J1	49.5	1 J1	< 0.2 U1	< 0.8 U1	10.5	2.235	0.25	< 0.4 U1	0.0262	0.464	< 8 U1	3 J1	< 2 U1
5/22/2019	Assessment	< 0.4 U1	< 0.6 U1	52.4	1 J1	< 0.2 U1	< 0.8 U1	10.5	1.178	0.23	< 0.4 U1	0.0245	0.481	< 8 U1	1 J1	< 0.1 U1
8/12/2019	Assessment	< 0.02 U1	0.41	38.6	1.00	0.04 J1	0.1 J1	7.02	1.141	0.19	0.1 J1	0.0233	0.564	< 0.4 U1	1.1	< 0.1 U1
3/10/2020	Assessment	< 0.02 U1	0.63	45.3	1.18	0.06	0.1 J1	9.67	2.479	0.25	0.208	0.0197	2.45	< 0.4 U1	2.0	< 0.1 U1
6/2/2020	Assessment	< 0.02 U1	0.61	41.3	1.15	0.05 J1	0.2 J1	8.78	1.477	0.28	0.2 J1	0.0188	2.52	< 0.4 U1	2.1	< 0.1 U1
11/2/2020	Assessment	< 0.02 U1	0.39	45.1	0.858	0.04 J1	0.1 J1	7.86	1.443	0.16	0.2 J1	0.0175	4.30	< 0.4 U1	1.1	< 0.1 U1
3/8/2021	Assessment	< 0.02 U1	1.01	47.5	1.51	0.06	0.373	12.4	1.312	0.42	0.286	0.0232	3.13	< 0.1 U1	3.4	< 0.04 U1
5/24/2021	Assessment	< 0.02 U1	0.43	43.8	1.04	0.048	0.28	9.85	1.40	0.29	0.22	0.0188	2.000	< 0.1 U1	1.39	0.05 J1
11/15/2021	Assessment	< 0.02 U1	0.40	45.1	0.916	0.043	0.28	6.75	1.65	0.17	0.23	0.0177	14.600	< 0.1 U1	1.0	< 0.04 U1
3/28/2022	Assessment	< 0.02 U1	0.87	45.0	1.35	0.057	0.47	9.82	2.28	0.30	0.32	0.0219	4.600	< 0.1 U1	2.68	< 0.04 U1
6/20/2022	Assessment	0.04 J1	1.19	42.0	0.939	0.039	0.64	7.81	3.37	0.19	0.27	0.0166	3.000	< 0.1 U1	1.27	< 0.04 U1
11/15/2022	Assessment	< 0.02 U1	0.37	49.4	0.945	0.038	0.44	6.83	3.66	0.16	0.22	0.0185	5.900	< 0.1 U1	0.96	< 0.04 U1
2/27/2023	Assessment	< 0.02 U1	0.76	44.4	1.50	0.064	0.31	12.4	2.85	0.34	0.32	0.0233	6.000	< 0.1 U1	2.54	0.04 J1
6/26/2023	Assessment	0.021 J1	1.08	41.4	1.48	0.056	0.39	10.7	1.96	0.21	0.48	0.0246	5.610	< 0.1 U1	4.21	0.03 J1
10/17/2023	Assessment	0.009 J1	0.58	45.9	1.00	0.037	0.33	7.51	1.79	0.18	0.22	0.0194	6.120	< 0.1 U1	1.97	0.04 J1

**Table 1. Groundwater Data Summary
Pirkey - Stackout Pad**

Geosyntec Consultants, Inc.

Notes:

--: Not analyzed

<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.

In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.

J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

L1: The associated laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) recovery was outside acceptance limits.

M1: The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.

mg/L: milligrams per liter

pCi/L: picocuries per liter

S7: Sample did not achieve constant weight.

SU: standard unit

µg/L: micrograms per liter

**Table 1. Groundwater Elevation Data Summary
Pirkey Power Plant**

Unit	All Units	East Bottom Ash Pond					West Bottom Ash Pond				
		Upgradient	Downgradient			Upgradient	Downgradient				
			AD-4	AD-18	AD-2		AD-31	AD-32	AD-3	AD-18	AD-17
Jan-2016	371.05	359.16	360.52	328.55	346.60	352.32	347.03	360.52	--	321.39	323.70
May-2016	372.17	360.07	359.26	328.35	348.21	352.74	348.04	359.26	329.38	321.82	324.26
Jul-2016	365.68	352.34	356.99	327.46	345.46	348.53	346.00	356.99	325.93	320.44	322.49
Jan-2017	365.11	353.27	357.06	327.65	343.78	347.44	344.19	357.06	324.70	320.27	322.23
Feb-2017	368.79	355.32	359.21	327.96	344.53	348.44	345.53	359.21	326.27	320.59	322.88
Apr-2017	372.97	356.62	358.63	329.09	344.58	349.09	345.53	358.63	326.27	320.69	322.88
Aug-2017	367.68	353.58	358.23	327.63	343.57	349.73	343.49	358.23	324.18	320.07	322.04
Mar-2018	370.57	359.04	360.00	328.36	344.10	351.42	344.56	360.00	327.13	321.79	323.29
Aug-2018	357.99	350.39	355.99	326.99	342.73	347.58	343.28	355.99	324.12	319.93	321.70
Feb-2019	372.43	360.40	354.61	329.21	348.31	352.86	348.36	354.61	331.11	321.86	324.54
May-2019	373.12	361.18	360.74	328.91	349.68	354.14	349.37	360.74	331.66	322.61	325.21
Aug-2019	361.90	354.10	357.09	327.60	346.63	353.12	346.08	357.09	326.45	320.40	322.63
Mar-2020	373.10	360.56	360.58	329.23	346.95	352.55	347.22	360.58	336.07	321.98	323.94
Jun-2020	381.55	360.25	359.98	328.06	347.95	352.87	347.76	359.98	328.04	321.28	323.40
Nov-2020	361.86	349.70	354.98	327.57	342.84	346.13	342.89	354.98	324.36	319.99	321.90
Mar-2021	373.52	359.14	359.99	329.00	346.24	350.30	346.58	359.99	329.37	322.06	324.19
May-2021	375.56	360.45	360.46	329.57	347.27	351.28	347.46	360.46	329.03	323.10	324.94
Jul-2021	--	--	--	--	--	--	--	--	--	--	--
Nov-2021	358.32	351.40	355.55	327.36	342.79	348.72	342.60	355.55	323.77	319.98	321.80
Jan-2022	--	--	--	--	--	--	--	--	--	--	--
Mar-2022	373.28	359.58	359.17	328.17	344.58	351.73	344.19	359.17	325.80	321.05	323.14
Jun-2022	360.55	351.31	356.01	327.07	342.36	349.94	342.22	356.01	323.48	320.11	321.54
Aug-2022	--	--	--	--	--	--	341.84	--	--	--	--
Nov-2022	363.46	351.15	355.11	327.52	341.97	348.00	340.85	355.11	322.61	319.73	321.81
Feb-2023	368.74	356.04	359.57	328.12	344.34	349.48	--	359.57	--	--	--
Mar-2023	--	--	--	--	--	--	--	--	--	--	--
Jun-2023	369.17	352.66	357.96	327.55	340.46	343.36	341.82	357.96	325.13	320.45	322.07
Aug-2023	362.47	347.25	354.17	326.59	337.74	341.46	--	354.17	--	--	--
Oct-2023	360.29	--	352.80	--	--	--	338.07	352.80	322.93	319.77	321.28

Notes:

1. Groundwater elevation measured in feet above mean sea level.

**Table 1. Groundwater Elevation Data Summary
Pirkey Power Plant**

Unit	Stackout Pad				Landfill					
	Upgradient	Downgradient			Upgradient			Downgradient		
Well	AD-13	AD-7	AD-22	AD-33	AD-8	AD-16	AD-27	AD-23	AD-34	AD-36
Jan-2016	354.15	349.31	350.29	351.13	347.21	347.68	--	321.23	307.61	--
May-2016	355.11	349.98	350.83	351.62	348.03	350.97	335.29	321.98	307.61	--
Jul-2016	352.31	347.54	347.55	349.88	347.10	343.32	331.47	321.97	307.61	--
Jan-2017	352.01	347.04	347.20	348.56	345.74	343.09	330.04	320.99	307.61	--
Feb-2017	352.81	347.96	348.52	349.32	346.00	344.54	331.59	321.00	307.61	--
Apr-2017	352.68	347.87	348.45	349.25	345.81	344.69	331.24	320.85	307.61	--
Aug-2017	352.62	347.40	347.37	349.31	346.31	342.71	330.05	320.77	307.61	--
Mar-2018	353.25	348.46	349.62	350.10	346.11	344.63	332.49	320.17	307.61	--
Aug-2018	349.14	344.57	344.05	347.23	345.24	340.03	328.61	320.31	306.66	--
Feb-2019	355.63	350.21	350.90	351.99	348.05	351.21	335.03	320.88	307.61	--
May-2019	355.87	350.82	351.99	352.95	348.60	351.92	336.53	320.99	--	--
Aug-2019	350.87	346.85	346.70	349.96	347.33	343.92	330.71	321.29	305.87	303.16
Mar-2020	355.71	350.64	351.80	352.68	--	--	--	--	DRY	303.21
Jun-2020	355.17	350.25	350.95	352.54	348.61	349.39	--	320.79	307.61	303.78
Nov-2020	350.93	346.45	346.12	348.71	346.63	343.07	329.77	320.83	307.00	302.88
Mar-2021	355.22	350.13	351.33	351.84	--	--	--	--	--	--
May-2021	356.42	350.97	352.31	352.95	348.58	350.52	337.25	320.32	307.61	302.22
Jul-2021	--	--	--	--	--	--	--	--	307.61	302.42
Nov-2021	349.43	345.08	345.25	348.40	346.48	341.99	329.69	320.49	307.20	301.66
Jan-2022	--	--	--	--	--	--	--	320.00	307.61	--
Mar-2022	353.99	348.66	349.66	350.15	--	--	--	--	307.61	--
Jun-2022	349.75	345.35	345.49	348.35	346.27	342.41	330.10	319.87	307.00	301.49
Aug-2022	--	--	--	--	--	--	--	319.81	306.84	301.35
Nov-2022	349.93	345.56	345.20	347.43	344.23	341.65	328.48	319.72	307.61	301.35
Feb-2023	353.36	348.68	349.47	350.18	--	--	--	319.56	307.61	301.51
Mar-2023	354.24	--	350.03	350.48	--	--	--	--	--	--
Jun-2023	352.47	347.83	348.29	349.81	346.88	342.44	332.67	320.13	--	299.99
Aug-2023	--	--	--	--	--	--	--	320.39	307.61	302.91
Oct-2023	348.85	--	344.70	346.93	345.07	339.45	328.43	320.35	307.61	300.48

Notes:

1. Groundwater elevation measured in feet above mean sea level.

**Table 1: Residence Time Calculation Summary
Pirkey Plant - Stackout Area**

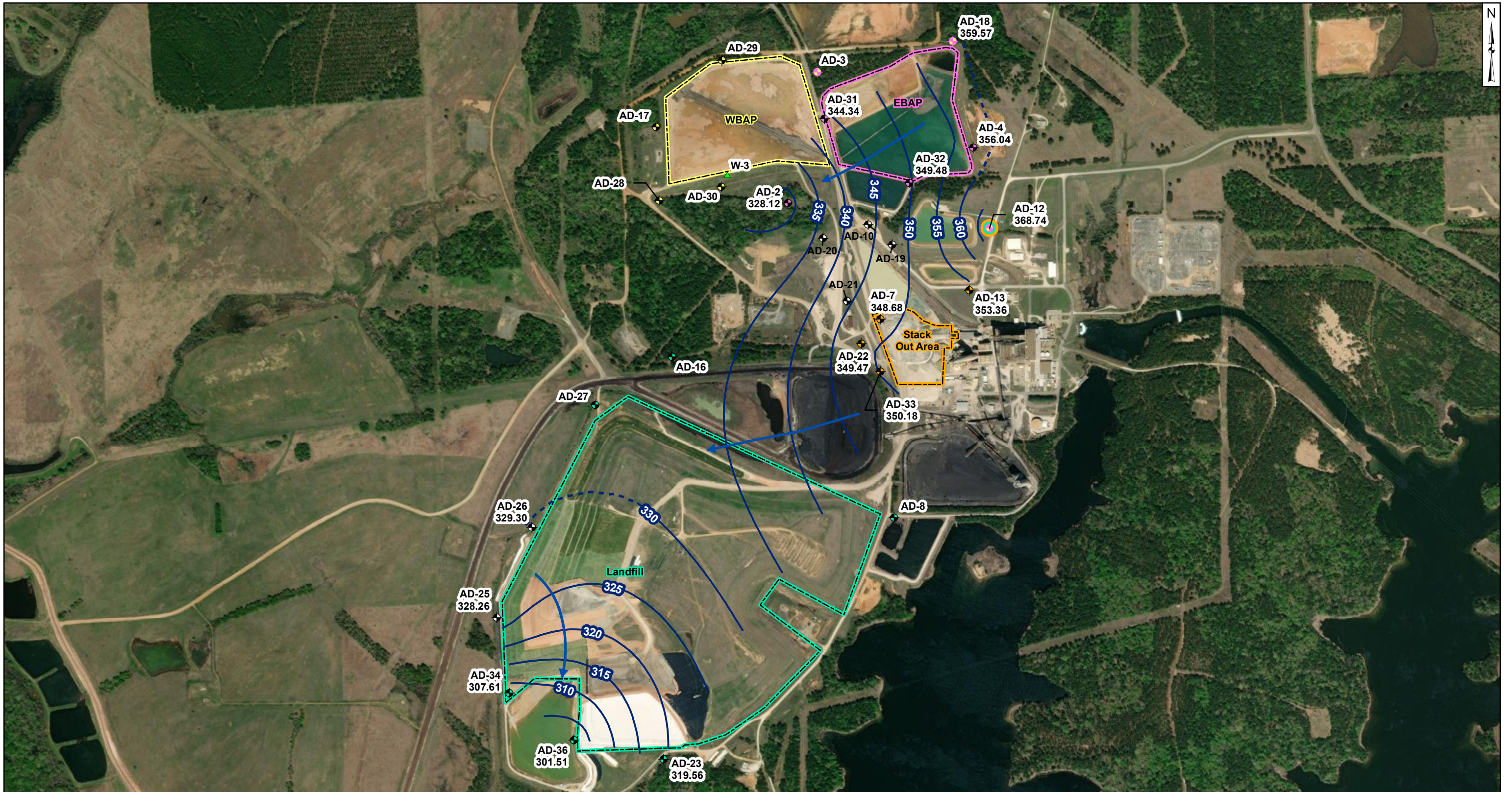
Geosyntec Consultants, Inc.

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2023-02		2023-06		2023-08		2023-10	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Stack Out Area	AD-7 ^[2]	4.0	12.2	9.9	12.1	10.0	NC	NC	21.1	5.8
	AD-12 ^[1]	4.0	35.7	3.4	44.0	2.8	30.4	4.0	20.3	6.0
	AD-13 ^[1]	4.0	6.1	20.0	6.5	18.7	NC	NC	16.7	7.3
	AD-22 ^[2]	2.0	18.2	3.3	14.2	4.3	NC	NC	20.9	2.9
	AD-33 ^[2]	2.0	11.5	5.3	9.4	6.4	NC	NC	10.5	5.8

Notes:

[1] - Background Well

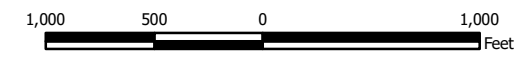
[2] - Downgradient Well



- Legend**
- Groundwater Monitoring Wells**
- Out of Network
 - EBAP
 - WBAP
 - Landfill
 - Stackout Area
 - EBAP and WBAP
 - All CCR Unit Networks
 - Piezometer
 - Groundwater Elevation Contour
 - Groundwater Elevation Contours (Inferred)
 - Approximate Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on February 27 and 28, 2023) provided by American Electric Power (AEP).
 2. Site features based on information available in coal combustion residuals (CCR) Groundwater Monitoring Well Network Evaluation Update (Arcadis 2022) provided by AEP.
 3. Groundwater elevation units are feet above mean sea level.
 4. AD-3, AD-8, AD-10, AD-16, AD-17, AD-19, AD-20, AD-21, AD-27, AD-28, AD-29, AD-30, and W-3 were not gauged during the February 2023 event.
 5. AD-35 was abandoned on November 13, 2018.
 6. Removal of CCR plus one foot of material was completed on July 26, 2022 for the West Bottom Ash Pond (WBAP).
- EBAP: East Bottom Ash Pond.



Beth Ann Gross
November 9, 2023

Geosyntec Consultants, Inc.
Texas Firm
Registration No. 1182

**Potentiometric Contours: Uppermost Aquifer
February 2023**

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Figure

1

Columbus, Ohio

2023/10/05



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP
- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Groundwater Elevation Contours (Inferred)
- Approximate Groundwater Flow Direction

Notes

- Monitoring well coordinates and water level data (collected on June 26 and 27, 2023) provided by American Electric Power (AEP).
- Site features based on information available in coal combustion residuals (CCR) Groundwater Monitoring Well Network Evaluation Update (Arcadis 2022) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- AD-10, AD-19, AD-20, AD-21, AD-29, and W-3 were not gauged during the June 2023 event.
- AD-35 was abandoned on November 13, 2018.
- Removal of CCR plus one foot of material was completed on July 26, 2022 for the West Bottom Ash Pond (WBAP).
EBAP: East Bottom Ash Pond.

1,000 500 0 1,000 Feet

Beth Ann Gross
November 9, 2023

Geosyntec Consultants, Inc.
Texas Firm
Registration No. 1182

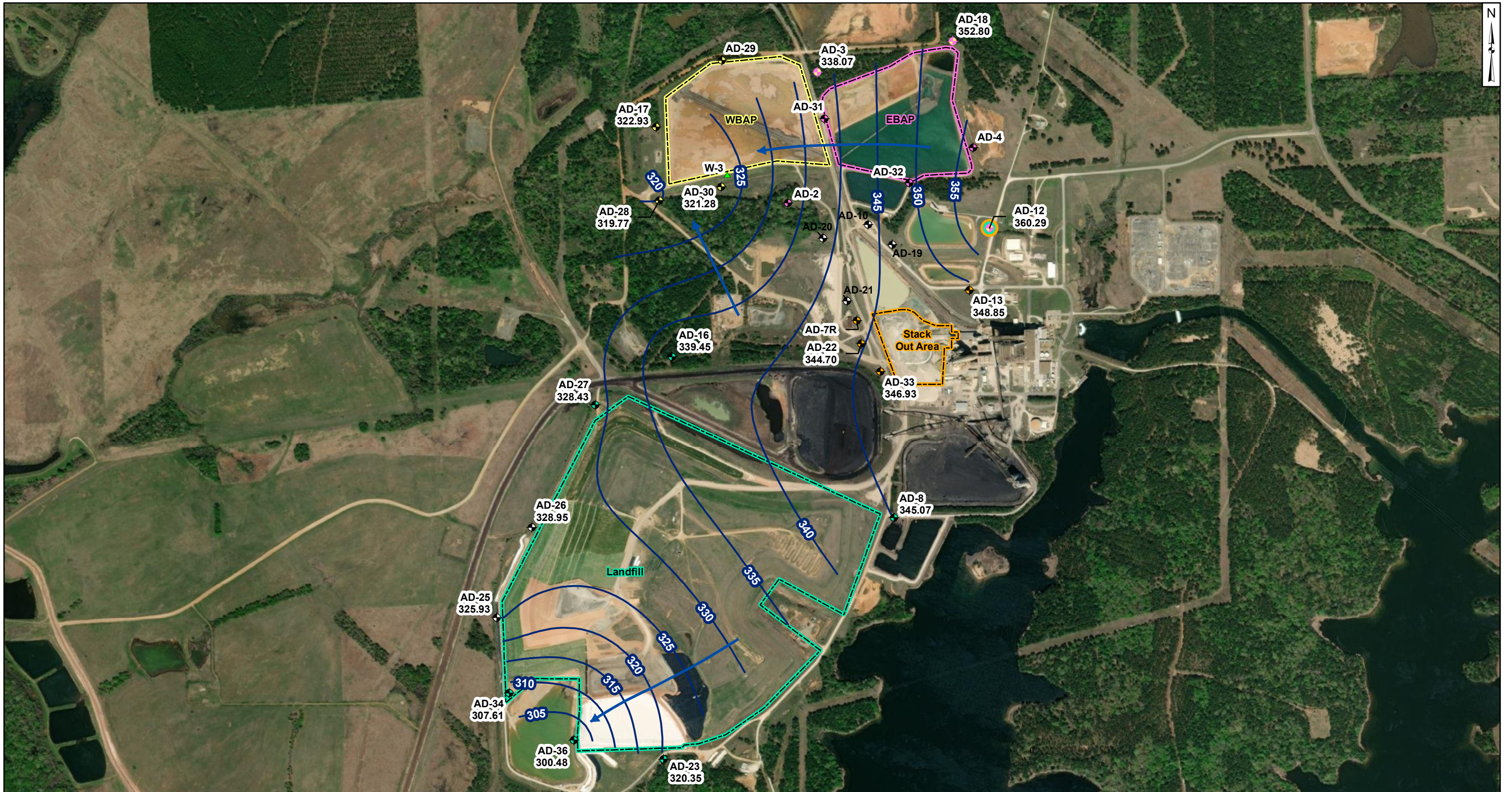
**Potentiometric Contours: Uppermost Aquifer
June 2023**

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Columbus, Ohio 2023/10/06

Figure 2



Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP
- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction

- Notes**
1. Monitoring well coordinates and water level data (collected on October 17 and 18, 2023) provided by AEP.
 2. Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation Update (Arcadis 2022) provided by AEP.
 3. Groundwater elevation units are feet above mean sea level.
 4. EBAP wells were not gauged during the October 2023 event.
 5. AD-02, AD-04, AD-10, AD-19, AD-20, AD-21, AD-24, AD-29, AD-31, AD-32, and W-3 were not gauged during the October 2023 event.
 6. AD-7R (350.92 ft msl) was not used for contouring due to an anomalous reading.
 7. AD-35 was abandoned on November 13, 2018.
 8. AD-7R will be used as a substitute for AD-07, as it was abandoned.
 9. Removal of CCR plus one foot of material was completed on July 26, 2022, for the West Pond.
 10. Removal of CCR plus one foot of material was completed on July 20, 2023, for the East Pond.
 11. Removal of CCR plus one foot of material was completed on September 18, 2023, for FGDSA.

1,000 500 1,000 Feet

Beth Ann Gross

January 19, 2024

Geosyntec Consultants, Inc.
Texas Firm
Registration No. 1182

**Potentiometric Contours: Uppermost Aquifer
October 2023**

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Columbus, Ohio 2024/01/10

Figure 3

APPENDIX 2- Statistical Analyses

The reports summarizing the statistical evaluation follow.

STATISTICAL ANALYSIS SUMMARY, FLUE GAS DESULFURIZATION (FGD) STACKOUT AREA

H.W. Pirkey Power Plant
Hallsville, Texas

Prepared for

American Electric Power
1 Riverside Plaza
Columbus, Ohio 43215-2372

Prepared by

Geosyntec Consultants, Inc.
500 West Wilson Bridge Road, Suite 250
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Project Number: CHA8500B

March 29, 2023

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Attachment B:	Data Quality Review Memorandum
Attachment C:	Statistical Analysis Output

ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
CCR	coal combustion residuals
FGD	flue gas desulfurization
GWPS	groundwater protection standard
LCL	lower confidence limit
LPL	lower prediction limit
mg/L	milligrams per liter
PQL	practical quantitation limit
QA/QC	quality assurance and quality control
SSI	statistically significant increase
SSL	statistically significant level
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	total dissolved solids
UPL	upper prediction limit

1. INTRODUCTION

In accordance with Texas Commission on Environmental Quality (TCEQ) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (Texas Administrative Code [TAC] Title 30, Chapter 352), groundwater monitoring has been conducted at the Flue Gas Desulfurization (FGD) Stackout Area, an existing CCR unit at the H.W. Pirkey Power Plant in Hallsville, Texas. Recent groundwater monitoring results were compared to site-specific groundwater protection standards (GWPSs) to identify potential exceedances.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, chloride, and sulfate at the FGD Stackout Area. An alternative source was not identified at the time, so assessment monitoring began at the FGD Stackout Area in 2018. GWPSs were set in accordance with 30 TAC § 352.951(b) and a statistical evaluation of the assessment monitoring data was conducted. Sampling events for both Appendix III and Appendix IV parameters, as required by § 352.951(a), were completed in March and June 2022. During the June 2022 assessment monitoring event, statistically significant levels (SSLs) were observed for beryllium and cobalt (Geosyntec 2022). In accordance with § 352.951(e), an alternative source demonstration (ASD) was successfully completed (Geosyntec 2023). Therefore, the unit remained in assessment monitoring. One assessment monitoring event was conducted at the FGD Stackout Area in November 2022 in accordance with § 352.951(a). The results of the November 2022 assessment event are documented in this report.

Prior to conducting the statistical analyses, the groundwater data underwent several validation tests, including those for completeness, sample tracking accuracy, transcription errors, and consistent use of measurement units. No data quality issues were identified which would impact data usability.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. GWPSs were reestablished for the Appendix IV parameters. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether SSLs of Appendix IV parameters were present above the GWPSs. SSLs were identified for beryllium, cobalt, and mercury during the November 2022 event. Therefore, either the unit will move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

2. FGD STACKOUT AREA EVALUATION

2.1 Data Validation and QA/QC

During the November 2022 assessment monitoring event, one set of samples was collected for analysis from the background and compliance wells to meet the requirements of § 352.951(a). Samples from November 2022 were analyzed for all Appendix III and Appendix IV parameters. A summary of data collected during this assessment monitoring event is presented in Table 1.

Chemical analysis was completed by an analytical laboratory certified by the National Environmental Laboratory Accreditation Program. Quality assurance and quality control (QA/QC) samples completed by the analytical laboratory included the use of laboratory reagent blanks, continuing calibration verification samples, and laboratory-fortified blanks.

A data quality review was completed to assess whether the data met the objectives outlined in TCEQ Draft Technical Guidance No. 32 related to groundwater sampling and analysis (TCEQ 2020). As noted in the review memorandum (Attachment B), the data were deemed usable for supporting project objectives. The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.9.6.36 statistics software. The export file was checked against the analytical data for transcription errors and completeness.

2.2 Statistical Analysis

Statistical analyses for the FGD Stackout Area were conducted in accordance with the November 2021 Statistical Analysis Plan (Geosyntec 2021). Time series plots and results for all completed statistical tests are provided in Attachment C.

The data obtained in November 2022 were screened for potential outliers. No outliers were identified for this event.

2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix IV parameter in accordance with the Statistical Analysis Plan (Geosyntec 2021). The established GWPS was set to whichever was greater of the background concentration and the maximum contaminant level for each Appendix IV parameter. To determine background concentrations, an upper tolerance limit was calculated using data that were pooled from the background wells collected during the background monitoring and assessment monitoring events. Tolerance limits were calculated parametrically with 95% coverage and 95% confidence for barium and combined radium. Nonparametric tolerance limits were calculated for arsenic, beryllium, chromium, cobalt, fluoride, and lithium due to apparent nonnormal distributions and for antimony, cadmium, lead, mercury, molybdenum, selenium, and thallium due to a high nondetect frequency. Tolerance limits and the final GWPSs are summarized in Table 2.

2.2.2 Evaluation of Potential Appendix IV SSLs

A confidence interval was constructed for each Appendix IV parameter at each compliance well. Confidence limits were generally calculated parametrically ($\alpha = 0.01$). However, nonparametric confidence limits were calculated in some cases (e.g., when the data did not appear to be normally distributed or when the nondetect frequency was too high).

Seasonal patterns were observed for several parameters at AD-22 based on the time series graphs (Attachment C). Kruskal-Wallis tests were performed to test whether differences between the results from different seasons were statistically significant for all Appendix IV constituents. Statistically significant differences were found for cadmium, cobalt, and lithium at AD-22. Where the Kruskal-Wallis test found significant seasonal effects, the data for these well/parameter pairs were deseasonalized so that the resulting confidence limits correctly account for seasonality as a predictable pattern rather than a random variation or a release.

An SSL was concluded if the lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). Calculated confidence limits are shown in Attachment B.

The following SSLs were identified at the Pirkey FGD Stackout Area:

- The LCL for beryllium exceeded the GWPS of 0.00400 milligrams per liter (mg/L) at AD-22 (0.00468 mg/L).
- The deseasonalized LCL for cobalt exceeded the GWPS of 0.0560 mg/L at AD-22 (0.0713 mg/L).
- The LCL for mercury exceeded the GWPS of 0.00200 mg/L at AD-33 (0.00216 mg/L).

As a result, either the Pirkey FGD Stackout Area will move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring.

2.2.3 Establishment of Appendix III Prediction Limits

Upper prediction limits (UPLs) were previously established for all Appendix III parameters following the background monitoring period. Intrawell tests were used to evaluate potential SSIs for calcium, pH and total dissolved solids (TDS), and interwell tests were used to evaluate potential SSIs for boron, chloride, fluoride, and sulfate. Interwell and intrawell prediction limits are updated periodically during the assessment monitoring period as sufficient data become available.

Mann-Whitney tests (Wilcoxon rank-sum tests) were performed to determine whether the newer data are affected by a release from the FGD Stackout Area. Because the interwell Appendix III limits and the Appendix IV GWPSs are based on data from upgradient wells, which were not expected to have been impacted by a release, these tests were used for intrawell Appendix III tests only. Mann-Whitney tests were used to compare the medians of historical data (May 2016–June 2020) with the more recent compliance samples (November 2020–June 2022). Results were evaluated to determine whether the medians of the two groups were similar at the 99% confidence level. Where no significant difference was found, the new compliance data were added to the background data set.

The complete Mann-Whitney test results and a summary of the significant findings can be found in Attachment C. No statistically significant differences were found between the two groups. Therefore, the background data sets for calcium, pH, and TDS were updated to include all available data through June 2022.

Prediction limits for the interwell tests were recalculated using data collected during the 2022 assessment monitoring events. New background well data were tested for outliers before being added to the background data set. Background well data were also evaluated for statistically significant trends using the Sen's Slope/Mann-Kendall trend test, and the results are included in Attachment C.

After the revised background set was established, a parametric or nonparametric analysis was selected based on the distribution of the data and the frequency of nondetect data. Estimated results under the reporting limit (i.e., practical quantitation limit [PQL]) but above the method detection limit—that is, “J-flagged” data—were considered detections and the estimated results were used in the statistical analyses. Nonparametric analyses were selected for data sets with at least 50% nondetect data or data sets that could not be normalized. Parametric analyses were selected for data sets (either transformed or untransformed) that passed the Shapiro-Wilk/Shapiro-Francia test for normality. The Kaplan-Meier nondetect adjustment was applied to data sets with between 15% and 50% nondetect data. For data sets with fewer than 15% nondetect data, nondetect data were replaced with one half of the PQL. The selected analysis (i.e., parametric or nonparametric) and transformation (where applicable) for each background data set are shown in Attachment B.

Interwell UPLs were updated for boron, chloride, fluoride, and sulfate using historical data through November 2022. Intrawell UPLs for calcium, pH, and TDS and intrawell lower prediction limits (LPLs) for pH were updated using data through June 2022 to represent background values. The updated prediction limits are summarized in Table 3. The prediction limits were calculated for a one-of-two retesting procedure: If at least one sample in a series of two is not above the UPL (or, in the case of pH, is neither less than the LPL nor greater than the UPL), then it can be concluded that an SSI has not occurred. In practice, where the initial result does not exceed the UPL (or, in the case of pH, is neither less than the LPL nor greater than the UPL), a second sample will not be collected. The retesting procedures allow achieving an acceptably high statistical power to detect changes at downgradient wells for constituents evaluated using intrawell prediction limits.

2.2.4 Evaluation of Potential Appendix III SSIs

While SSLs were identified for Appendix IV parameters, a review of the Appendix III results was also completed to assess whether concentrations of Appendix III parameters at the compliance wells exceeded background concentrations.

Data collected during the November 2022 assessment monitoring event from each compliance well were compared to the recalculated prediction limits to evaluate results above background values. The results from this event and the prediction limits are summarized in Table 3. The following exceedances of the UPLs were noted:

- Boron concentrations exceeded the interwell UPL of 0.0859 mg/L at AD-7 (9.38 mg/L) AD-33 (0.086 mg/L).

- Chloride concentrations exceeded the interwell UPL of 54.5 mg/L at AD-7 (69.7 mg/L) and AD-22 (101 mg/L).
- Sulfate concentrations exceeded the interwell UPL of 138 mg/L at AD-22 (251 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the November 2022 sample was above the UPL or below the LPL. Based on these results, concentrations of Appendix III constituents appear to be above background levels at compliance wells.

2.3 Conclusions

A semiannual assessment monitoring event was conducted at the FGD Stackout Area in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that impacted data usability. A review of outliers identified no potential outliers in the November 2022 data. GWPSs were reestablished for the Appendix IV parameters. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval exceeded the GWPS. SSLs were identified for beryllium, cobalt, and mercury. Appendix III parameters were compared to established prediction limits, with exceedances identified for boron, chloride, and sulfate.

Based on this evaluation, either the Pirkey FGD Stackout Area CCR unit will move to an assessment of corrective measures or an ASD will be conducted to evaluate whether the unit can remain in assessment monitoring.

3. REFERENCES

- TCEQ. 2020. Topic: Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action Draft Technical Guidance No. 32. May.
- Geosyntec. 2021. Statistical Analysis Plan – H.W. Pirkey Plant. Geosyntec Consultants, Inc. November.
- Geosyntec. 2022. Statistical Analysis Summary – Flue Gas Desulfurization Stackout Area, Pirkey, Hallsville, Texas. Geosyntec Consultants, Inc. October.
- Geosyntec. 2023. Alternative Source Demonstration Report - Texas State CCR Rule. H.W. Pirkey Power Plant Flue Gas Desulfurization (FGD) Stackout Area Hallsville, Texas. Geosyntec Consultants, Inc. January.

TABLES

**Table 1. Groundwater Data Summary
Statistical Analysis Summary
Pirkey Plant - FGD Stackout Area**

Well ID		AD-7	AD-12	AD-13	AD-22	AD-33
Well Classification		Compliance	Background	Background	Compliance	Compliance
Parameter	Unit	11/16/2022	11/15/2022	11/15/2022	11/14/2022	11/15/2022
Antimony	µg/L	0.1 U1	0.1 U1	0.1 U1	0.1 U1	0.1 U1
Arsenic	µg/L	0.43	0.06 J1	1.62	2.40	0.37
Barium	µg/L	55.2	30.6	44.2	20.8	49.4
Beryllium	µg/L	2.49	0.153	0.131	2.16	0.945
Boron	mg/L	9.38	0.013 J1	0.095	0.021 J1	0.086
Cadmium	µg/L	0.880	0.007 J1	0.02 U1	0.494	0.038
Calcium	mg/L	5.20	0.36	8.57	10.5	0.90
Chloride	mg/L	69.7	8.03	41.3	101	9.18
Chromium	µg/L	0.35	0.45	0.35	0.47	0.44
Cobalt	µg/L	31.8	1.59	45.9	60.3	6.83
Combined Radium	pCi/L	4.13	1.46	1.55	2.7	3.66
Fluoride	mg/L	0.23	0.08	0.36	0.28	0.16
Lead	µg/L	0.27	0.08 J1	0.2 U1	0.22	0.22
Lithium	mg/L	0.110	0.0119	0.141	0.0905	0.0185
Mercury	µg/L	0.037	0.005 U1	0.005 U1	0.410	5.900
Molybdenum	µg/L	0.5 U1	0.5 U1	0.5 U1	0.5 U1	0.5 U1
Selenium	µg/L	1.49	0.23 J1	0.5 U1	1.93	0.96
Sulfate	mg/L	60.5	3.39	69.6	251	42.7
Thallium	µg/L	0.19 J1	0.2 U1	0.2 U1	0.14 J1	0.2 U1
Total Dissolved Solids	mg/L	300	70	260	570	140
pH	SU	3.62	4.73	5.81	4.77	3.96

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U1: Not detected at or above method detection limit (MDL). For statistical analysis, parameters that were not detected were replaced with the reporting limit.

J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

FGD: Flue Gas Desulfurization

**Table 2. Appendix IV Groundwater Protection Standards
Statistical Analysis Summary
Pirkey Plant - FGD Stackout Area**

Constituent Name	MCL	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600	0.000100	0.00600
Arsenic, Total (mg/L)	0.0100	0.00900	0.0100
Barium, Total (mg/L)	2.00	0.0528	2.00
Beryllium, Total (mg/L)	0.00400	0.00200	0.00400
Cadmium, Total (mg/L)	0.00500	0.000860	0.00500
Chromium, Total (mg/L)	0.100	0.00400	0.100
Cobalt, Total (mg/L)	n/a	0.0562	0.0562
Combined Radium, Total (pCi/L)	5.00	2.89	5.00
Fluoride, Total (mg/L)	4.00	1.00	4.00
Lead, Total (mg/L)	n/a	0.00500	0.00500
Lithium, Total (mg/L)	n/a	0.165	0.165
Mercury, Total (mg/L)	0.00200	0.0000193	0.00200
Molybdenum, Total (mg/L)	n/a	0.00500	0.00500
Selenium, Total (mg/L)	0.0500	0.00386	0.0500
Thallium, Total (mg/L)	0.00200	0.00144	0.00200

Notes:

Calculated UTL (Upper Tolerance Limit) represents site-specific background values.

Grey cells indicate the GWPS is based on the calculated UTL. Either the UTL is higher than the MCL or an MCL does not exist.

mg/L: milligrams per liter

pCi/L: picocuries per liter

MCL: maximum contaminant level

GWPS: groundwater protection standard

FGD: flue gas desulfurization

**Table 3. Appendix III Data Summary
Statistical Analysis Summary
Pirkey - FGD Stackout Area**

Analyte	Unit	Description	AD-7	AD-22	AD-33
			11/16/2022	11/14/2022	11/15/2022
Boron	mg/L	Interwell Background Value (UPL)	0.0859		
		Analytical Result	9.38	0.021	0.086
Calcium	mg/L	Intrawell Background Value (UPL)	6.26	16.3	2.22
		Analytical Result	5.20	10.5	0.90
Chloride	mg/L	Interwell Background Value (UPL)	54.5		
		Analytical Result	69.7	101	9.18
Fluoride	mg/L	Interwell Background Value (UPL)	1.00		
		Analytical Result	0.23	0.28	0.16
pH	SU	Intrawell Background Value (UPL)	4.2	5.0	4.6
		Intrawell Background Value (LPL)	3.0	3.5	3.1
		Analytical Result	3.6	4.8	4.0
Sulfate	mg/L	Interwell Background Value (UPL)	138		
		Analytical Result	60.5	251	42.7
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	332	735	217
		Analytical Result	300	570	140

Notes:

Bold values exceed the background value.

Background values are shaded gray.

mg/L: milligrams per liter

SU: standard units

UPL: upper prediction limit

LPL: lower prediction limit

FGD: flue gas desulfurization

ATTACHMENT A

Certification by Certified Professional Engineer

Certification by Qualified Professional Engineer

I certify that selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Pirkey Bottom Ash Pond CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

David Anthony Miller

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



112498

License Number

Texas

Licensing State

03.29.2023

Date

ATTACHMENT B
Data Quality Review Memorandum

Memorandum

Date: January 20, 2023
To: David Miller (AEP)
Copies to: Leslie Fuerschbach (AEP)
From: Allison Kreinberg (Geosyntec)
Subject: Data Quality Review – H.W. Pirkey Power Plant
November 2022 Sampling Event

This memorandum summarizes the findings of a data quality review for groundwater samples collected at the H.W. Pirkey Power Plant, located in Pittsburg, Texas in November 2022. The groundwater samples were collected to comply with the Texas Commission on Environmental Quality's (TCEQ's) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Title 30 Chapter 352, "CCR Rule"). The groundwater samples were analyzed for 40 CFR 257 Appendix III and IV constituents, plus additional constituents collected to support site evaluation efforts.

The following sample data groups (SDGs) were associated with the November 2022 sampling event and are reviewed in this memorandum:

- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 223647
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 223649
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 223664
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 223668

The laboratory reports for SDGs 223647 and 223649 were reissued in December 2022 with amended matrix spike precision calculations. The data included in the revised laboratory reports associated with these SDGs were reviewed to assess if they met the objectives outlined in TCEQ Draft Technical Guideline No. 32¹ prior to submittal of this data to TCEQ.

¹ TCEQ. 2020. Topic: Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action Draft Technical Guidance No. 32. May.

The following data quality issues were identified:

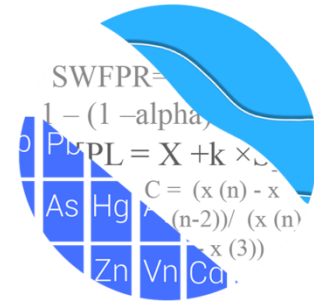
- As reported in SDG 223664, chromium, cobalt, and molybdenum were detected in the equipment blank sample “Equipment Blank” collected on 11/16/2022. The detected chromium concentration in the equipment blank (0.47 µg/L) was more than 10% of the detected values in the groundwater samples, which could result in high bias for all groundwater chromium results. The detected cobalt concentration in the equipment blank (0.143 µg/L) was more than 10% of the detected value in sample “AD-18” (0.723 µg/L), which could result in high bias in the “AD-18” cobalt results. The estimated molybdenum concentration in the equipment blank (0.2 µg/L) was more than 10% of the detected value in sample “Duplicate-2” (0.2 µg/L), which could result in high bias in the “Duplicate-2” molybdenum results. Molybdenum was not detected in the other groundwater samples.
- As reported in SDG 223649, the relative percent difference (RPD) for sulfate concentrations from parent sample “AD-36” and duplicate sample “Landfill Duplicate” was 86%. The “AD-36” sulfate results should be considered estimated.
- As reported in SDG 223664, the following matrix spike (MS) and matrix spike duplicate (MSD) recovery for sodium (160% and 223%, respectively) associated with sample “AD-2” was above the acceptable range of 75-125%. The MS recovery for sodium (50.4%) associated with sample “AD-30” was below the acceptable range of 75-125%. The associated samples (“AD-2” and “AD-30”) were flagged M1: the associated MS or MSD recovery was outside acceptance limits. The “AD-2” and “AD-30” sodium results should be considered estimated. Sodium is not a regulated Appendix III or IV constituent.
- As reported in SDG 223664, the RPD for radium-226 (52.5%) in the laboratory duplicate was above the acceptable limit of 25%. The “AD-12” radium-226 result was flagged P1: the precision between duplicate results was above acceptance limits. The “AD-12” radium-226 results should be considered estimated.

Based on these findings, the majority of the data reported in these SDGs are considered accurate and complete. Although the QC failures mentioned above will result in some limitations of data use since the affected results are considered estimated or have elevated reporting limits, the data are considered usable for supporting project objectives.

ATTACHMENT C

Statistical Analysis Output

GROUNDWATER STATS CONSULTING



March 24, 2023

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
500 W. Wilson Bridge Road, Suite 250
Worthington, OH 43085

Re: Pirkey Stackout
Background Update & Assessment Monitoring Event – November 2022

Dear Ms. Kreinberg,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the background update and statistical analysis of groundwater data for the November 2022 sample event for American Electric Power Inc.'s Pirkey Stackout. The analysis complies with the Texas Commission of Environmental Quality rule 30 TAC 352 as well as with the United States Environmental Protection Agency (USEPA) Unified Guidance (2009).

Sampling began at the site for the CCR program in 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** AD-12 and AD-13
- **Downgradient wells:** AD-22, AD-33, and AD-7

Data were sent electronically to Groundwater Stats Consulting, and the statistical analysis was conducted according to the Statistical Analysis Plan and screening evaluation prepared by GSC and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GSC. The analysis was reviewed by Kristina Rayner, Founder and Senior Statistician to Groundwater Stats Consulting.

The CCR program consists of the following constituents:

- **Appendix III** (Detection Monitoring) – boron, calcium, chloride, fluoride, pH, sulfate, and TDS
- **Appendix IV** (Assessment Monitoring) – antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium

Time series plots for these parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record (Figure A). Additionally, box plots are included for all constituents at upgradient and downgradient wells (Figure B). All flagged values may also be seen in a lighter font and disconnected symbol on the time series graphs (Figure C).

A change in reported concentrations of more recent data was previously noted for mercury relative to historical concentrations in wells AD-22 and AD-33. In order to construct confidence intervals that represent current groundwater quality conditions and eliminate the influence of the trend, earlier concentrations were truncated from the records. A list of well/constituent pairs using truncated records follows this report.

In the previous background screening, data at all wells were evaluated for the following: 1) outliers; 2) trends; 3) most appropriate statistical method for Appendix III parameters based on site characteristics of groundwater data upgradient of the facility; and 4) eligibility of downgradient wells when intrawell statistical methods are recommended. Power curves were provided with the background screening report submitted in December 2017 and demonstrated that the selected statistical methods for Appendix III parameters comply with the USEPA Unified Guidance recommendations.

Summary of Appendix III Statistical Methods

The most appropriate statistical methods for each parameter as recommended in the 2017 screening analysis were as follows:

- 1) Intrawell prediction limits, combined with a 1-of-2 resample plan, for calcium, pH, and TDS
- 2) Interwell prediction limits, combined with a 1-of-2 resample plan, for boron, chloride, fluoride, and sulfate

Parametric prediction limits are utilized when the screened historical data follow a normal or transformed-normal distribution. When data cannot be normalized or the majority of

data are non-detects, a nonparametric test is utilized. The distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (US EPA, 2009), data are analyzed using either parametric or non-parametric prediction limits as appropriate. Non-detects are handled as follows:

- No statistical analyses are required on wells and analytes containing 100% non-detects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% non-detects, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for non-detects is the most practical quantification limit (PQL) as reported by the laboratory.
- When data contain between 15-50% non-detects, the Kaplan-Meier non-detect adjustment is applied to the background data. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.
- Nonparametric prediction limits are used on data containing greater than 50% non-detects.

Natural systems continuously evolve due to physical changes made to the environment. Examples include capping a landfill, paving areas near a well, or lining a drainage channel to prevent erosion. Periodic updating of background statistical limits will be necessary to accommodate these types of changes. In the interwell case, statistical limits may be updated with all upgradient well data after careful screening for new outliers. In the intrawell case, data for all wells and constituents are re-evaluated when a minimum of 4 new data points are available to determine whether earlier concentrations are representative of present-day groundwater quality. In some cases, the earlier portion of data are deselected prior to construction of limits in order to provide sensitive limits that will rapidly detect changes in groundwater quality. Even though the data are excluded from the calculation, the values will continue to be reported and shown in tables and graphs.

Note that while the most recent PQL is used for non-detect values, the historic reporting limit of 0.005 mg/L was used for lead and molybdenum in order to maintain statistical limits that are conservative from a regulatory perspective.

Summary of Original Background Screening Conducted in December 2017

Outlier Evaluation

Time series plots were used to identify suspected outliers, or extreme values that would result in limits that are not conservative from a regulatory perspective, in proposed background data. Suspected outliers at all wells for Appendix III and Appendix IV parameters were formally tested using Tukey's box plot method and, when identified by Tukey's test or visual comparison with other data, flagged in the computer database with "o" and deselected prior to construction of statistical limits.

Tukey's outlier test noted a few outliers, and the results were submitted with the screening report. For the downgradient well data that are used to construct confidence intervals, a regulatory conservative approach is taken in that values that are marginally high relative to the rest of the data are retained unless there is particular justification for excluding them. However, during the 9/7/16 sample event, several reported measurements for a number of constituents were remarkably high, suggesting a likely systematic error. Therefore, those values were flagged as outliers.

Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate all data at each well to identify statistically significant increasing or decreasing trends. In the absence of suspected contamination, significant trending data are typically not included as part of the background data used for construction of prediction limits. Exclusion of trending data produces conservative limits that better represent current background concentrations.

The results of the trend analyses showed no statistically significant trends; therefore, no adjustments were made to the data sets.

Appendix III – Determination of Statistical Methods

The most appropriate statistical method, i.e., interwell or intrawell prediction limits as listed above for each Appendix III parameter, was recommended based on two criteria: 1) spatial variability of each parameter among upgradient wells and 2) comparison of average concentrations in each downgradient well to the expected upper limit of concentrations across all upgradient wells. The results of the application of Analysis of Variance, upgradient tolerance limits, and downgradient confidence intervals were included in the 2017 screening study report.

Summaries of Background Updates

December 2020

Prior to updating background, data were evaluated using Tukey's outlier test and visual screening through the June 2020 sample event for Appendix III parameters at all wells. For Appendix IV parameters, pooled upgradient well data were evaluated using Tukey's test and visual screening. Previously flagged data were re-evaluated. For several constituents, the reporting limit changed--usually decreased--over time. For the screening non-detect data were analyzed using the reporting limit as originally entered into the database. However, when a non-detect substitution could result in a misleadingly high statistical limit, those data were flagged as outliers and deselected prior to computing limits. In particular, the reporting limit during the February and May 2019 events for molybdenum at all wells (except for well AD-7 in February) was 0.04 mg/L, compared to the previous reporting limit of 0.002 mg/L. The resulting non-detects, reported at 0.04 mg/L, were censored at much higher levels than the rest of the data and, therefore, were flagged as outliers. The reporting limit (practical quantitation limit) for the February 2019 event for thallium also increased from the historical reporting limit of 0.002 mg/L to 0.01 mg/L for all wells. However, since no detections were present above the method detection limit of 0.002 mg/L, the historical reporting limit of 0.002 mg/L was used for historic non-detects, and the non-detects with a reporting limit of 0.01 mg/L were flagged as outliers. A list of all flagged measurements was submitted with the report.

Several constituents appeared to have seasonal patterns for well AD-22. Therefore, all constituents at this well were tested for seasonality using the Kruskal-Wallis test, and the results were presented with the report. Appendix III constituents with significant seasonality were boron, calcium, fluoride, and sulfate. Appendix IV constituents with significant seasonality were beryllium, cadmium, cobalt, combined radium 226+228, fluoride, and lithium.

For Appendix III constituents evaluated through intrawell methods (calcium, pH, and TDS), the Mann-Whitney (Wilcoxon Rank Sum) test was used to compare the medians of historical data through April 2017 to the new compliance samples at each well through June 2020. The test evaluates whether the groups are statistically different at the 99% confidence level. If no significant difference is found, background data may be updated with compliance data. No significant differences were found; therefore, all records were updated through June 2020.

The Sen's Slope/Mann Kendall trend test was used to evaluate upgradient well data for constituents evaluated through interwell methods (boron, chloride, fluoride, and sulfate)

to identify statistically significant increasing or decreasing trends. Although a statistically significant decreasing trend was identified for fluoride in upgradient well AD-12, the trend is a result of several non-detects followed by reported trace values. Therefore, no adjustment was required at the time for this record.

February 2022

Upgradient well data through November 2021 were re-screened for the purpose of updating the interwell prediction limits for boron, chloride, fluoride, and sulfate and interwell upper tolerance limits for Appendix IV parameters. Intrawell prediction limits will be updated after the Fall 2022 sample event when sufficient compliance samples are available.

Outlier Analysis

Prior to updating background data, upgradient wells were re-evaluated using Tukey's outlier test and visual screening for Appendix III constituents tested with interwell prediction limits and for Appendix IV constituents on historical data through November 2021 (Figure C). Tukey's outlier test on pooled upgradient well data did not identify any potential outliers, and no new values were flagged.

No changes to values flagged in previous background updates occurred. As mentioned above, any flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages.

Seasonality

Several constituents appear to have seasonal patterns for well AD-22. Therefore, all constituents at this well were tested for seasonality using the Kruskal-Wallis test. Appendix III constituents with significant seasonality were boron, calcium, fluoride, and sulfate. Appendix IV constituents with significant seasonality were beryllium, cadmium, cobalt, combined radium 226+228, fluoride, and lithium.

Intrawell Prediction Limits

Intrawell prediction limits, combined with a 1-of-2 resample plan, are constructed using historical data through June 2020 for calcium, pH, and TDS at all wells. Additionally, a deseasonalized prediction limit was constructed for calcium in well AD-22. As discussed earlier, background data sets for calcium, pH, and TDS will be updated after the Fall 2022 sample event when a minimum of 4 new compliance samples are available.

Interwell – Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate data at upgradient wells for boron, chloride, fluoride, and sulfate to identify statistically significant increasing or decreasing trends. A statistically significant decreasing trend was identified for fluoride in upgradient well AD-12; however, the trend is a result of several non-detects followed by reported trace values. Statistically significant increasing trends were identified for chloride and sulfate in upgradient well AD-13; however, the magnitude of the trends would not greatly impact the respective interwell prediction limits. Therefore, no adjustments were required at the time for these records.

Interwell – Prediction Limits

Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed using all pooled upgradient well data through November 2021 for boron, chloride, fluoride, and sulfate. Time series plots were included with the interwell prediction limit graphs to display concentrations at upgradient wells that were used to construct the statistical limits.

February 2023

During this analysis, Tukey's outlier test and visual screening were used to evaluate data through June 2022 at all wells for calcium, pH, and TDS, which are tested using intrawell prediction limits, and through November 2022 at upgradient wells for boron, chloride, fluoride, and sulfate, which are tested using interwell prediction limits. (Figure C).

Outlier Analysis

Tukey's outlier test on all wells for calcium, pH, and TDS did not identify any values. Likewise, Tukey's outlier test on pooled upgradient well data did not identify any values for boron, chloride, fluoride, or sulfate as outliers; therefore, no new values were flagged. Tukey's outlier test results for all Appendix III parameters are shown in Figure C. No changes to values flagged in previous background updates occurred. As mentioned above, any flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages.

Seasonality

Several constituents appear to have seasonal patterns for well AD-22. Therefore, all constituents evaluated with intrawell prediction limits at this well were tested for

seasonality using the Kruskal-Wallis test (Figure D). Calcium, pH, and TDS were as identified with significant seasonality.

Intrawell – Mann-Whitney Test

For calcium, pH, and TDS which are tested using intrawell prediction limits, the Mann-Whitney (Wilcoxon Rank Sum) test was used to compare the medians of historical data through June 2020 to the new compliance samples at each well through June 2022 to evaluate whether the groups are statistically similar at the 99% confidence level, in which case background data may be updated with compliance data (Figure E). No statistically significant differences were identified; therefore, all records were updated with compliance data. A summary of the Mann-Whitney results follows this report. A list of any well/constituent pairs using a truncated portion of their record follows this report.

Intrawell Prediction Limits

Intrawell prediction limits, combined with a 1-of-2 resample plan, are constructed using historical data through June 2022 for calcium, pH, and TDS at all wells. Additionally, a deseasonalized prediction limit was constructed for calcium in well AD-22 (Figure F). No comparison of compliance data was made in this analysis.

Interwell – Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate data at upgradient wells for boron, chloride, fluoride, and sulfate to identify statistically significant increasing or decreasing trends at the 99% confidence level (Figure G). Statistically significant trends were identified for the following well/constituent pairs:

Increasing:

- Chloride: AD-13 (upgradient)
- Sulfate: AD-13 (upgradient)

Decreasing:

- Fluoride: AD-12 (upgradient)

The statistically significant decreasing trend identified for fluoride in upgradient well AD-12 is a result of several non-detects followed by lower reported values. The statistically significant increasing trends identified for chloride and sulfate in upgradient well AD-13 required no adjustments at this time since the magnitude of the trends would not greatly impact the respective interwell prediction limits.

Interwell – Prediction Limits

Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed using all pooled upgradient well data through November 2022 for boron, chloride, fluoride, and sulfate (Figure H). Time series plots were included with the interwell prediction limit graphs to display concentrations at upgradient wells that were used to construct the statistical limits. No comparison of compliance data was made in this analysis.

Evaluation of Appendix IV Constituents – November 2022

As mentioned above, prior to evaluating Appendix IV parameters, background data are screened through visual screening and Tukey's outlier test for potential outliers and extreme trending patterns that would lead to artificially elevated statistical limits. For the current analysis, Tukey's outlier test on pooled upgradient well data for Appendix IV parameters through November 2022 identified high values for selenium. These values were well below the MCL of 0.05 mg/L; therefore, no new values were flagged and no changes to previous outliers were made. A full list of flagged values follows this report (Figure C).

Seasonality

Several constituents appear to have seasonal patterns for well AD-22. Therefore, all constituents evaluated with confidence intervals at this well were tested for seasonality using the Kruskal-Wallis test (Figure D). Appendix IV constituents with significant seasonality were cadmium, cobalt, and lithium.

Interwell Upper Tolerance Limits

Parametric upper tolerance limits were used to calculate background limits from pooled upgradient well data through November 2022 for Appendix IV parameters with a target of 95% confidence and 95% coverage for use as background limits (Figure I). The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples.

Groundwater Protection Standards

These background limits were compared to the Maximum Contaminant Levels (MCLs) as shown in the Groundwater Protection Standard (GWPS) table following this letter to determine the highest limit for use as the GWPS in the Confidence Interval comparisons (Figure J).

Confidence Intervals

Confidence intervals were then constructed on downgradient wells with data through November 2022 for each of the Appendix IV parameters and then compared to the GWPS, i.e., the highest limit of the MCL, or background limit as discussed above (Figure K). Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. Complete graphical results of the confidence intervals follow this letter. An exceedance was identified for the following well/constituent pair:

- Beryllium: AD-22
- Mercury: AD-33

Confidence intervals were constructed on deseasonalized data for well AD-22 when seasonality was identified by the Kruskal-Wallis test and when at least one reported measurement was higher than the established GWPS for a given parameter. The constituents analyzed using deseasonalized data at well AD-22 include cadmium, cobalt, and lithium. The results are included with the confidence intervals provided in Figure K. The following exceedances were identified in the confidence intervals constructed with the original and deseasonalized data:

- Cobalt: AD-22

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Pirkey Stackout. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,



Andrew T. Collins
Project Manager



Kristina L. Rayner
Senior Statistician

Date Ranges

Date: 2/7/2023 4:37 PM

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

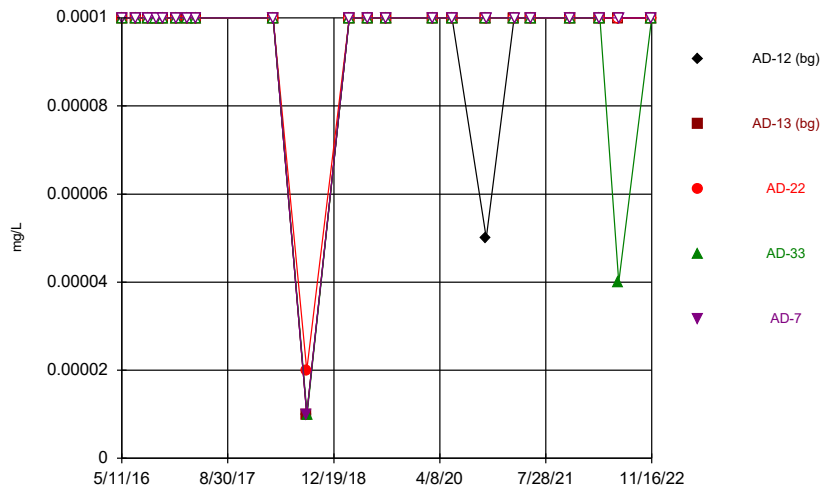
Mercury, total (mg/L)

AD-22 overall:3/10/2020-11/14/2022

AD-33 overall:3/10/2020-11/15/2022

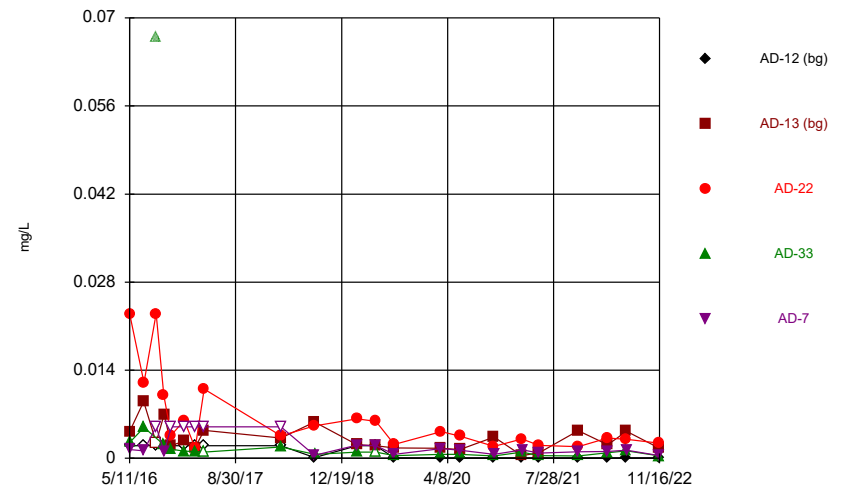
FIGURE A
Time Series

Time Series



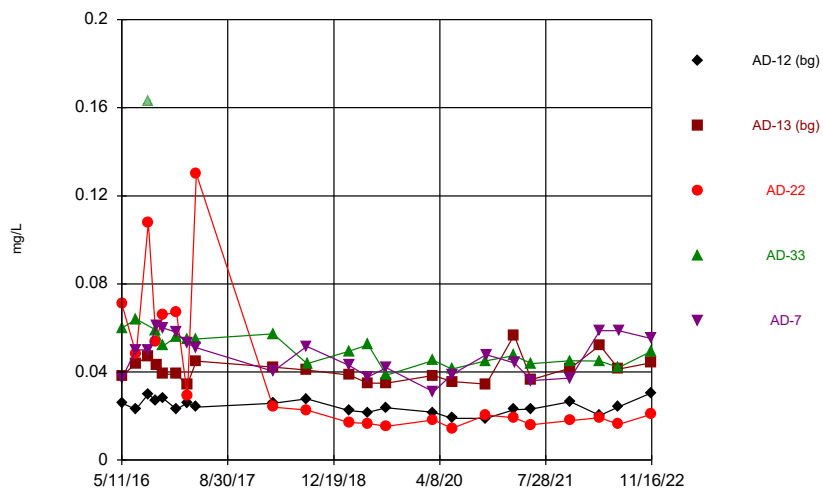
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



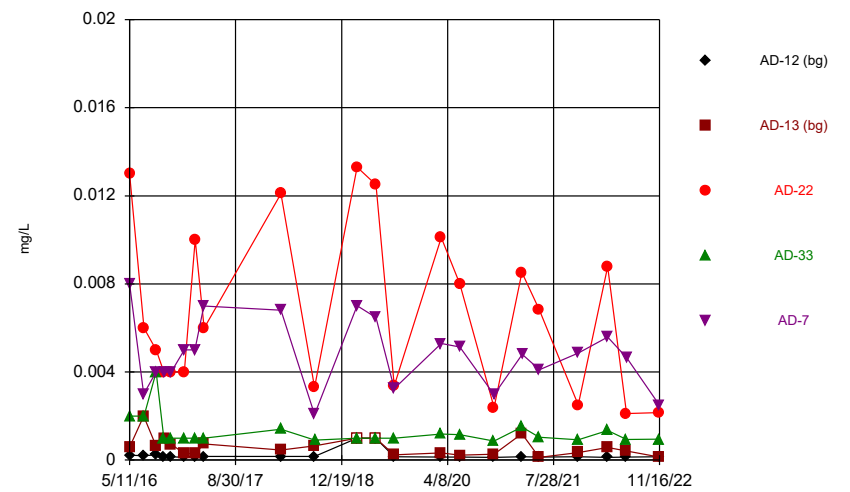
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Time Series



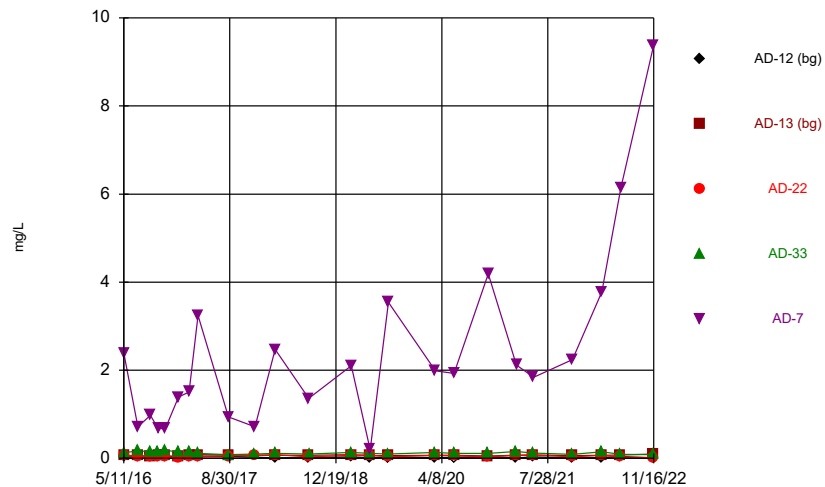
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Time Series

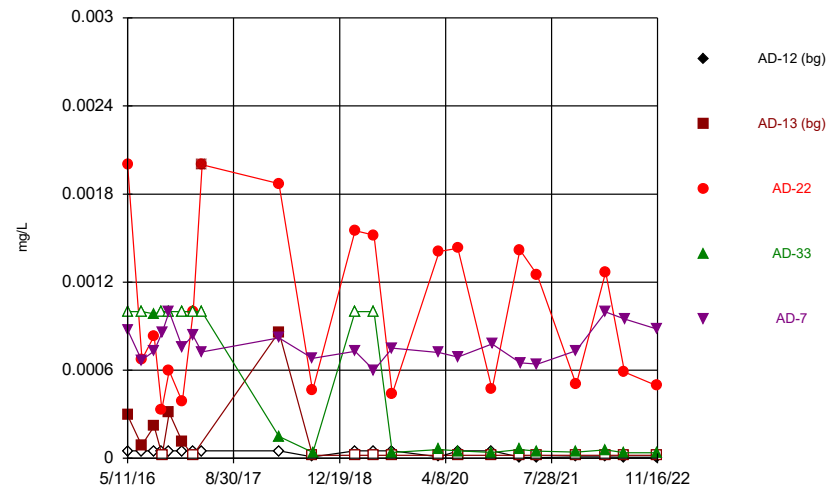


Constituent: Beryllium, total Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

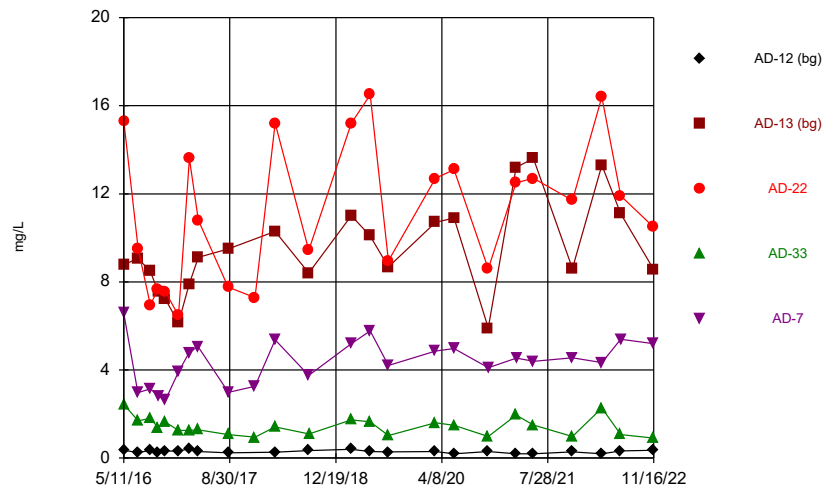
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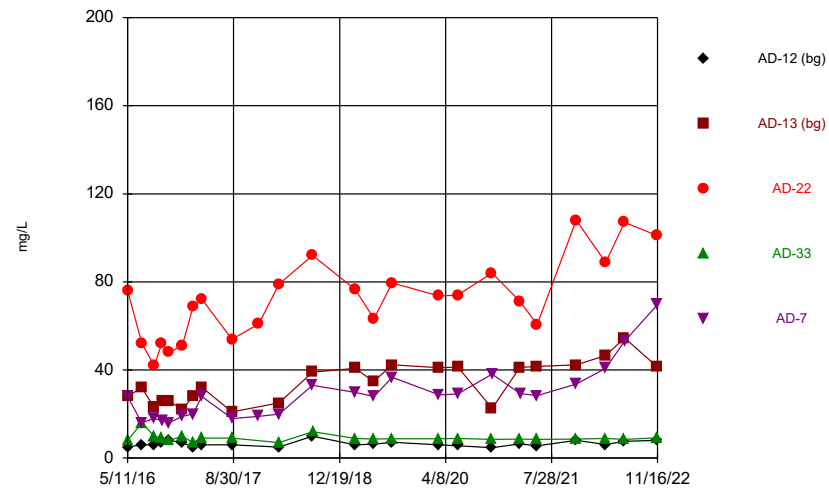
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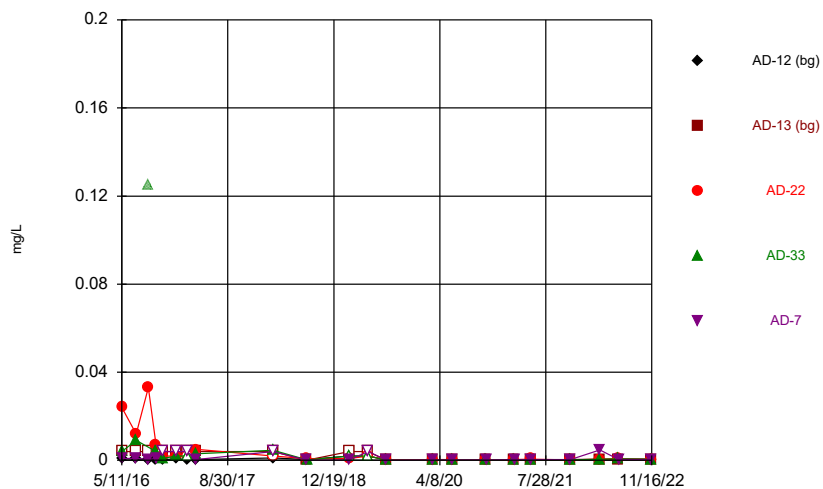
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Time Series

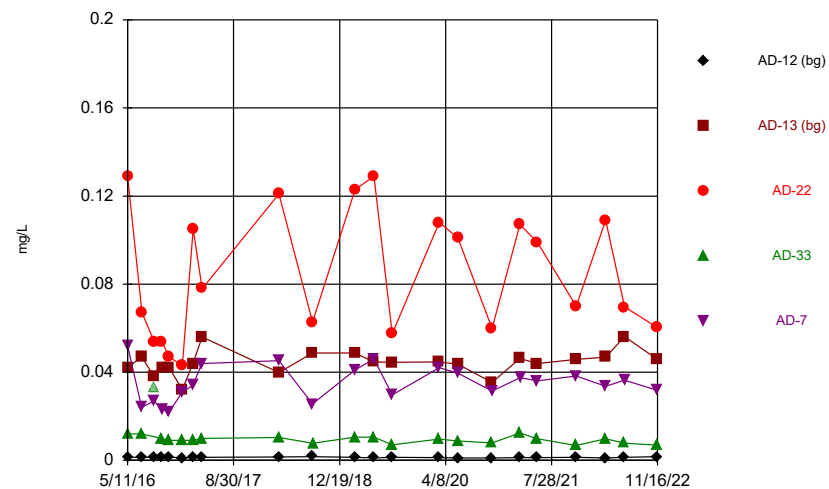


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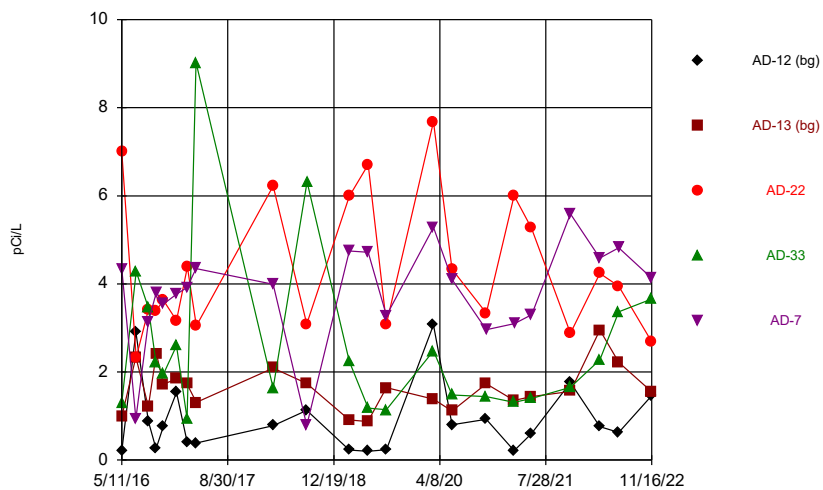
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Time Series



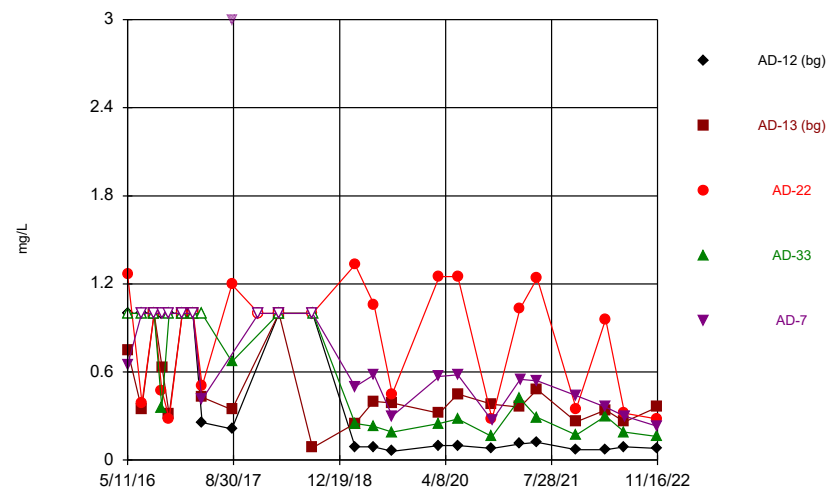
Constituent: Cobalt, total Analysis Run 2/20/2023 9:56 AM
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Time Series



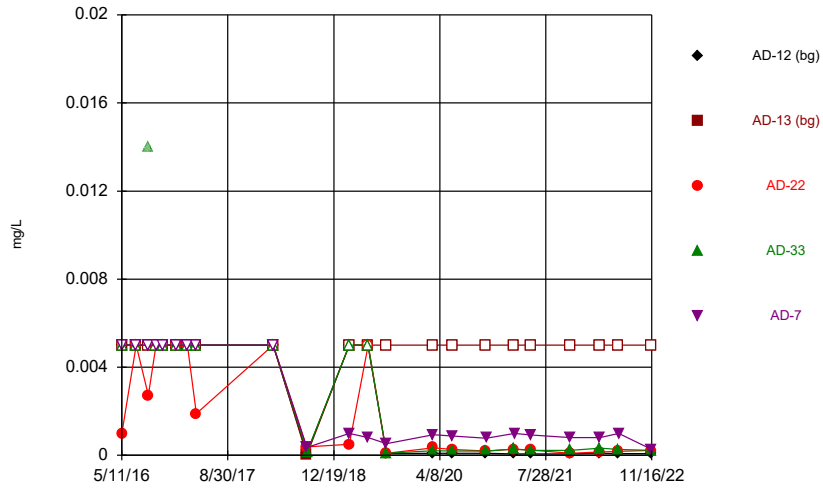
Constituent: Combined Radium 226 + 228 Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



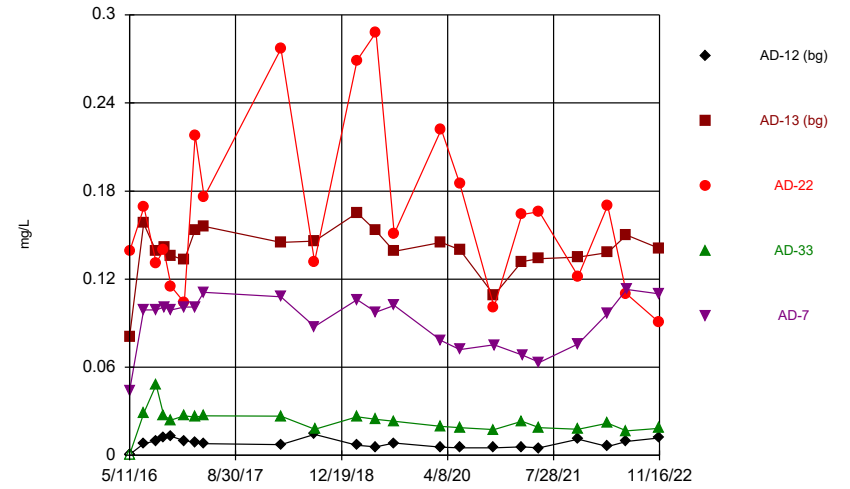
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



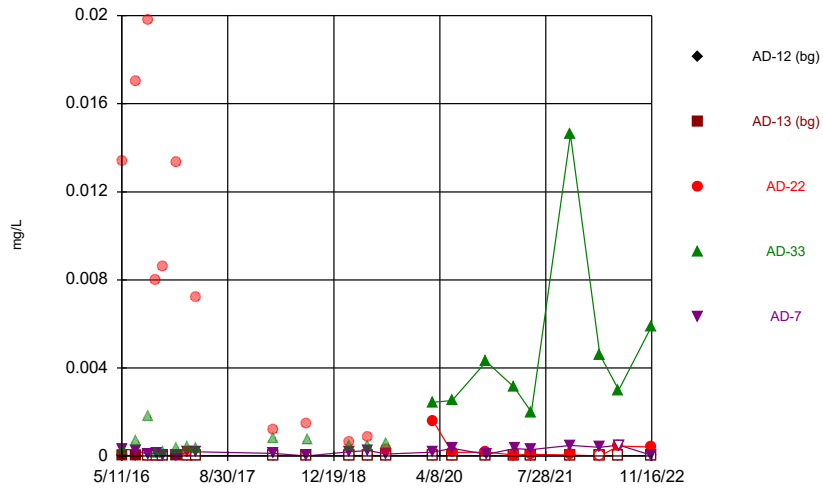
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



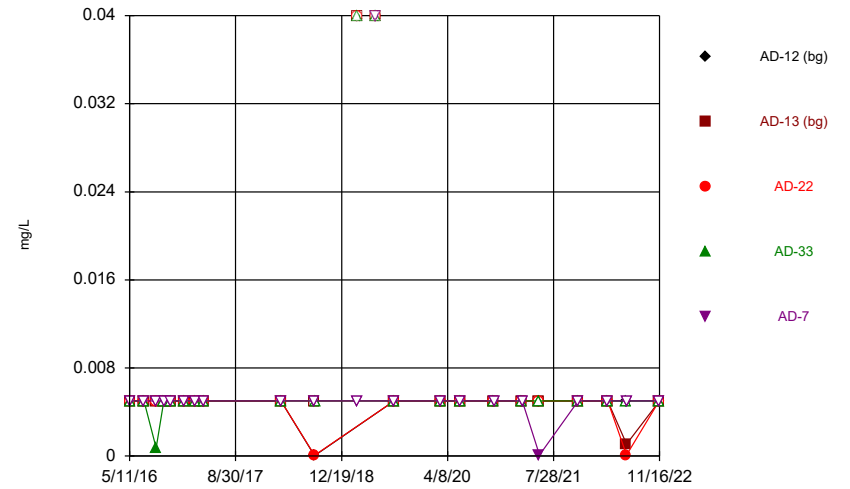
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



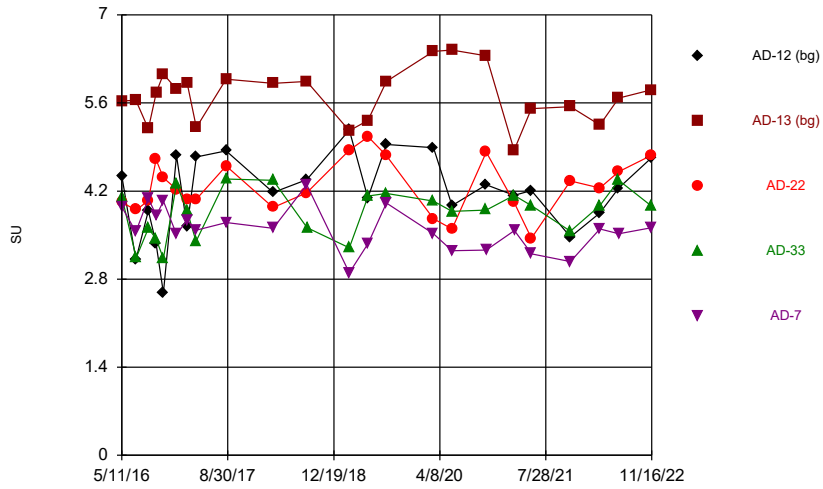
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



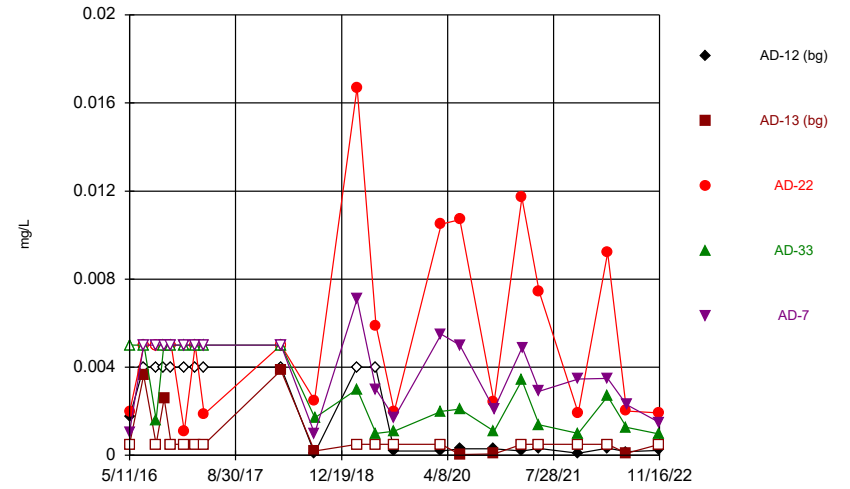
Constituent: Molybdenum, total Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



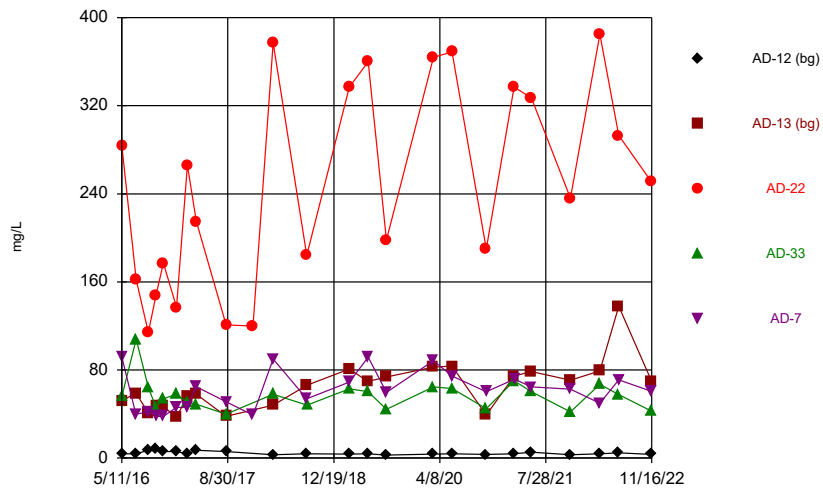
Constituent: pH, field Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



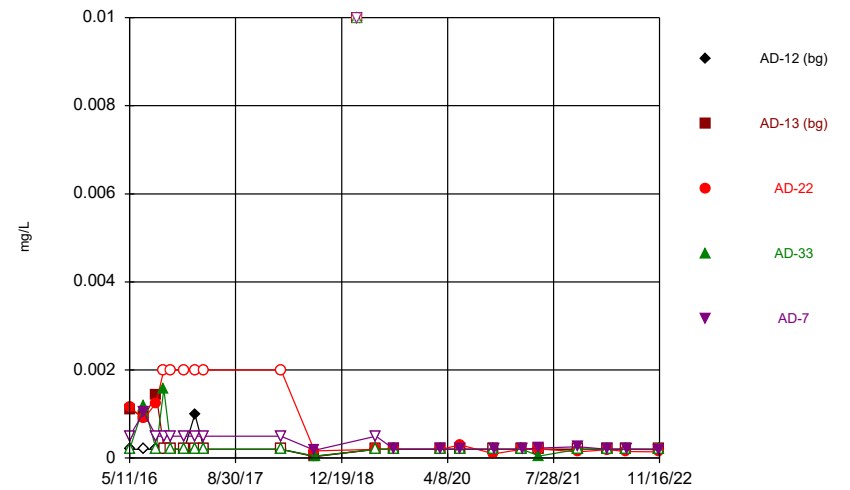
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



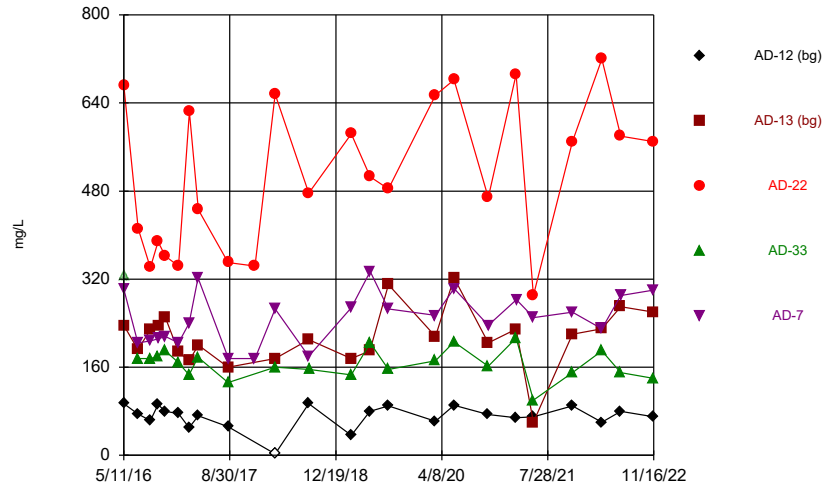
Constituent: Sulfate, total Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Thallium, total Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

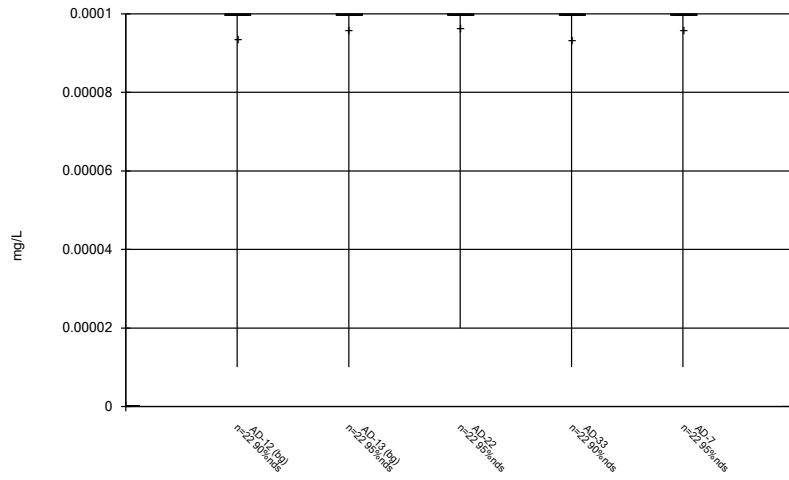
Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/20/2023 9:56 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

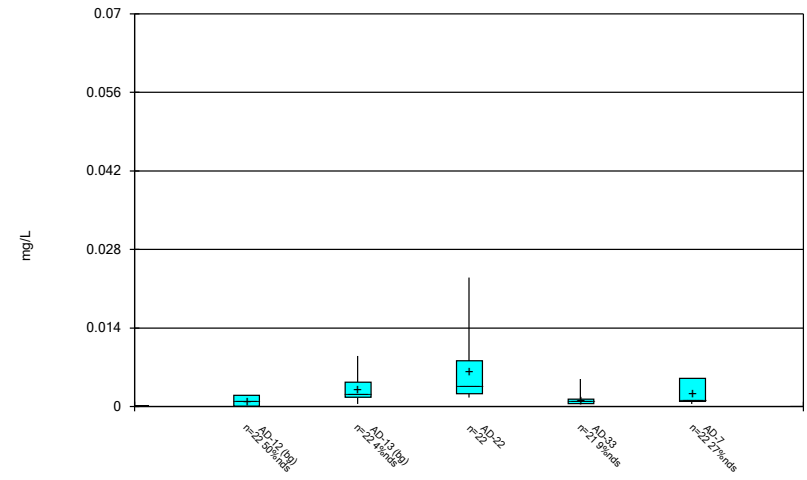
FIGURE B
Box Plots

Box & Whiskers Plot



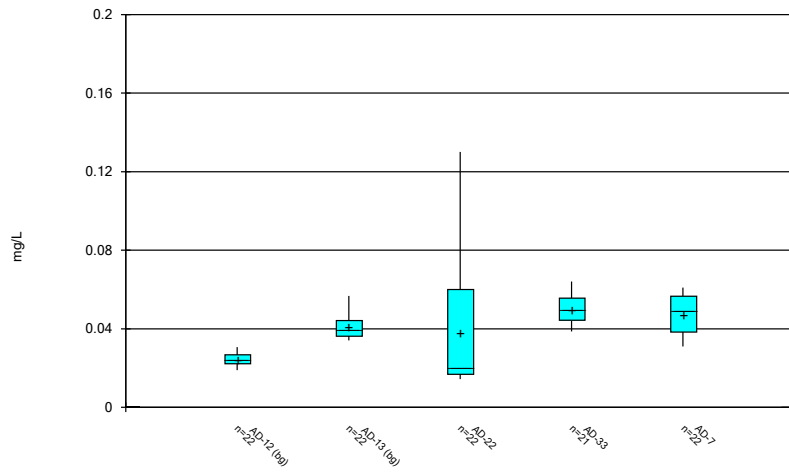
Constituent: Antimony, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



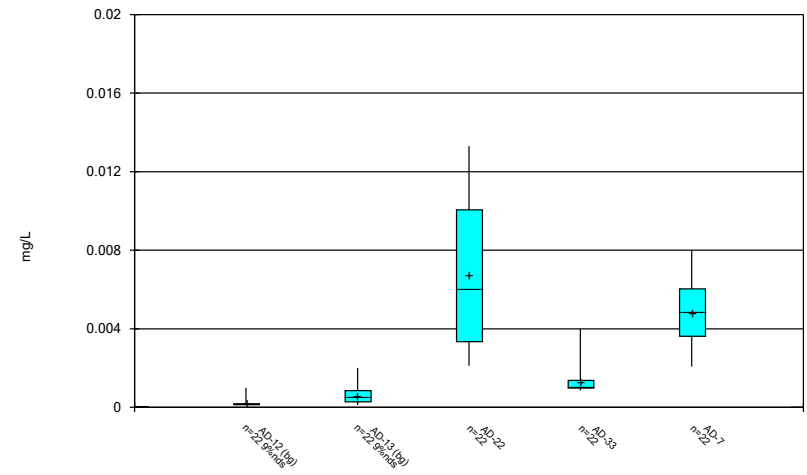
Constituent: Arsenic, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



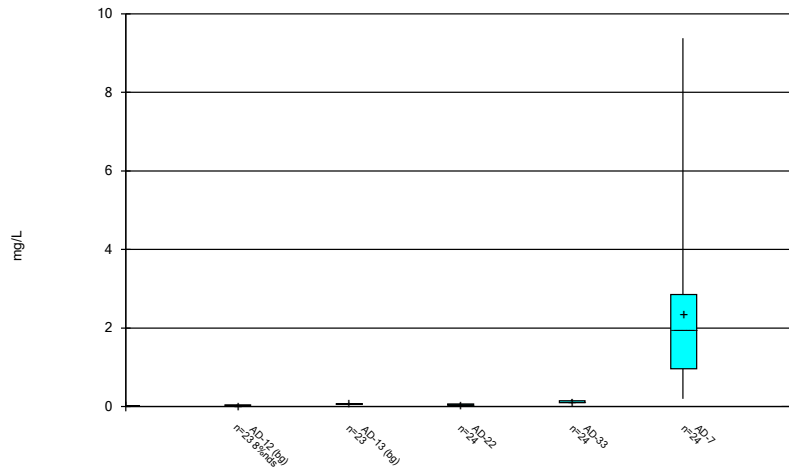
Constituent: Barium, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



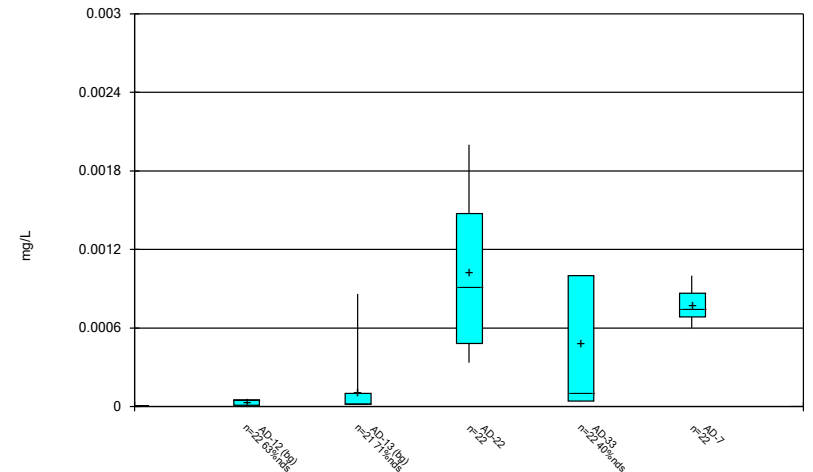
Constituent: Beryllium, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



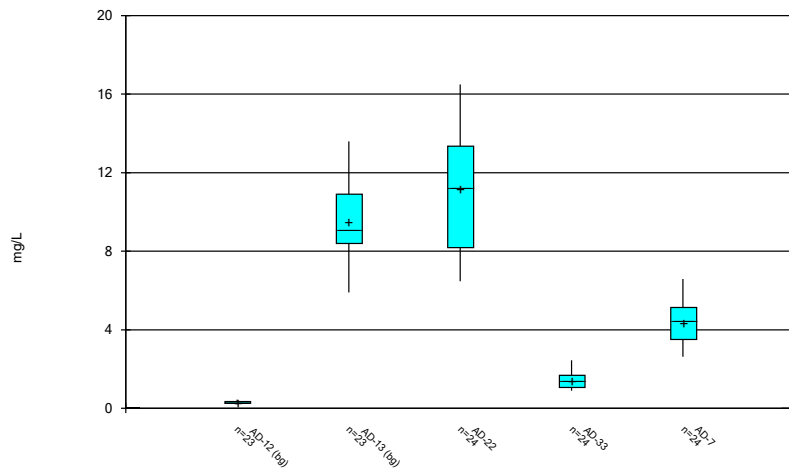
Constituent: Boron, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



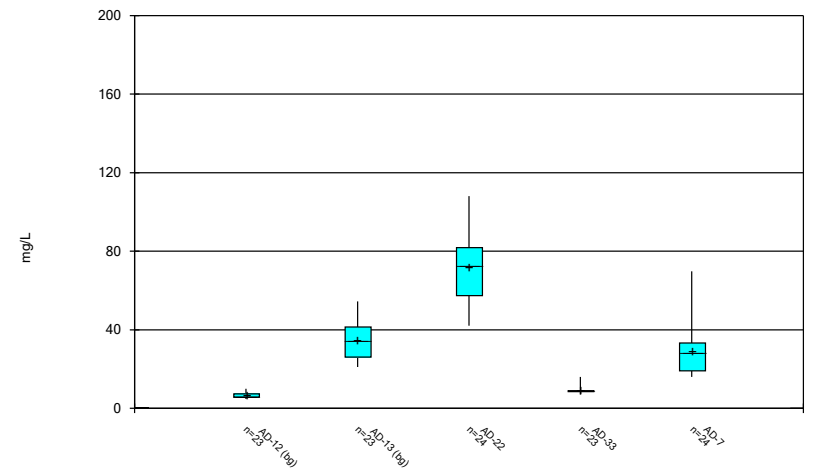
Constituent: Cadmium, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



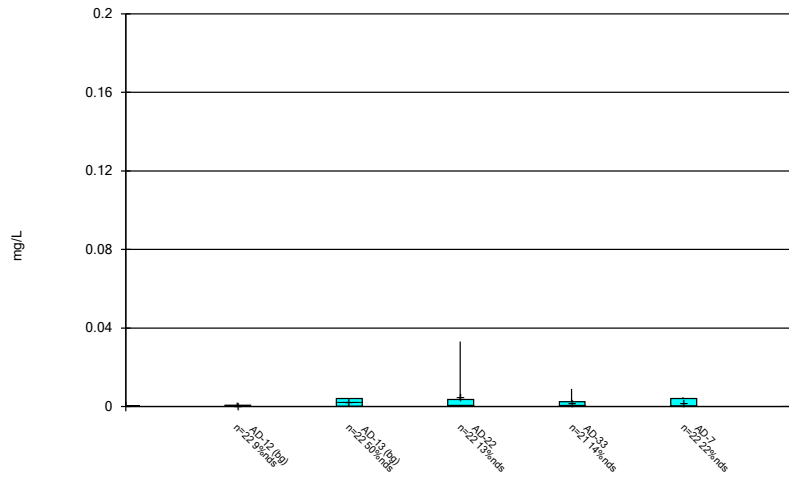
Constituent: Calcium, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



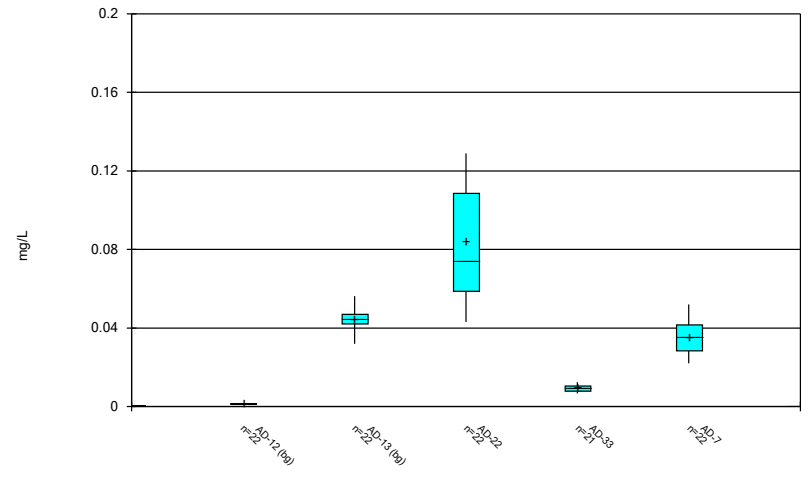
Constituent: Chloride, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



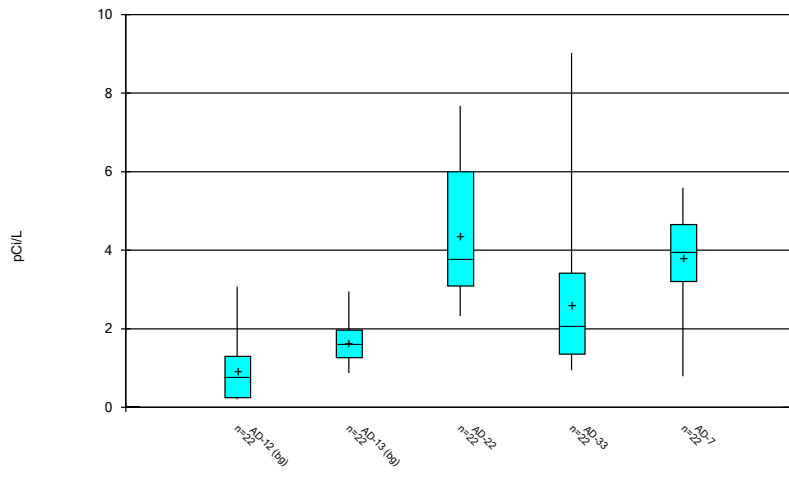
Constituent: Chromium, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



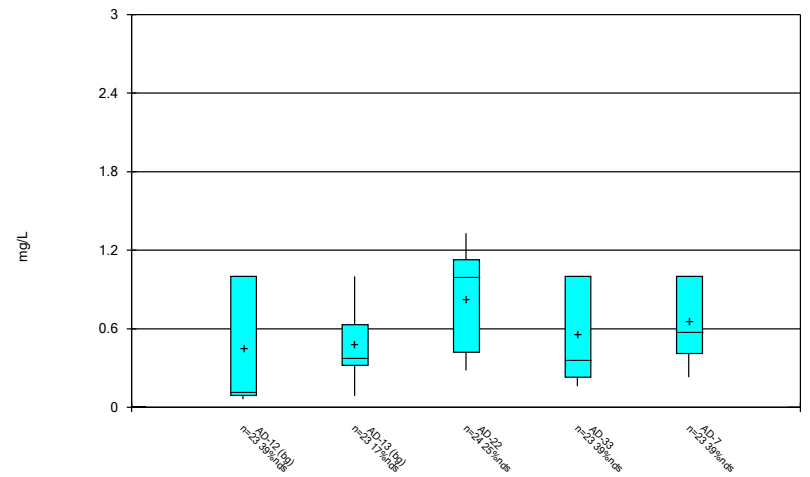
Constituent: Cobalt, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



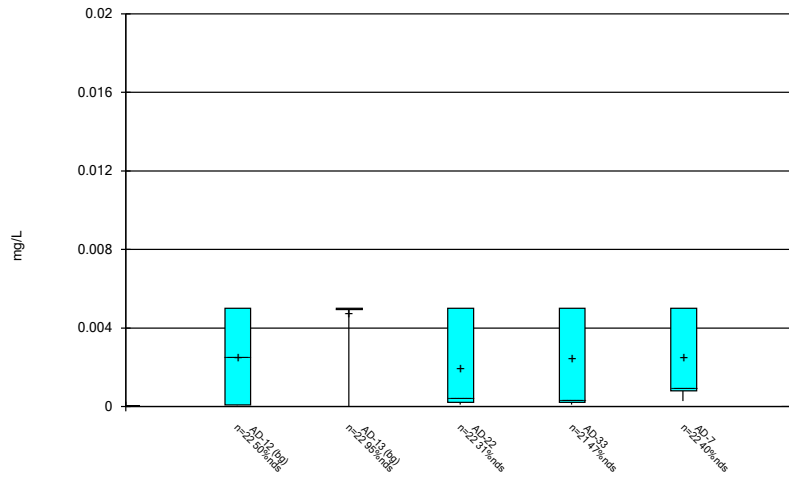
Constituent: Combined Radium 226 + 228 Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



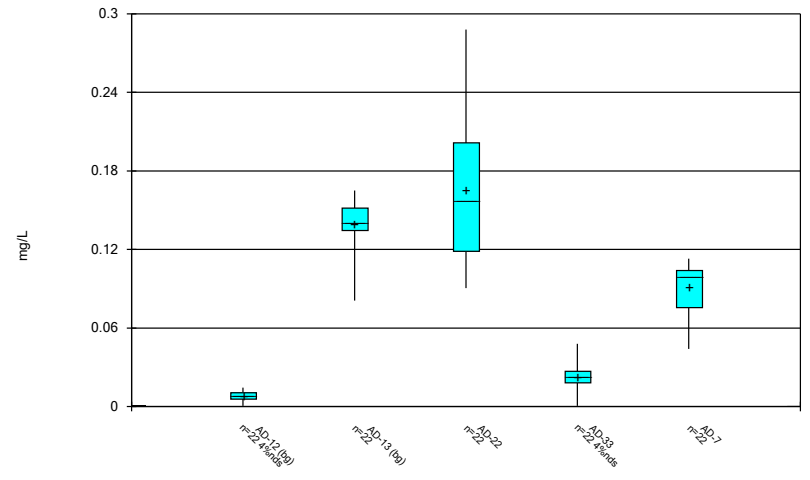
Constituent: Fluoride, total Analysis Run 2/20/2023 9:57 AM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



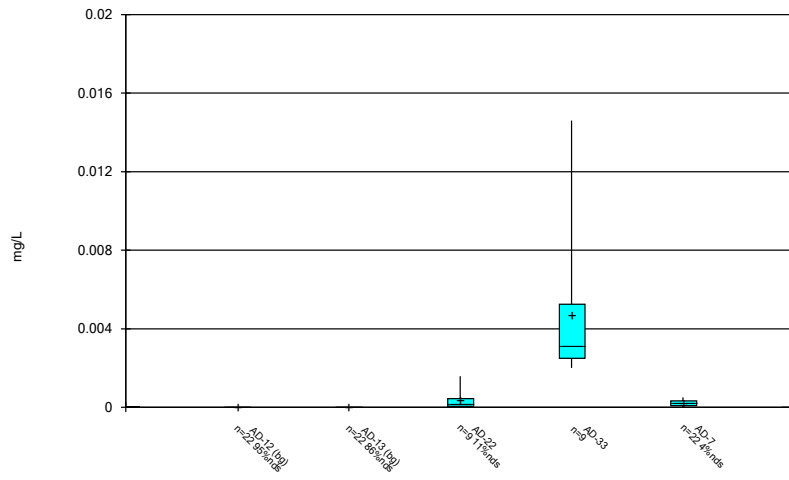
Constituent: Lead, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



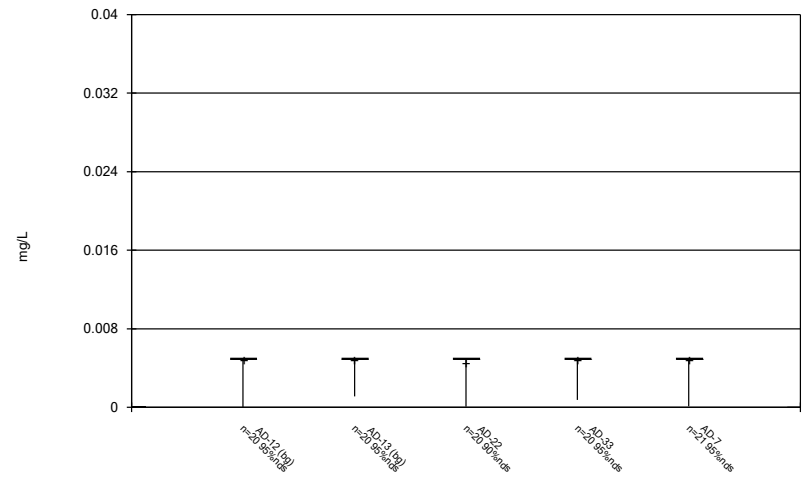
Constituent: Lithium, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



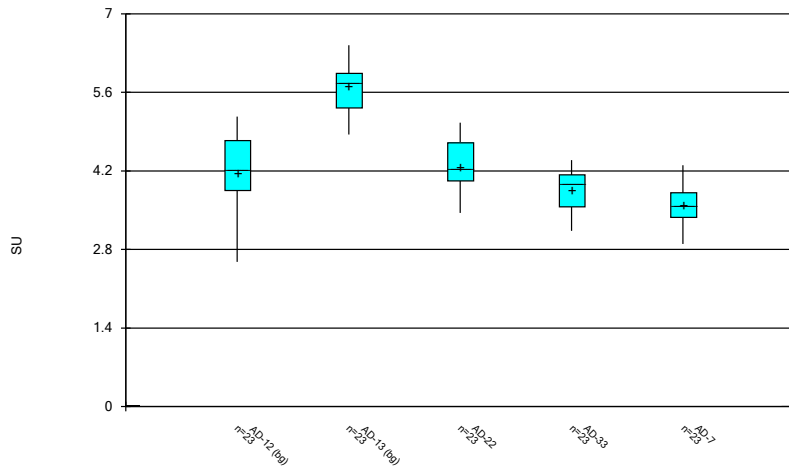
Constituent: Mercury, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



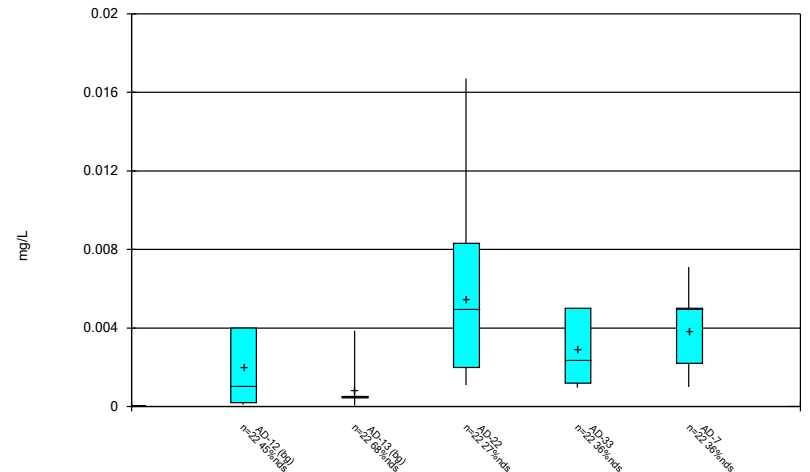
Constituent: Molybdenum, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



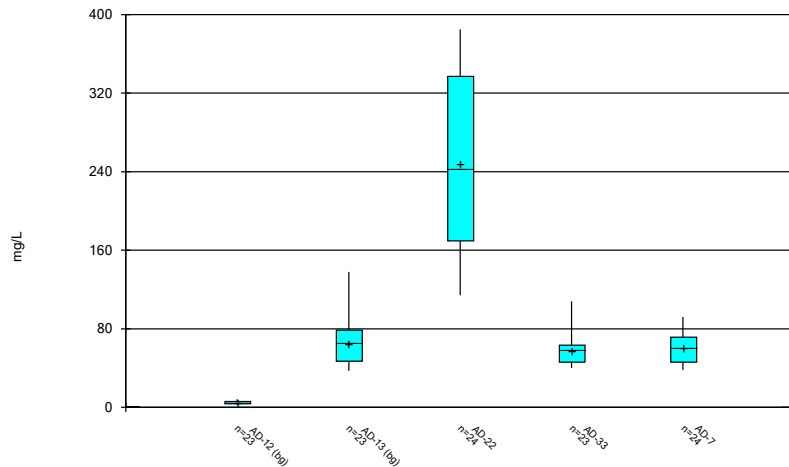
Constituent: pH, field Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



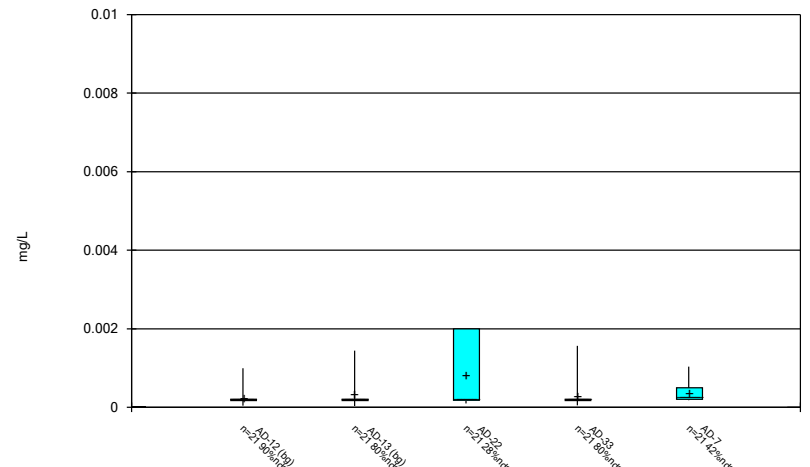
Constituent: Selenium, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



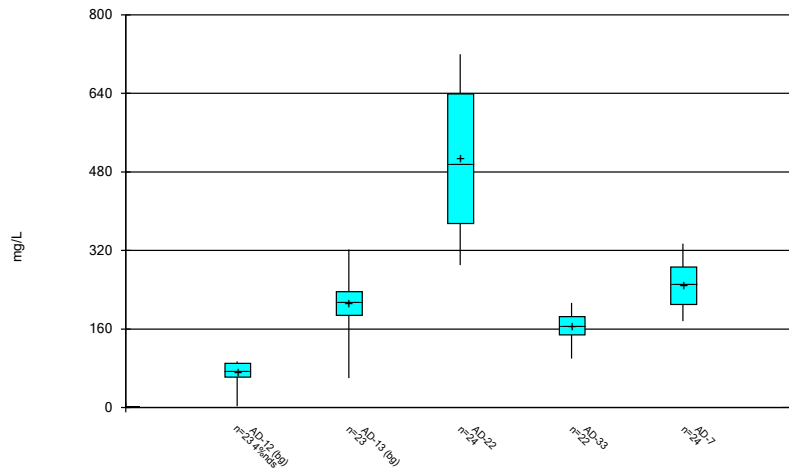
Constituent: Sulfate, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 2/20/2023 9:57 AM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/20/2023 9:57 AM

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE C

Outlier Summary and Tukey's Outlier Test

Outlier Summary

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 9:58 AM

	AD-33 Arsenic, total (mg/L)	AD-33 Barium, total (mg/L)	AD-13 Cadmium, total (mg/L)	AD-33 Chromium, total (mg/L)	AD-33 Cobalt, total (mg/L)	AD-7 Fluoride, total (mg/L)	AD-33 Lead, total (mg/L)	AD-12 Molybdenum, total (mg/L)	AD-13 Molybdenum, total (mg/L)	AD-22 Molybdenum, total (mg/L)
5/11/2016										
9/7/2016	0.067 (o)	0.163 (o)		0.125 (o)	0.033 (o)		0.014 (o)			
4/11/2017			0.002 (o)							
8/24/2017						2.994 (o)				
2/27/2019								<0.04 (o)	<0.04 (o)	<0.04 (o)
5/21/2019								<0.04 (o)	<0.04 (o)	
5/22/2019										<0.04 (o)

	AD-33 Molybdenum, total (mg/L)	AD-7 Molybdenum, total (mg/L)	AD-12 Thallium, total (mg/L)	AD-13 Thallium, total (mg/L)	AD-22 Thallium, total (mg/L)	AD-33 Thallium, total (mg/L)	AD-7 Thallium, total (mg/L)	AD-33 Total Dissolved Solids [TDS] (mg/L)
5/11/2016								326 (o)
9/7/2016								
4/11/2017								
8/24/2017								
2/27/2019	<0.04 (o)		<0.01 (o)	<0.01 (o)	<0.01 (o)	<0.01 (o)	<0.01 (o)	
5/21/2019								
5/22/2019	<0.04 (o)	<0.04 (o)						

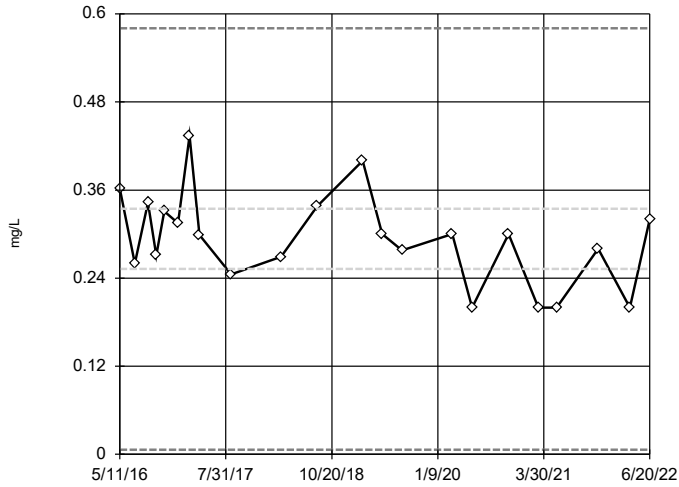
Tukey's Outlier Test - All Results (No Significant)

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/6/2023, 1:40 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Calcium, total (mg/L)	AD-12 (bg)	No	n/a	NP	NaN	22	0.293	0.06283	normal	ShapiroWilk
Calcium, total (mg/L)	AD-13 (bg)	No	n/a	NP	NaN	22	9.522	2.124	x^(1/3)	ShapiroWilk
Calcium, total (mg/L)	AD-22	No	n/a	NP	NaN	23	11.21	3.243	sqrt(x)	ShapiroWilk
Calcium, total (mg/L)	AD-33	No	n/a	NP	NaN	23	1.459	0.4105	ln(x)	ShapiroWilk
Calcium, total (mg/L)	AD-7	No	n/a	NP	NaN	23	4.331	1.036	normal	ShapiroWilk
pH, field (SU)	AD-12 (bg)	No	n/a	NP	NaN	22	4.145	0.6423	x^2	ShapiroWilk
pH, field (SU)	AD-13 (bg)	No	n/a	NP	NaN	22	5.706	0.4284	normal	ShapiroWilk
pH, field (SU)	AD-22	No	n/a	NP	NaN	22	4.255	0.4237	x^(1/3)	ShapiroWilk
pH, field (SU)	AD-33	No	n/a	NP	NaN	22	3.855	0.3975	x^4	ShapiroWilk
pH, field (SU)	AD-7	No	n/a	NP	NaN	22	3.598	0.346	sqrt(x)	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-12 (bg)	No	n/a	NP	NaN	22	70.52	21.72	x^2	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-13 (bg)	No	n/a	NP	NaN	22	212.5	53.58	normal	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-22	No	n/a	NP	NaN	23	506.3	137.1	sqrt(x)	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-33	No	n/a	NP	NaN	22	174.4	42.6	ln(x)	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-7	No	n/a	NP	NaN	23	247	45.89	normal	ShapiroWilk

Tukey's Outlier Screening

AD-12 (bg)

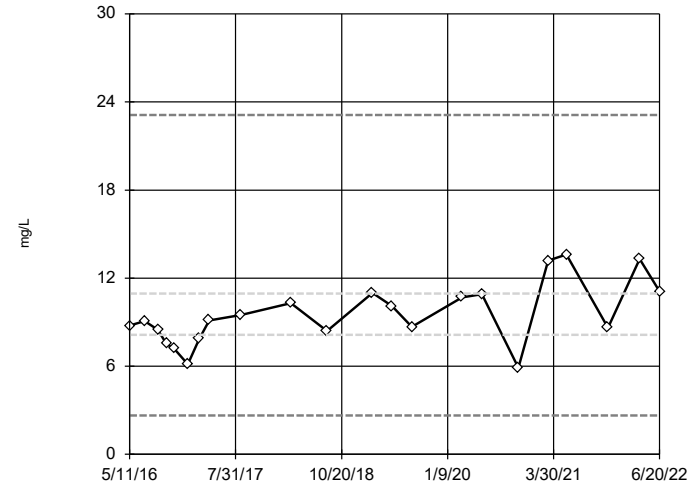


n = 22
 No outliers found. Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.5805, low cutoff = 0.0065, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-13 (bg)

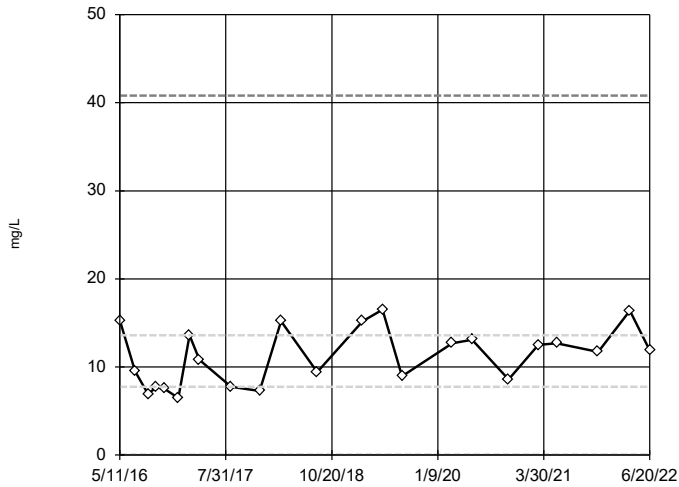


n = 22
 No outliers found. Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 23.11, low cutoff = 2.649, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-22

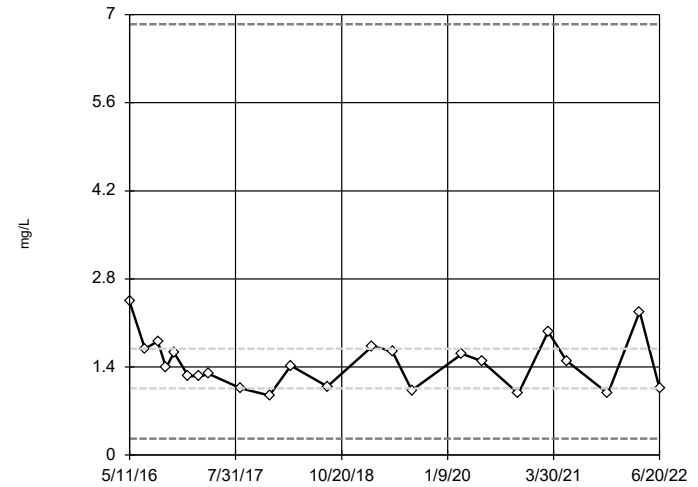


n = 23
 No outliers found. Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 40.82, low cutoff = 0.007471, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

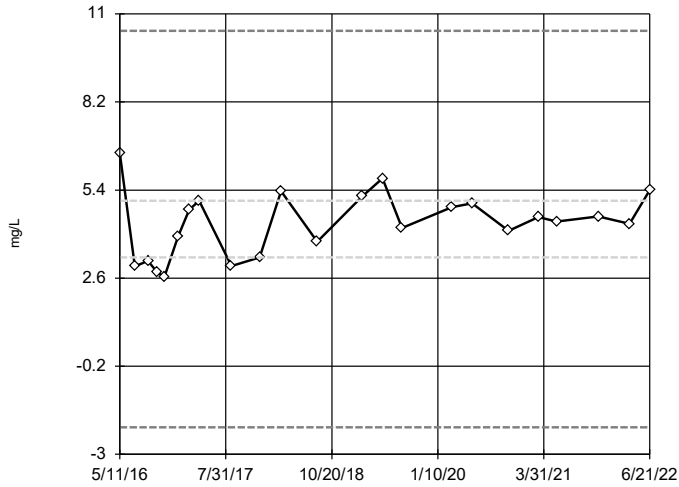
Tukey's Outlier Screening

AD-33



Tukey's Outlier Screening

AD-7

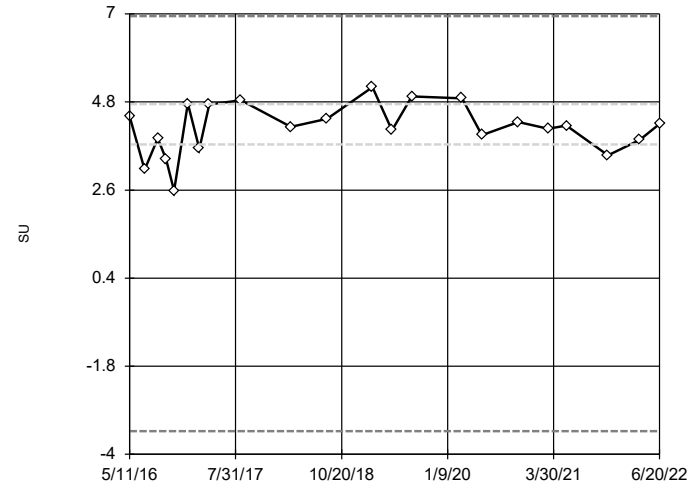


n = 23
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 10.46, low cutoff = -2.14, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-12 (bg)

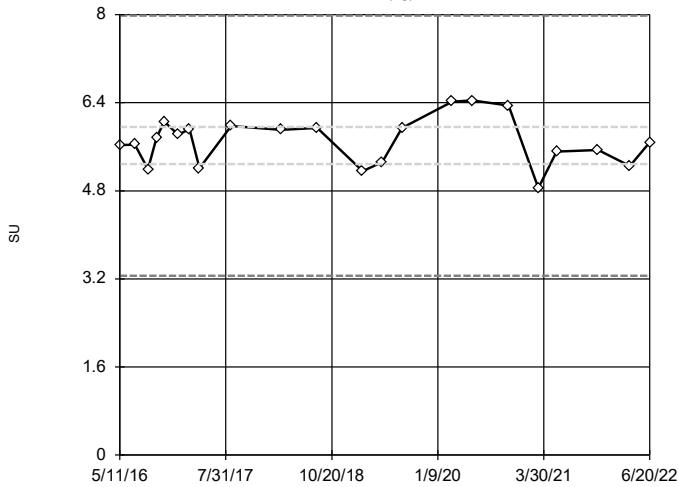


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.946, low cutoff = -3.419, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-13 (bg)

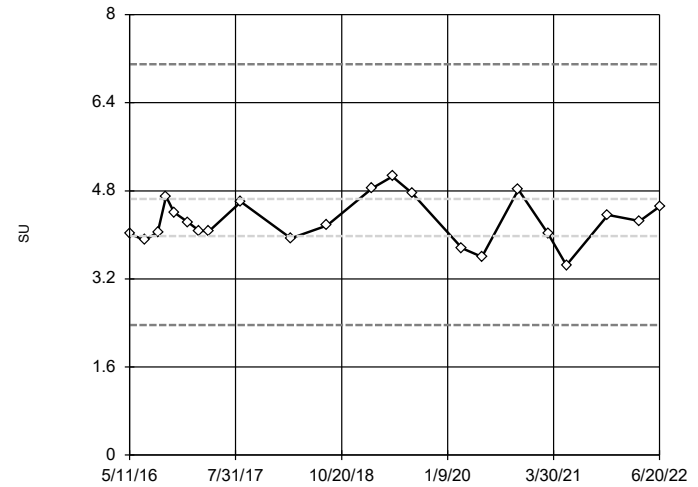


n = 22
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 7.985, low cutoff = 3.26, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-22

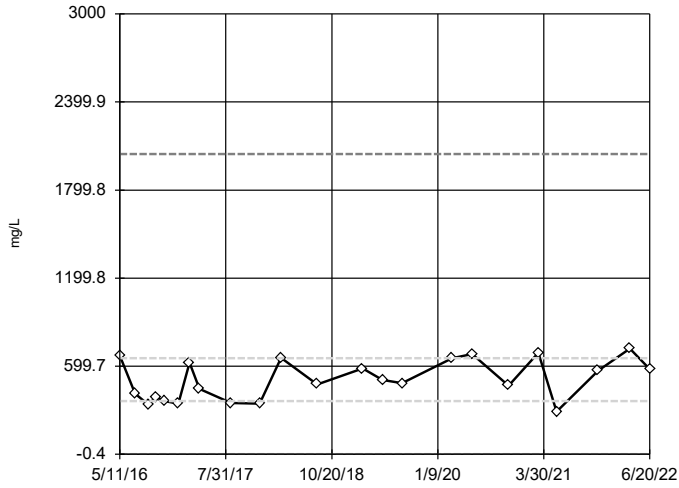


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 7.102, low cutoff = 2.362, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/6/2023 1:39 PM View: Outliers
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-22



n = 23

No outliers found.
Tukey's method selected by user.

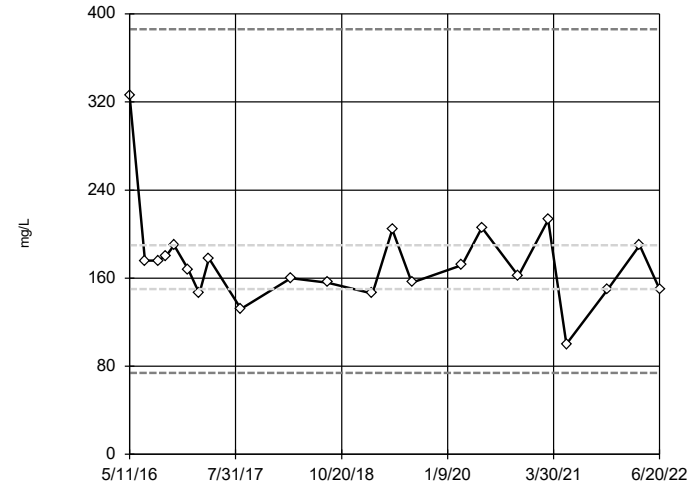
Data were square root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 2044, low cutoff = -0.3783, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 1:39 PM View: Outliers
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-33



n = 22

No outliers found.
Tukey's method selected by user.

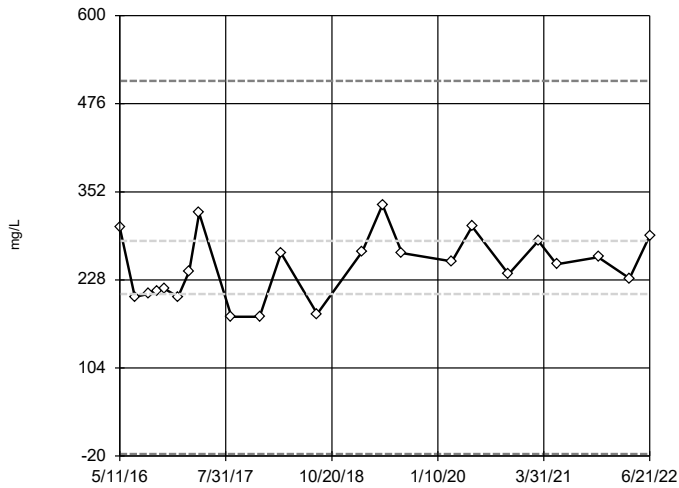
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 386.1, low cutoff = 73.81, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 1:39 PM View: Outliers
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening

AD-7



n = 23

No outliers found.
Tukey's method selected by user.

Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 508, low cutoff = -17, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 1:39 PM View: Outliers
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Test - Upgradient Wells - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 9:33 AM

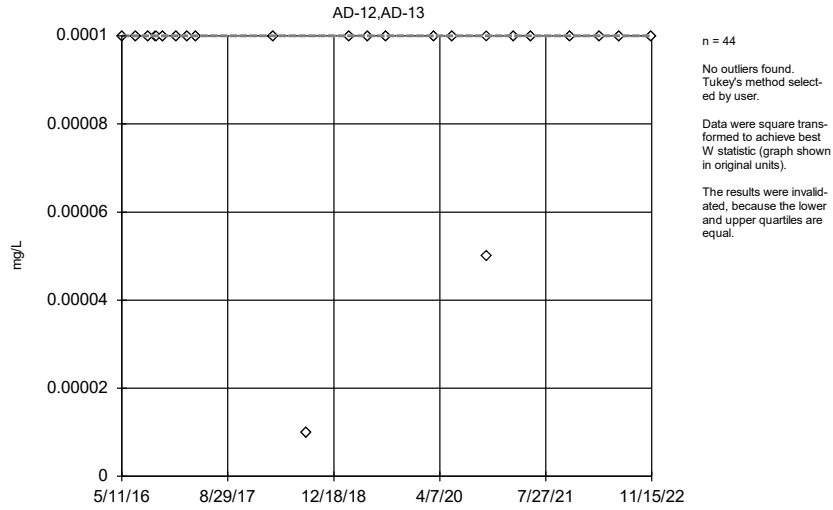
<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Selenium, total (mg/L)	AD-12,AD-13	Yes	0.003637,0.00386	NP	NaN	44	0.0006176	0.0008074	In(x)	ShapiroWilk

Tukey's Outlier Test - Upgradient Wells - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 9:33 AM

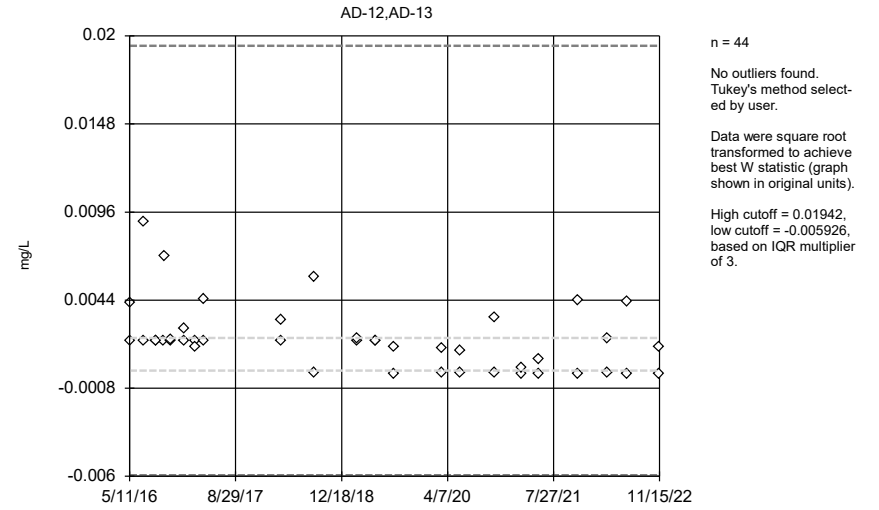
Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	44	0.00009477	0.00002017	unknown	ShapiroWilk
Arsenic, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.002069	0.001925	sqrt(x)	ShapiroWilk
Barium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.03267	0.009586	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.0004151	0.0003983	ln(x)	ShapiroWilk
Boron, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	46	0.04725	0.02229	normal	ShapiroWilk
Cadmium, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	44	0.0001029	0.0003248	unknown	ShapiroWilk
Chloride, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	46	20.46	15.59	sqrt(x)	ShapiroWilk
Chromium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.001428	0.001695	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.0229	0.02216	x^3	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	AD-12,AD-13	No	n/a	NP	NaN	44	1.279	0.7661	sqrt(x)	ShapiroWilk
Fluoride, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	46	0.4711	0.3665	ln(x)	ShapiroWilk
Lead, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.003657	0.002218	ln(x)	ShapiroWilk
Lithium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	44	0.07381	0.06764	ln(x)	ShapiroWilk
Mercury, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	44	0.00000568	0.000002577	unknown	ShapiroWilk
Molybdenum, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	44	0.004799	0.0009404	unknown	ShapiroWilk
Selenium, total (mg/L)	AD-12,AD-13	Yes	0.003637,0.00386	NP	NaN	44	0.0006176	0.0008074	ln(x)	ShapiroWilk
Sulfate, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	46	34.63	34.19	normal	ShapiroWilk
Thallium, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	44	0.0002761	0.0002788	unknown	ShapiroWilk

Tukey's Outlier Screening, Pooled Background



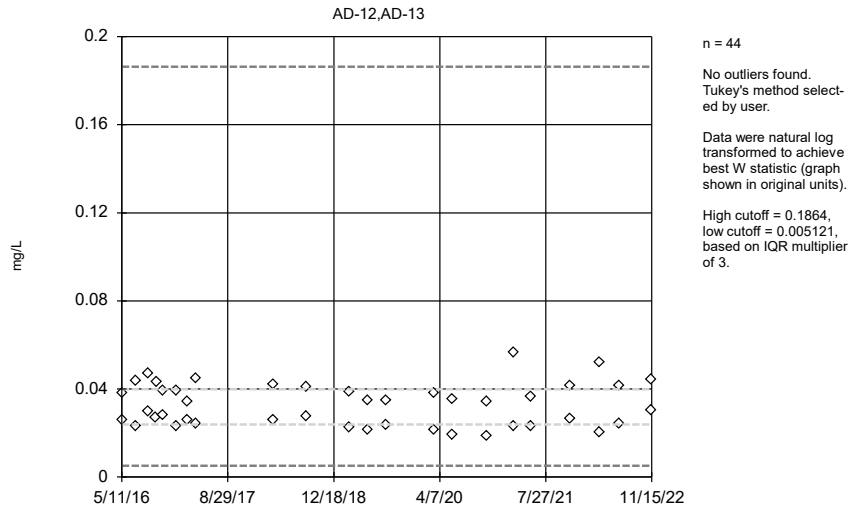
Constituent: Antimony, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background



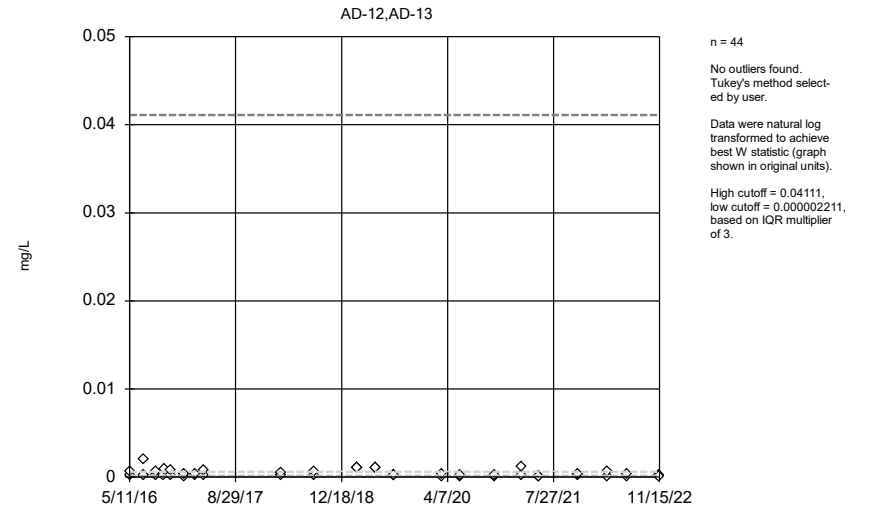
Constituent: Arsenic, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background



Constituent: Barium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

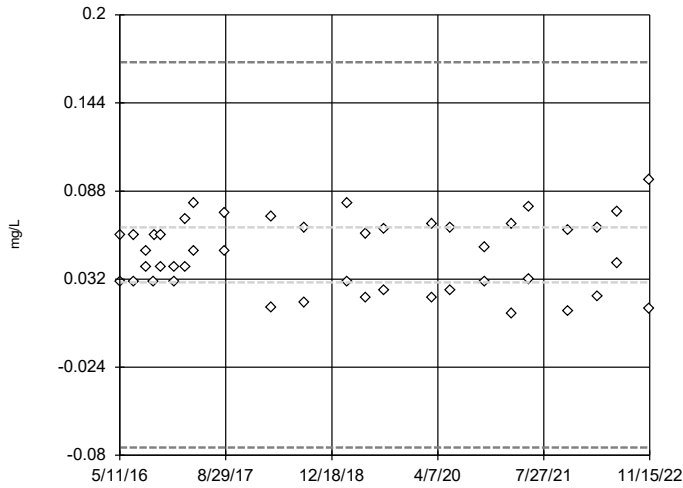
Tukey's Outlier Screening, Pooled Background



Constituent: Beryllium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

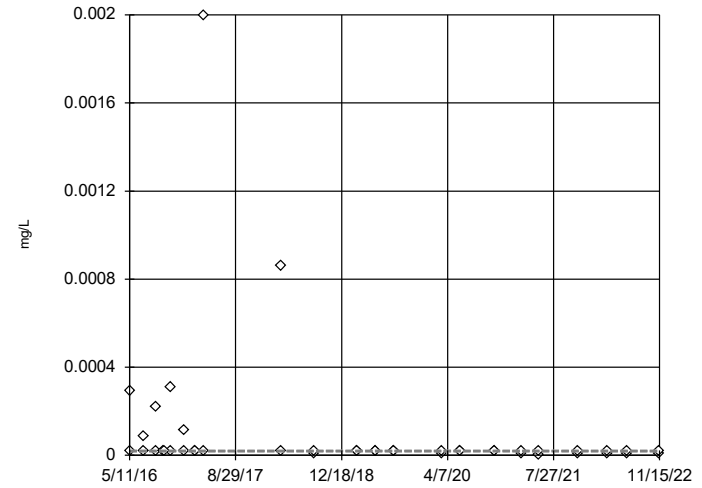


n = 46
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.17, low cutoff = -0.075, based on IQR multiplier of 3.

Constituent: Boron, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

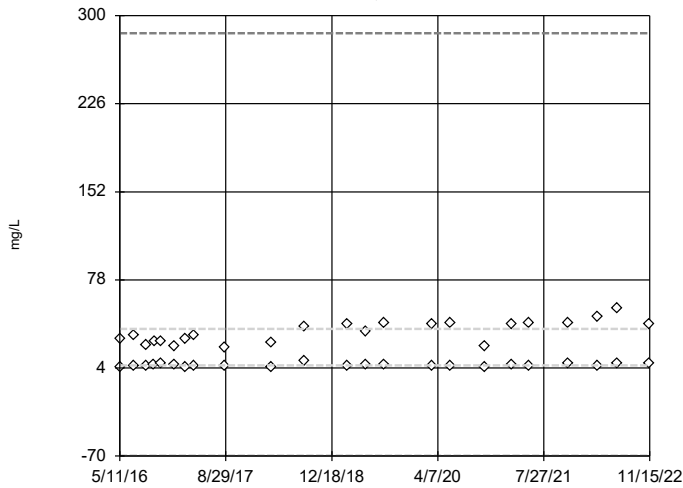


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Cadmium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

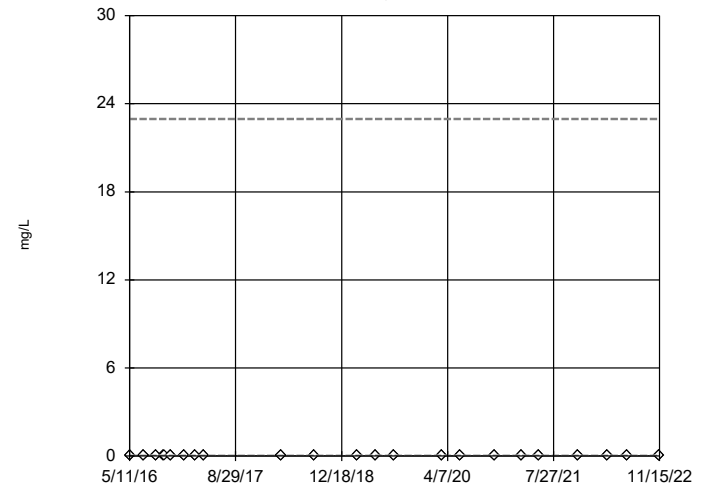


n = 46
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 285.3, low cutoff = -69.78, based on IQR multiplier of 3.

Constituent: Chloride, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

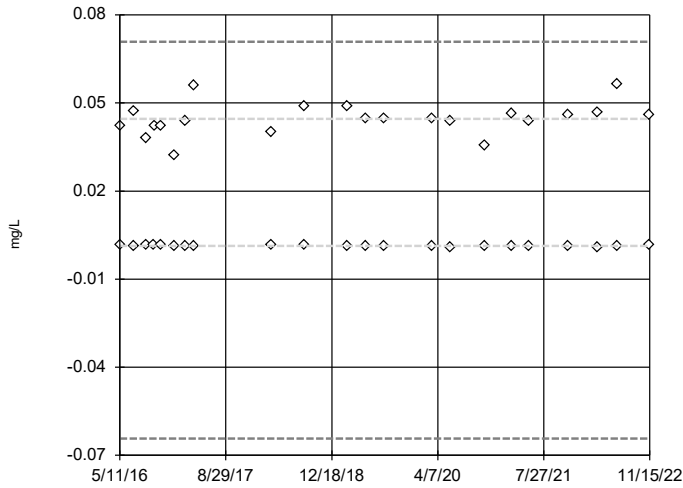


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 22.95, low cutoff = 3.9e-8, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

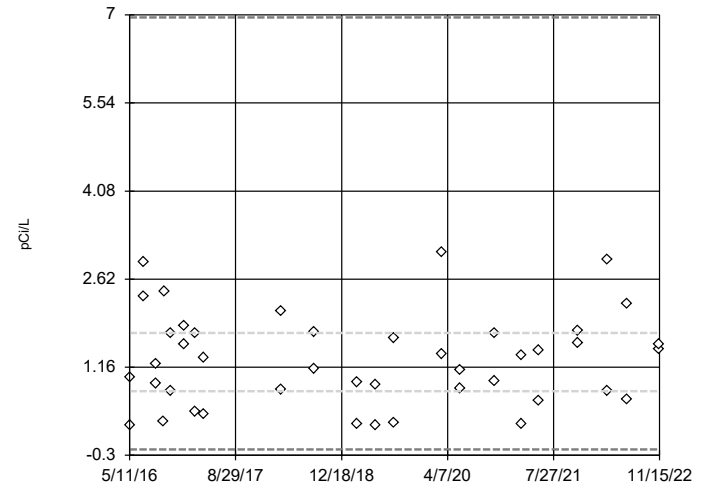


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.0708, low cutoff = -0.06432, based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

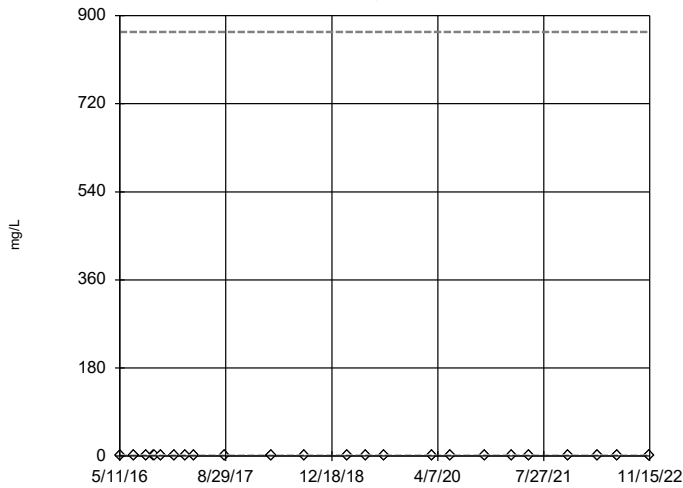


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.957, low cutoff = -0.2016, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

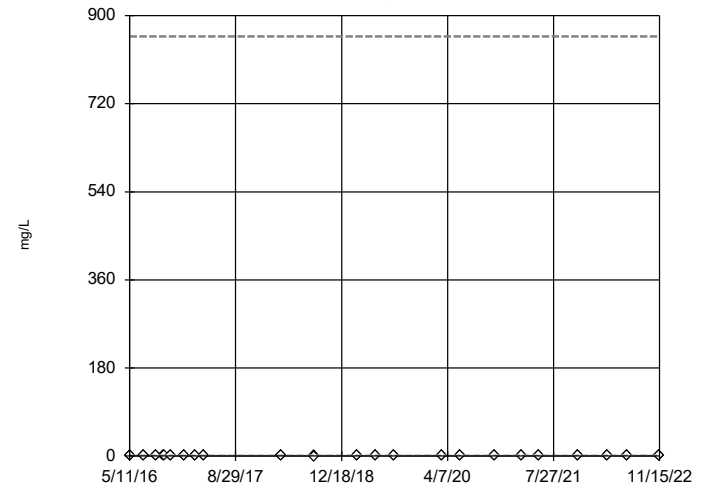


n = 46
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 866.8, low cutoff = 0.000121, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

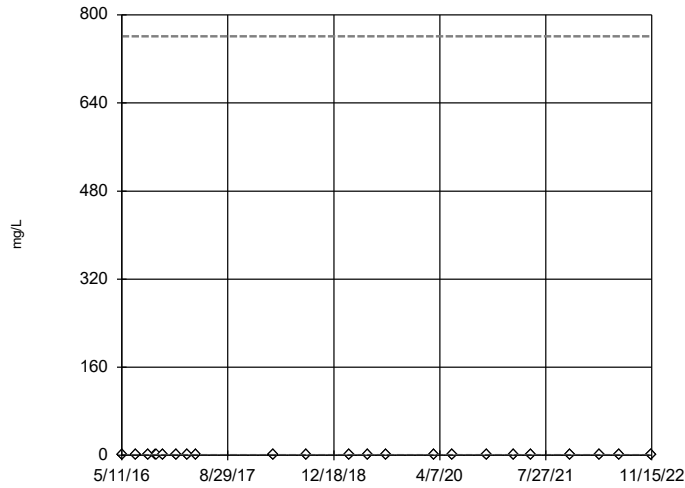


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 857.3, low cutoff = 5.2e-10, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

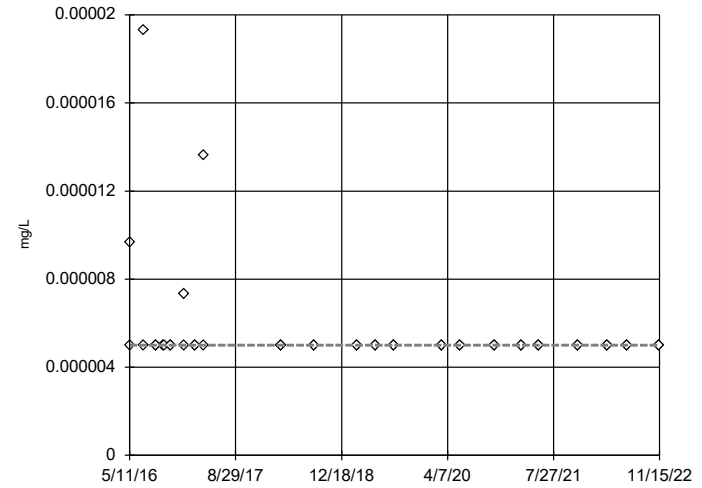


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 761.1, low cutoff = 0.00001477, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

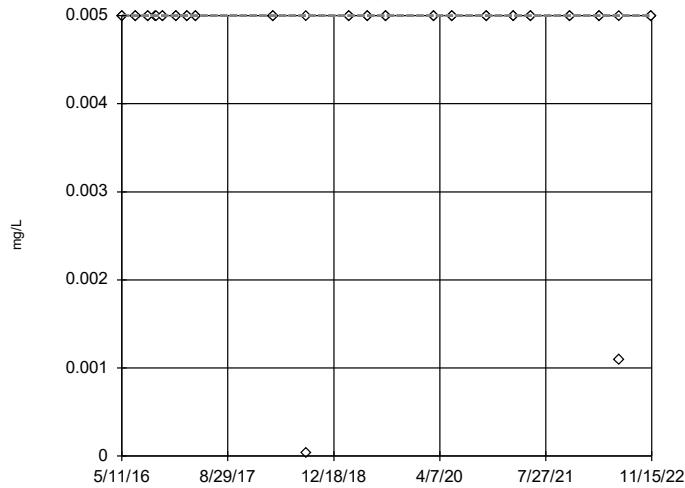


n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

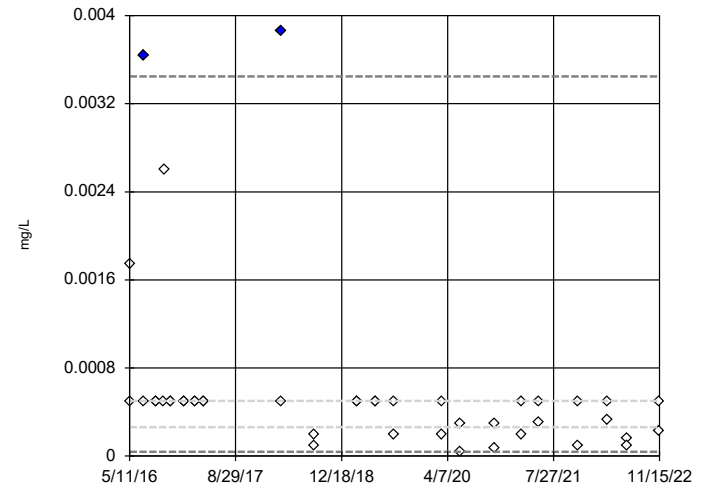


n = 44
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality, analysis run on raw data.
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Molybdenum, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

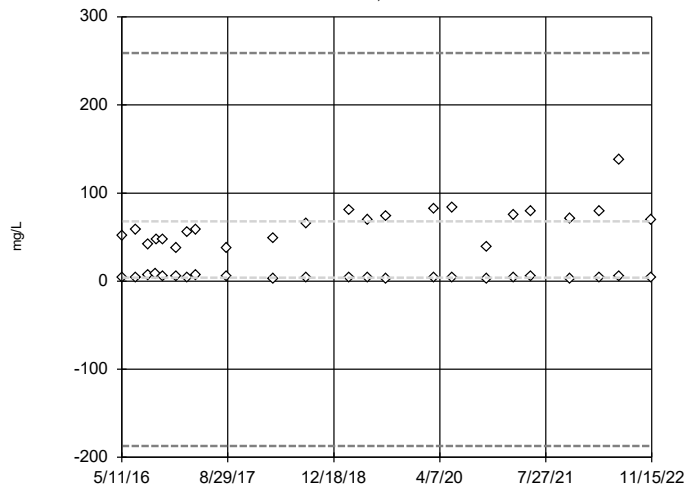


n = 44
 Outliers are drawn as solid.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.003448, low cutoff = 0.00003809, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

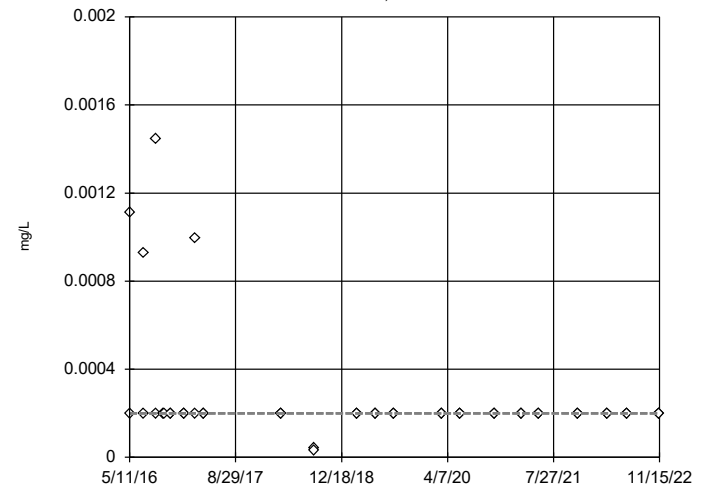


n = 46
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 259, low cutoff = -187.3, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13



n = 44
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Thallium, total Analysis Run 2/20/2023 9:31 AM View: Outliers Upgradient
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE D
Seasonality

Seasonality Summary Table - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 12:35 PM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>K.-W.</u>	<u>Chi-Sq.</u>	<u>df</u>	<u>N</u>	<u>Alpha</u>
Cadmium, total (mg/L)	AD-22	Yes	4.773	3.841	1	22	0.05
Calcium, total (mg/L)	AD-22	Yes	7.53	3.841	1	24	0.05
Cobalt, total (mg/L)	AD-22	Yes	6.734	3.841	1	22	0.05
Lithium, total (mg/L)	AD-22	Yes	6.727	3.841	1	22	0.05
pH, field (SU)	AD-22	Yes	4.821	3.841	1	23	0.05
Total Dissolved Solids [TDS] (mg/L)	AD-22	Yes	4.236	3.841	1	24	0.05

Seasonality Summary Table - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 12:35 PM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>K.-W.</u>	<u>Chi-Sq.</u>	<u>df</u>	<u>N</u>	<u>Alpha</u>
Antimony, total (mg/L)	AD-22	No	0.5714	3.841	1	22	0.05
Arsenic, total (mg/L)	AD-22	No	0.0571	3.841	1	22	0.05
Barium, total (mg/L)	AD-22	No	1.682	3.841	1	22	0.05
Beryllium, total (mg/L)	AD-22	No	3.406	3.841	1	22	0.05
Cadmium, total (mg/L)	AD-22	Yes	4.773	3.841	1	22	0.05
Calcium, total (mg/L)	AD-22	Yes	7.53	3.841	1	24	0.05
Chromium, total (mg/L)	AD-22	No	0.001169	3.841	1	22	0.05
Cobalt, total (mg/L)	AD-22	Yes	6.734	3.841	1	22	0.05
Combined Radium 226 + 228 (pCi/L)	AD-22	No	2.911	3.841	1	22	0.05
Fluoride, total (mg/L)	AD-22	No	3.039	3.841	1	24	0.05
Lead, total (mg/L)	AD-22	No	0.07697	3.841	1	22	0.05
Lithium, total (mg/L)	AD-22	Yes	6.727	3.841	1	22	0.05
Mercury, total (mg/L)	AD-22	No	0.06667	3.841	1	9	0.05
Molybdenum, total (mg/L)	AD-22	No	1.134	3.841	1	20	0.05
pH, field (SU)	AD-22	Yes	4.821	3.841	1	23	0.05
Selenium, total (mg/L)	AD-22	No	1.294	3.841	1	22	0.05
Thallium, total (mg/L)	AD-22	No	0.001434	3.841	1	21	0.05
Total Dissolved Solids [TDS] (mg/L)	AD-22	Yes	4.236	3.841	1	24	0.05

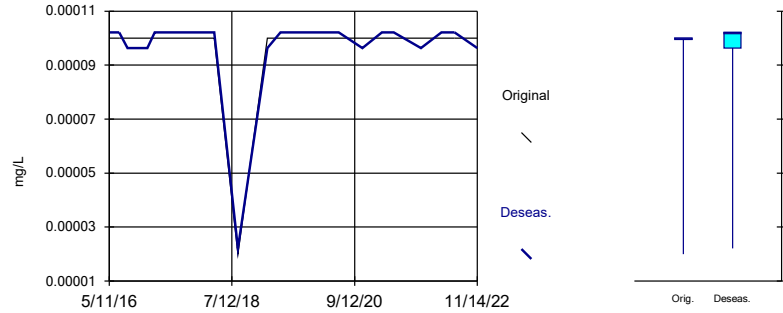
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.5714
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 0.07453
 Adjusted Kruskal-Wallis statistic (H') = 0.5714



Constituent: Antimony, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

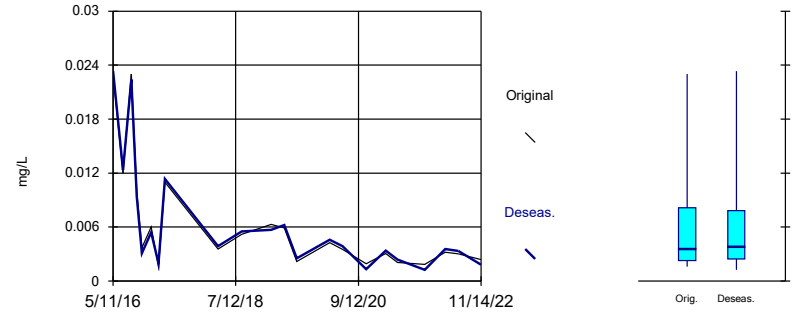
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.0571
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 0.05707
 Adjusted Kruskal-Wallis statistic (H') = 0.0571



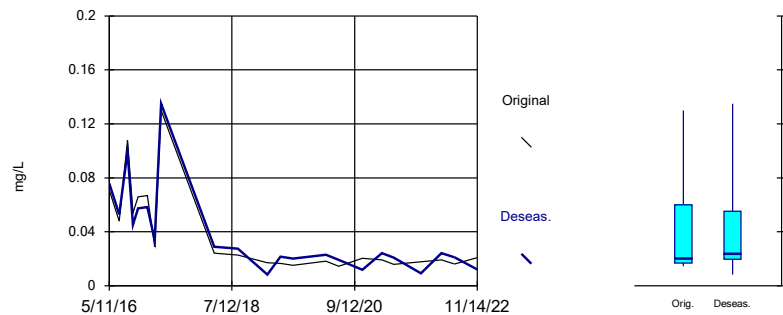
Constituent: Arsenic, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 1.682
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Barium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

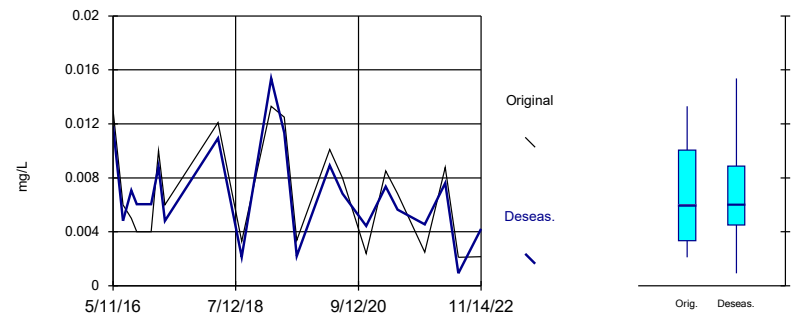
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 3.406
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 3.396
 Adjusted Kruskal-Wallis statistic (H') = 3.406

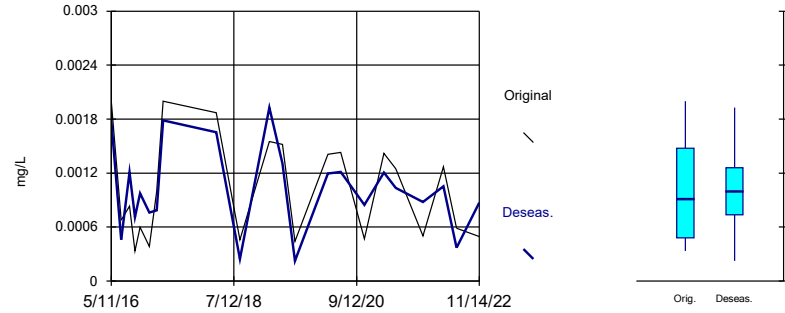


Constituent: Beryllium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 4.773
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 4.77
 Adjusted Kruskal-Wallis statistic (H') = 4.773

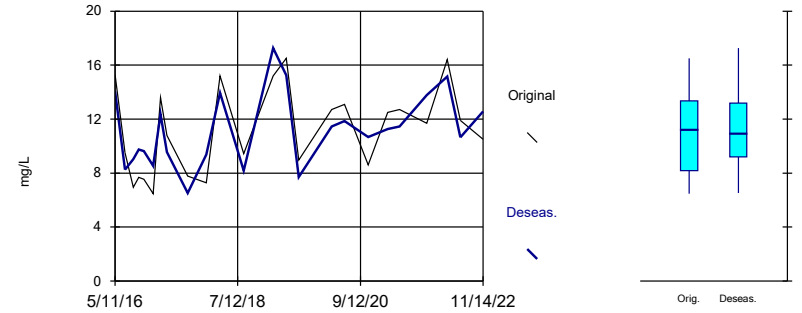


Constituent: Cadmium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 7.53
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 7.524
 Adjusted Kruskal-Wallis statistic (H') = 7.53

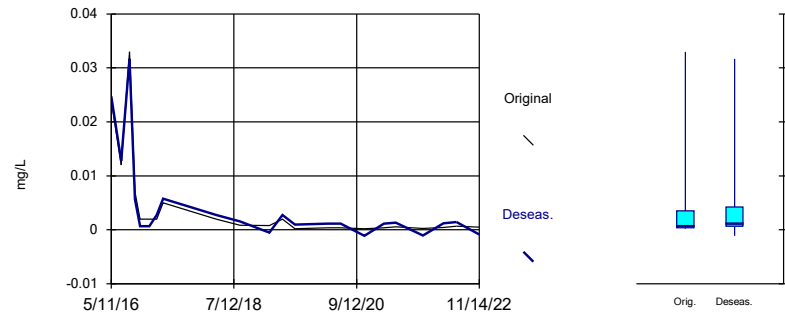


Constituent: Calcium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.001169
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.001165
 Adjusted Kruskal-Wallis statistic (H') = 0.001169

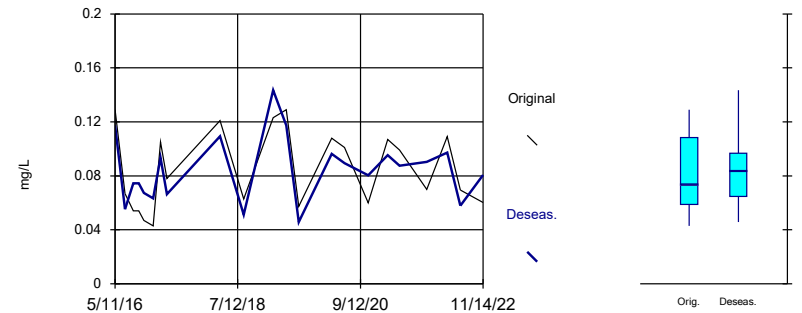


Constituent: Chromium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

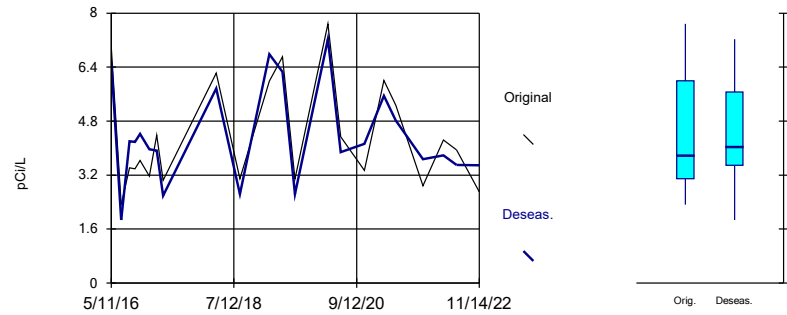
Calculated Kruskal-Wallis statistic = 6.734
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 6.727
 Adjusted Kruskal-Wallis statistic (H') = 6.734



Constituent: Cobalt, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

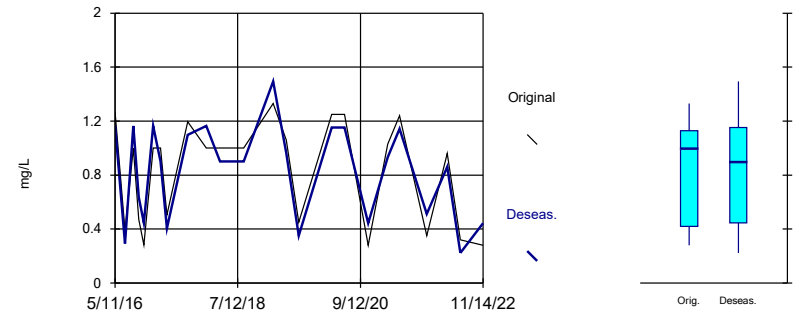
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 2.911
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Combined Radium 226 + 228 Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

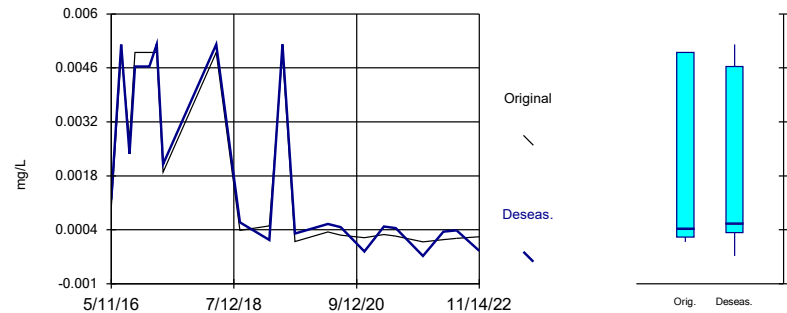
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 3.039
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 2.99
 Adjusted Kruskal-Wallis statistic (H') = 3.039



Constituent: Fluoride, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

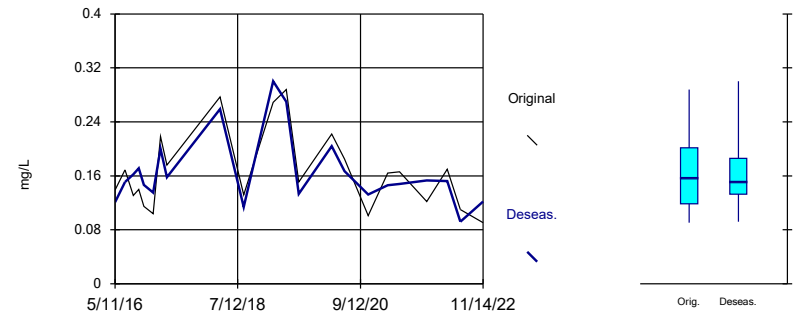
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.07697
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.07453
 Adjusted Kruskal-Wallis statistic (H') = 0.07697



Constituent: Lead, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

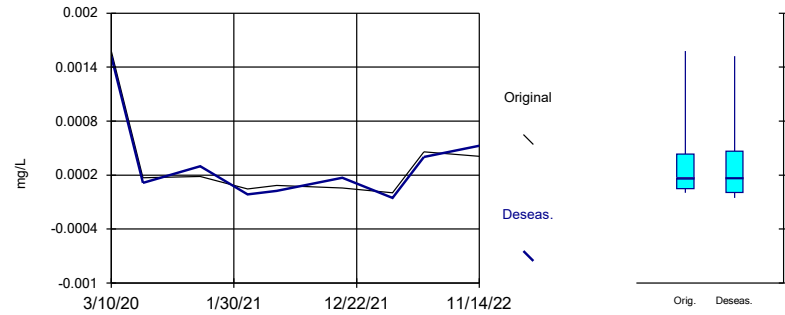
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 6.727
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Lithium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

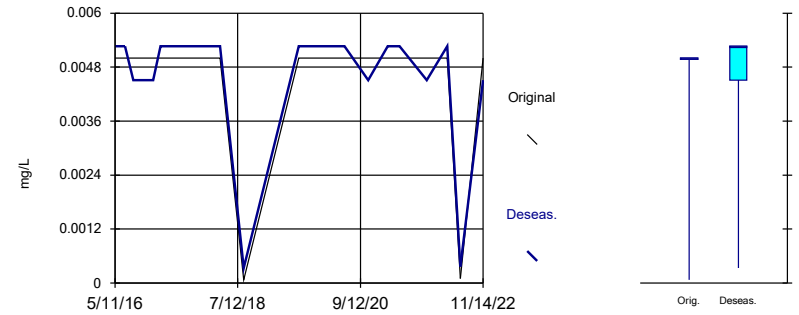
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.06667
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Mercury, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

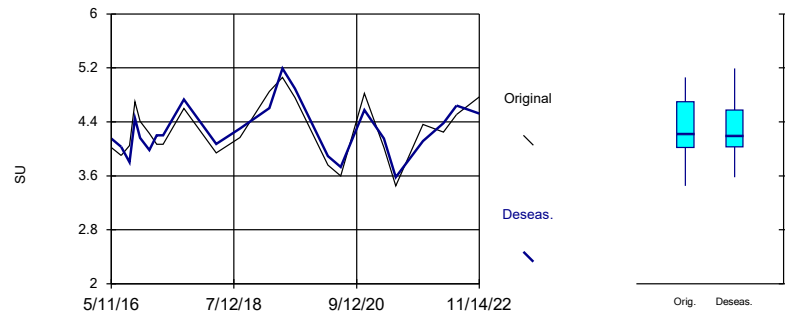
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.134
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.3077
 Adjusted Kruskal-Wallis statistic (H') = 1.134



Constituent: Molybdenum, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

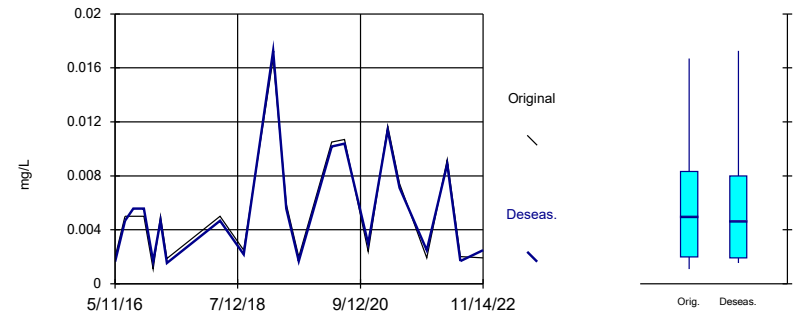
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 4.821
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 4.817
 Adjusted Kruskal-Wallis statistic (H') = 4.821



Constituent: pH, field Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.294
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 1.268
 Adjusted Kruskal-Wallis statistic (H') = 1.294



Constituent: Selenium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

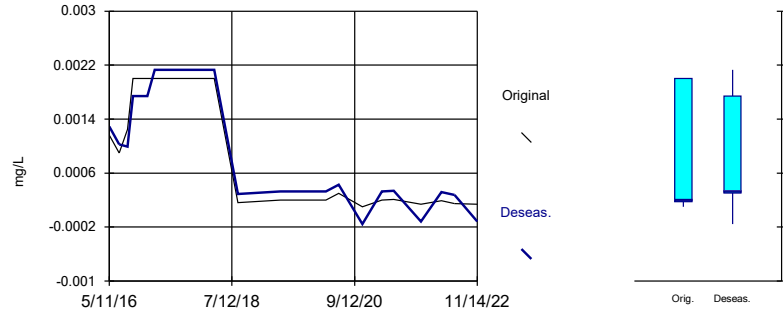
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.001434
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 0.001391
 Adjusted Kruskal-Wallis statistic (H') = 0.001434



Constituent: Thallium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

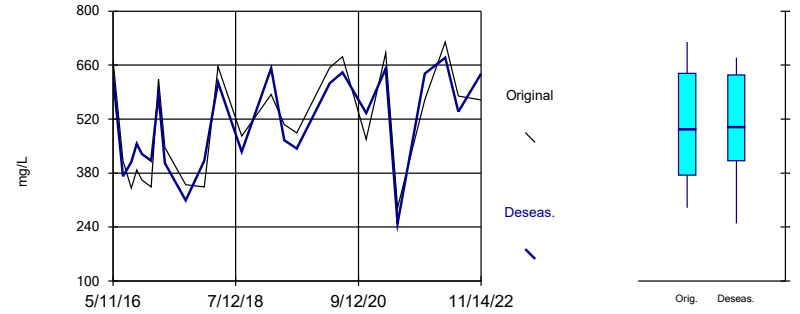
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 4.236
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 4.232
 Adjusted Kruskal-Wallis statistic (H') = 4.236



Constituent: Total Dissolved Solids [TDS] Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE E
Mann-Whitney

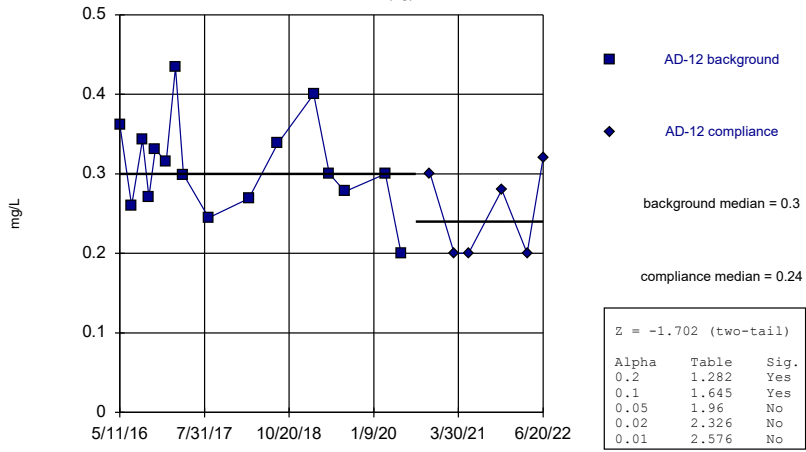
Welch's t-test/Mann-Whitney - All Results (No Significant)

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/6/2023, 3:48 PM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
Calcium, total (mg/L)	AD-12 (bg)	-1.702	No	Mann-W
Calcium, total (mg/L)	AD-13 (bg)	1.585	No	Mann-W
Calcium, total (mg/L)	AD-22	0.7705	No	Mann-W
Calcium, total (mg/L)	AD-33	-0.3502	No	Mann-W
Calcium, total (mg/L)	AD-7	0.5251	No	Mann-W
pH, field (SU)	AD-12 (bg)	-0.7741	No	Mann-W
pH, field (SU)	AD-13 (bg)	-1.29	No	Mann-W
pH, field (SU)	AD-22	0.07376	No	Mann-W
pH, field (SU)	AD-33	0.7376	No	Mann-W
pH, field (SU)	AD-7	-1.991	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-12 (bg)	-0.2954	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-13 (bg)	0.4057	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-22	0.8754	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-33	-0.4679	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-7	0.6656	No	Mann-W

Mann-Whitney (Wilcoxon Rank Sum)

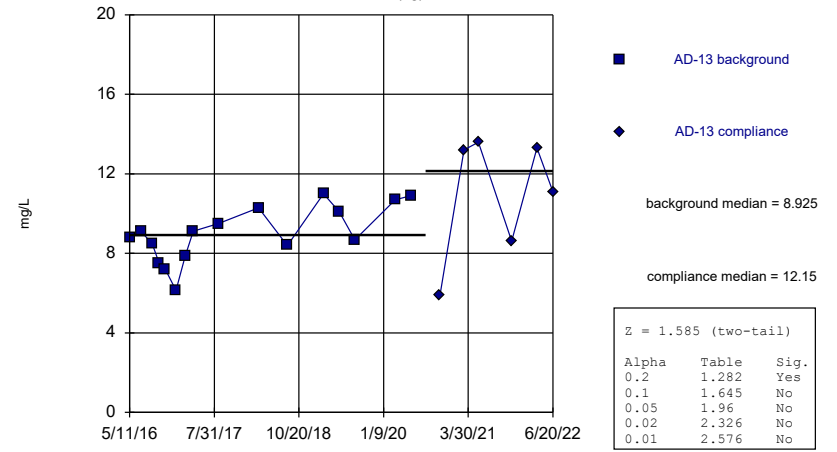
AD-12 (bg)



Constituent: Calcium, total Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

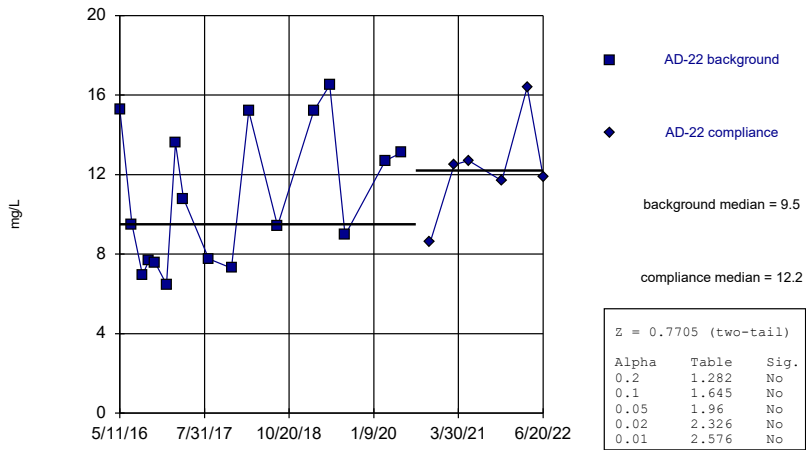
AD-13 (bg)



Constituent: Calcium, total Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

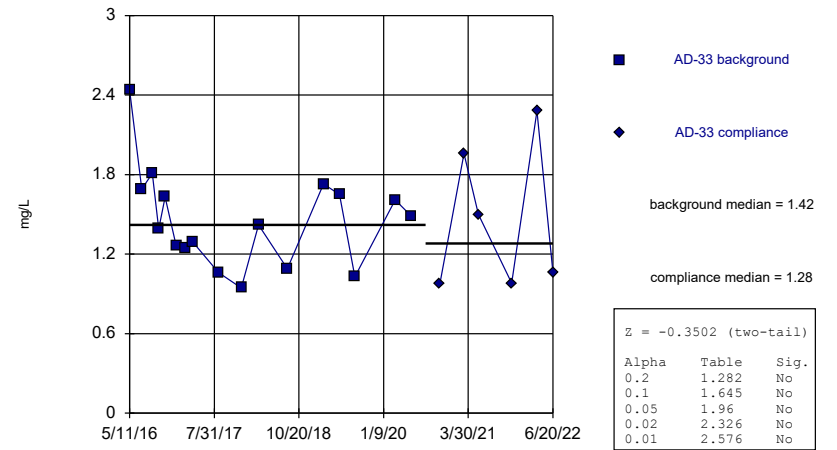
AD-22



Constituent: Calcium, total Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

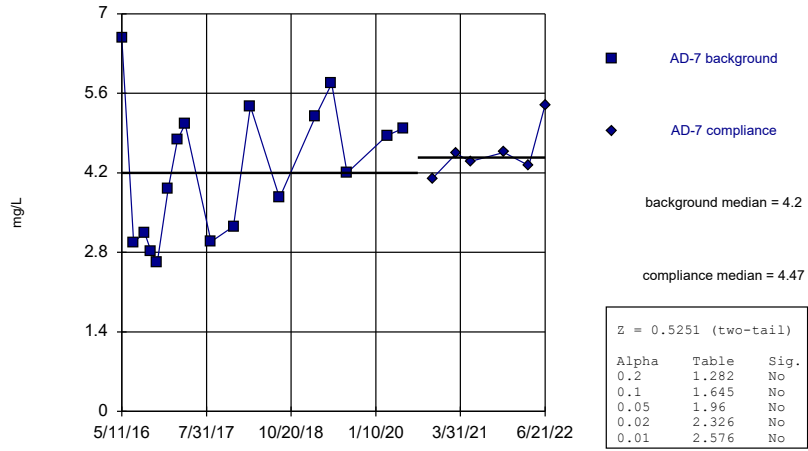
AD-33



Constituent: Calcium, total Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

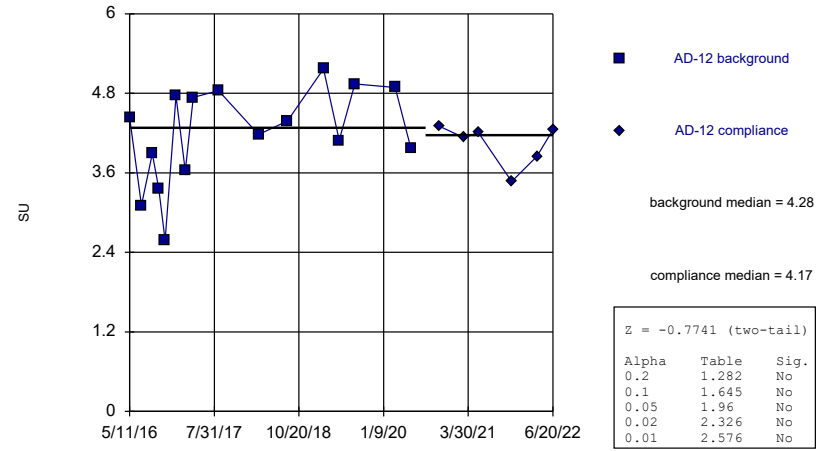
AD-7



Constituent: Calcium, total Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

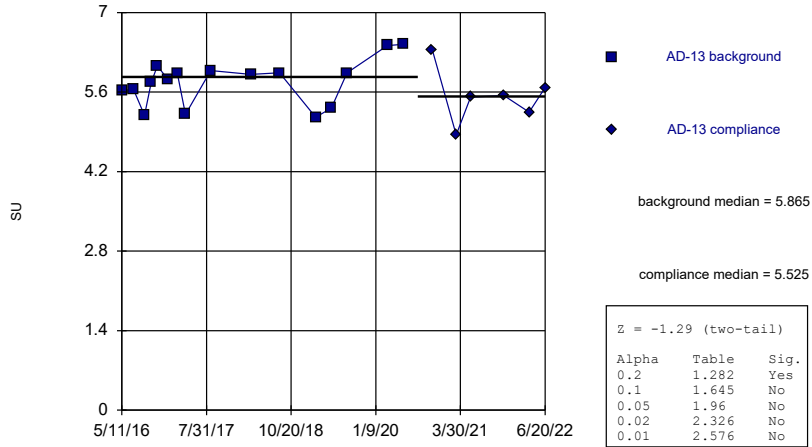
AD-12 (bg)



Constituent: pH, field Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

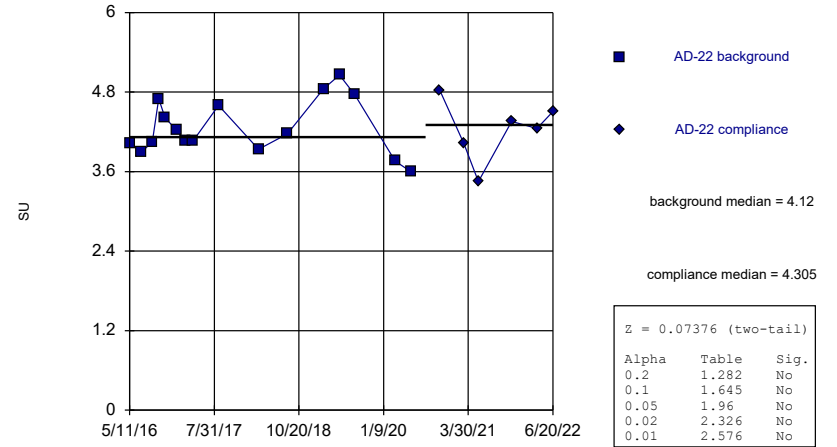
AD-13 (bg)



Constituent: pH, field Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

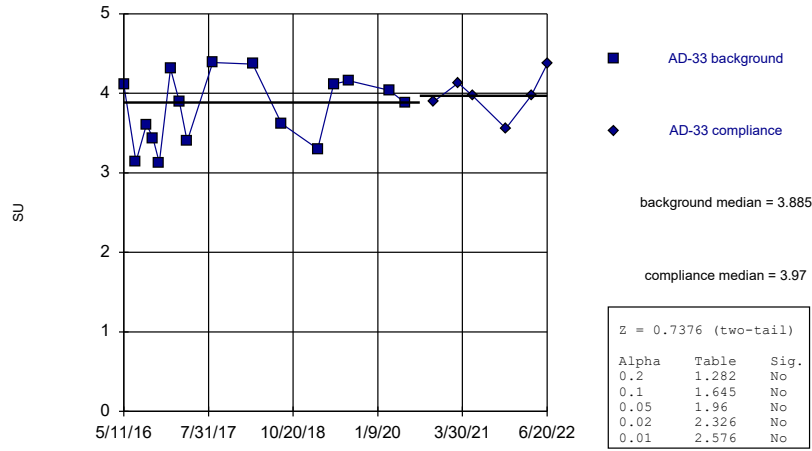
AD-22



Constituent: pH, field Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

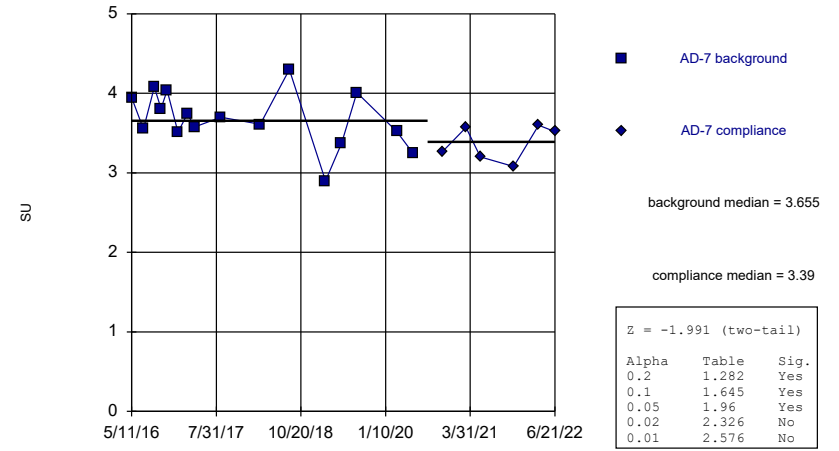
AD-33



Constituent: pH, field Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

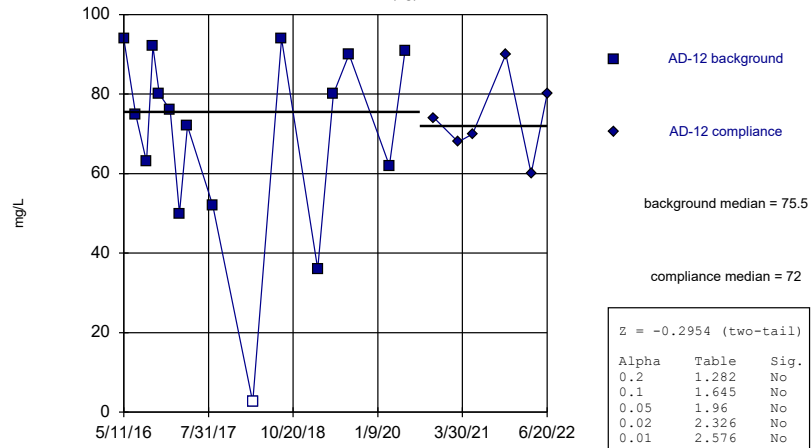
AD-7



Constituent: pH, field Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

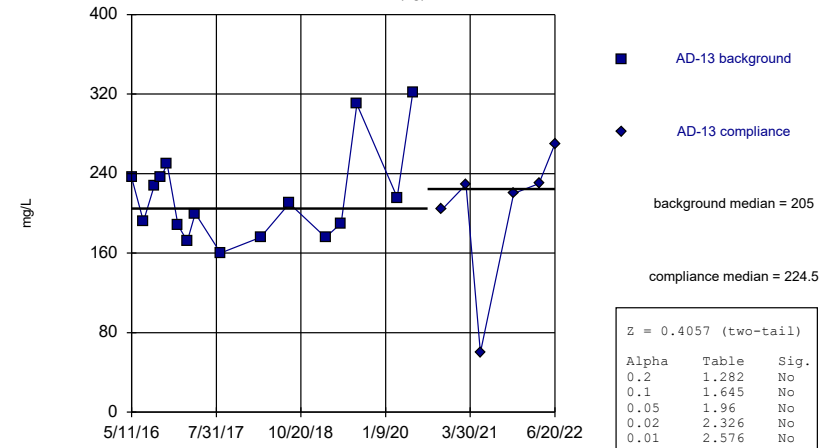
AD-12 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

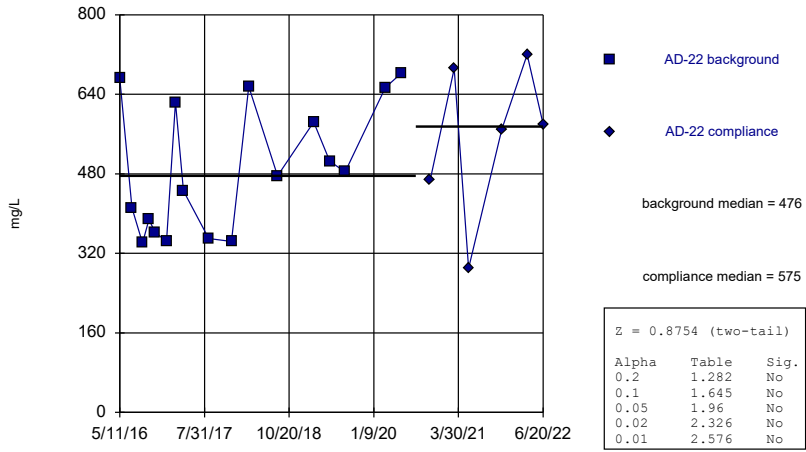
AD-13 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

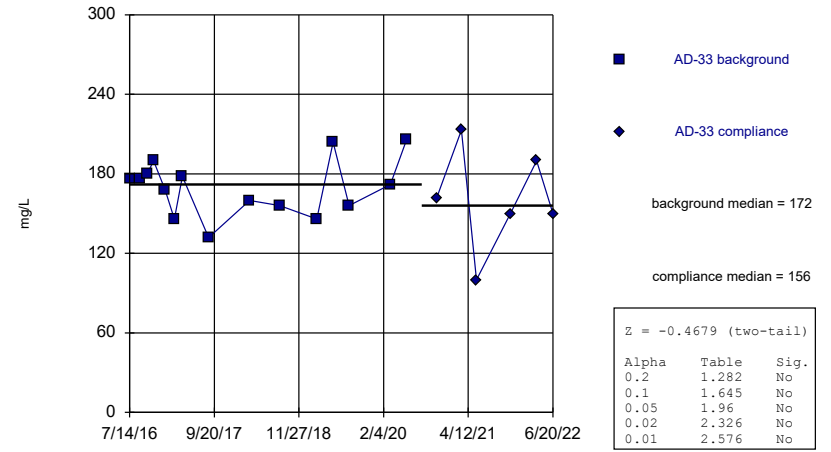
AD-22



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

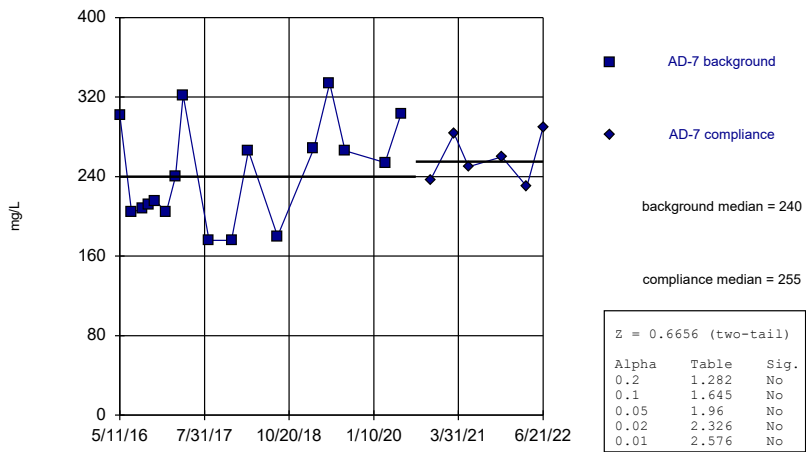
AD-33



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Mann-Whitney (Wilcoxon Rank Sum)

AD-7



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/6/2023 3:47 PM View: Mann-Whitney
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

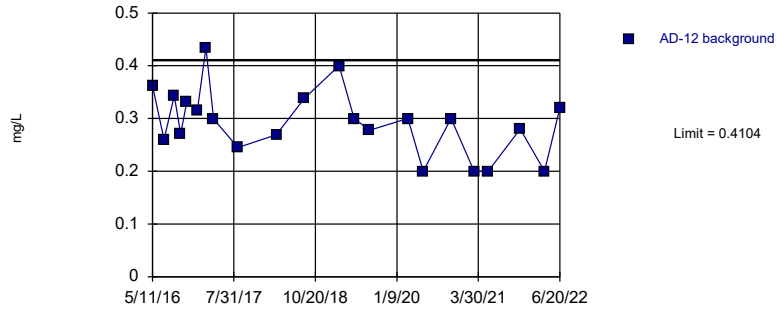
FIGURE F
Intrawell PLs

Intrawell Prediction Limits - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 12:39 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium, total (mg/L)	AD-12	0.4104	n/a	n/a	1 future	n/a	22	0.293	0.06283	0	None	No	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-13	13.49	n/a	n/a	1 future	n/a	22	9.522	2.124	0	None	No	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-33	2.221	n/a	n/a	1 future	n/a	23	1.459	0.4105	0	None	No	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-7	6.255	n/a	n/a	1 future	n/a	23	4.331	1.036	0	None	No	0.002505	Param Intra 1 of 2
pH, field (SU)	AD-12	5.345	2.945	n/a	1 future	n/a	22	4.145	0.6423	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-13	6.507	4.905	n/a	1 future	n/a	22	5.706	0.4284	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-33	4.598	3.112	n/a	1 future	n/a	22	3.855	0.3975	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-7	4.244	2.951	n/a	1 future	n/a	22	3.598	0.346	0	None	No	0.001253	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-12	100.3	n/a	n/a	1 future	n/a	22	5424	2481	4.545	None	x^2	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-13	312.6	n/a	n/a	1 future	n/a	22	212.5	53.58	0	None	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-33	217	n/a	n/a	1 future	n/a	21	167.2	26.49	0	None	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-7	332.2	n/a	n/a	1 future	n/a	23	247	45.89	0	None	No	0.002505	Param Intra 1 of 2

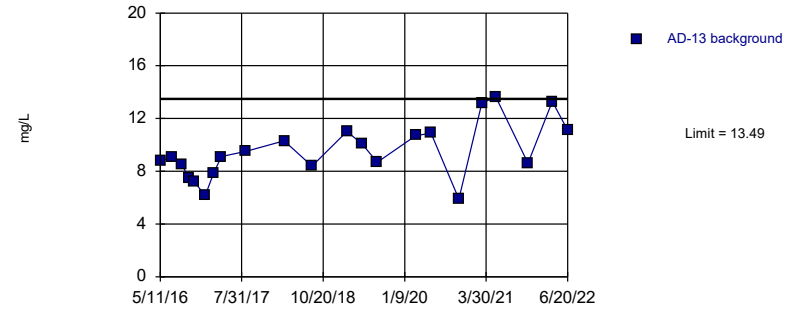
Prediction Limit
Intrawell Parametric, AD-12 (bg)



Background Data Summary: Mean=0.293, Std. Dev.=0.06283, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9534, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

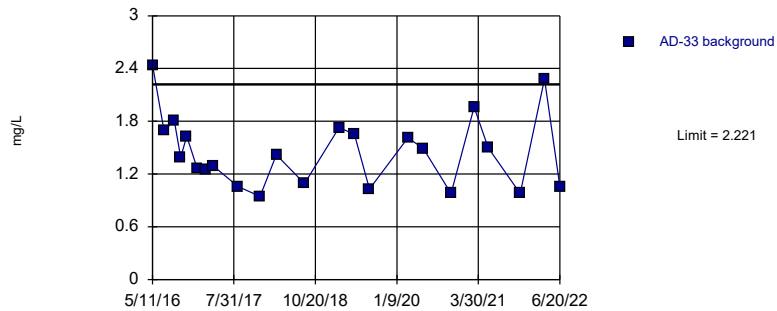
Prediction Limit
Intrawell Parametric, AD-13 (bg)



Background Data Summary: Mean=9.522, Std. Dev.=2.124, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9578, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

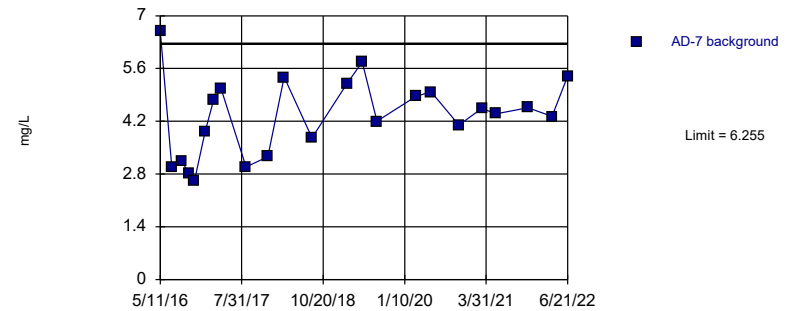
Prediction Limit
Intrawell Parametric, AD-33



Background Data Summary: Mean=1.459, Std. Dev.=0.4105, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9284, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

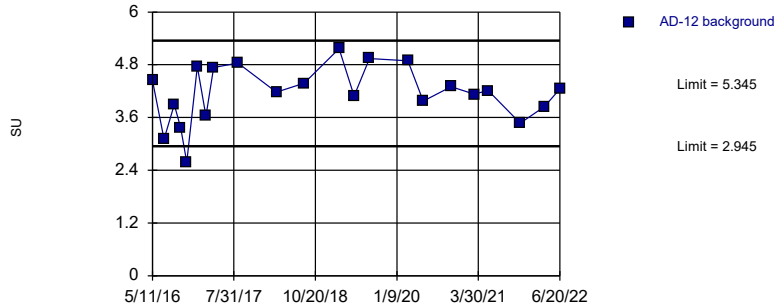
Prediction Limit
Intrawell Parametric, AD-7



Background Data Summary: Mean=4.331, Std. Dev.=1.036, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.971, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

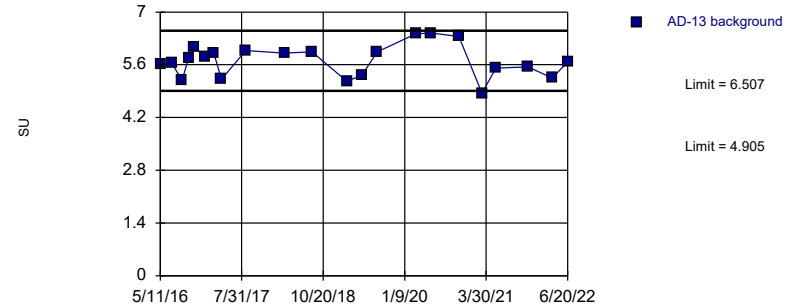
Prediction Limit
Intrawell Parametric, AD-12 (bg)



Background Data Summary: Mean=4.145, Std. Dev.=0.6423, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9666, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

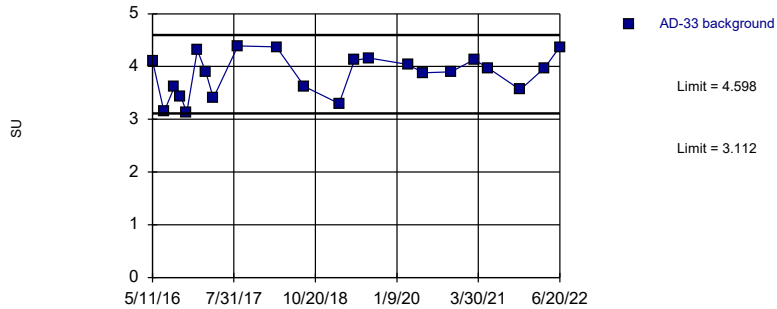
Prediction Limit
Intrawell Parametric, AD-13 (bg)



Background Data Summary: Mean=5.706, Std. Dev.=0.4284, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9693, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

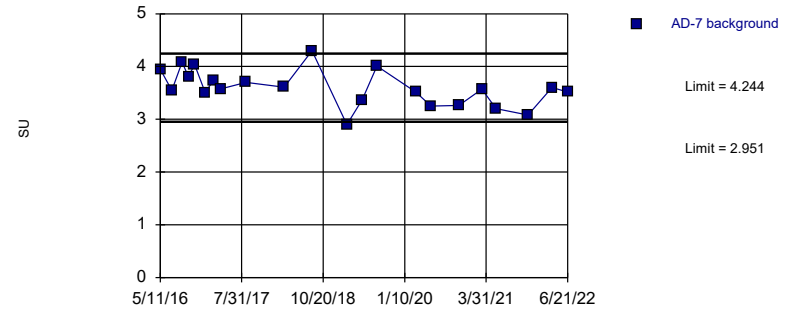
Prediction Limit
Intrawell Parametric, AD-33



Background Data Summary: Mean=3.855, Std. Dev.=0.3975, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9336, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

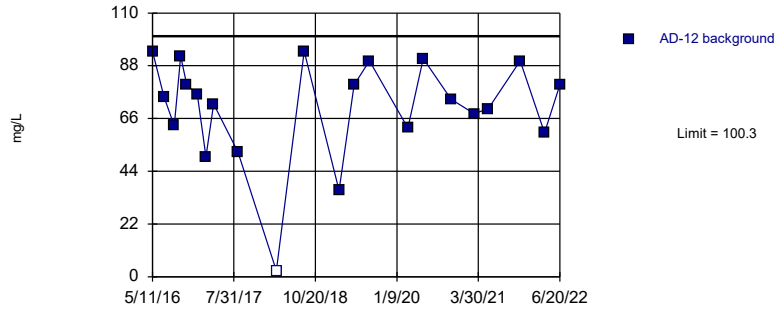
Prediction Limit
Intrawell Parametric, AD-7



Background Data Summary: Mean=3.598, Std. Dev.=0.346, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9817, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 3/24/2023 12:38 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

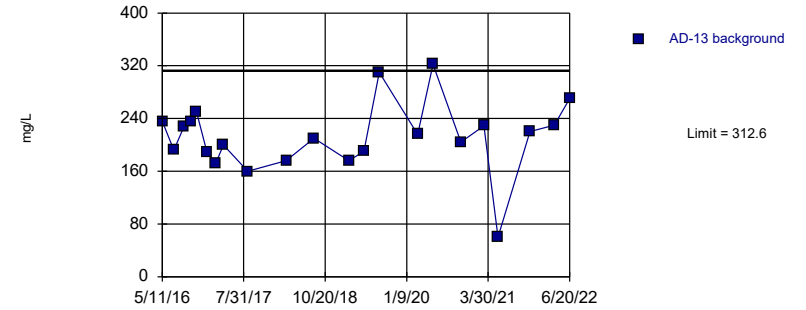
Prediction Limit
 Intrawell Parametric, AD-12 (bg)



Background Data Summary (based on square transformation): Mean=5424, Std. Dev.=2481, n=22, 4.545% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9554, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 3/24/2023 12:38 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

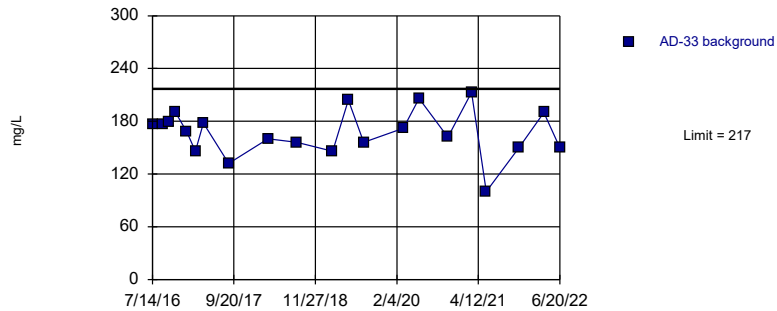
Prediction Limit
 Intrawell Parametric, AD-13 (bg)



Background Data Summary: Mean=212.5, Std. Dev.=53.58, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9264, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 3/24/2023 12:38 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

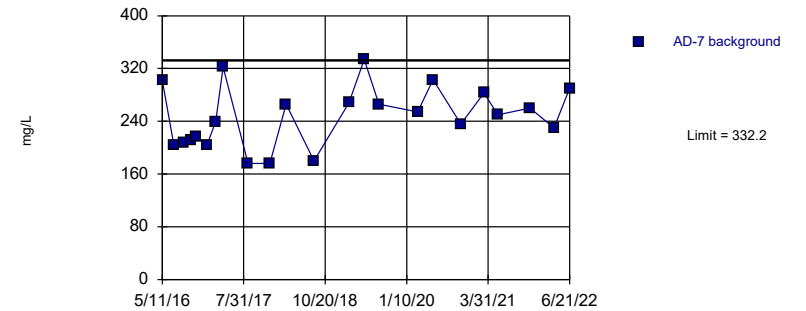
Prediction Limit
 Intrawell Parametric, AD-33



Background Data Summary: Mean=167.2, Std. Dev.=26.49, n=21. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9685, critical = 0.873. Kappa = 1.88 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 3/24/2023 12:38 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit
 Intrawell Parametric, AD-7



Background Data Summary: Mean=247, Std. Dev.=45.89, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9676, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

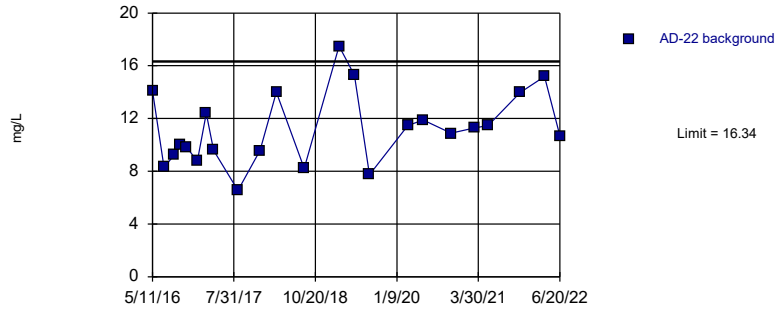
Constituent: Total Dissolved Solids [TDS] Analysis Run 3/24/2023 12:38 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Deseasonalized Intrawell Prediction Limits - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 12:44 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg.N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium, total (mg/L)	AD-22	16.34	n/a	n/a	1 future	n/a	23	11.21	2.761	0	None	No	0.002505	Param Intra 1 of 2
pH, field (SU)	AD-22	4.985	3.524	n/a	1 future	n/a	22	4.255	0.3908	0	None	No	0.001253	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-22	734.7	n/a	n/a	1 future	n/a	23	506.3	123	0	None	No	0.002505	Param Intra 1 of 2

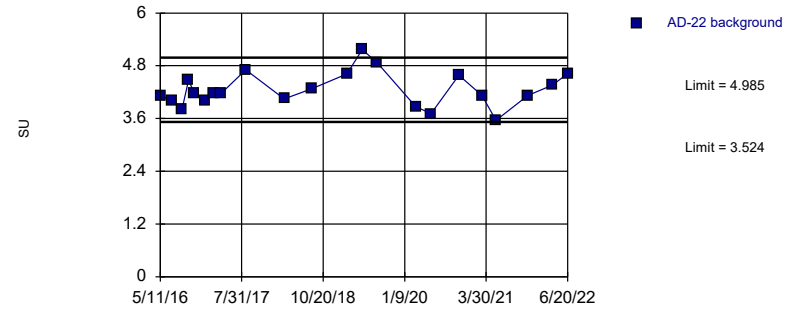
Prediction Limit
Intrawell Parametric, AD-22



Background Data Summary: Mean=11.21, Std. Dev.=2.761, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9675, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total, Alt. Values Analysis Run 3/24/2023 12:41 PM View: Deaseasonalized Values
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

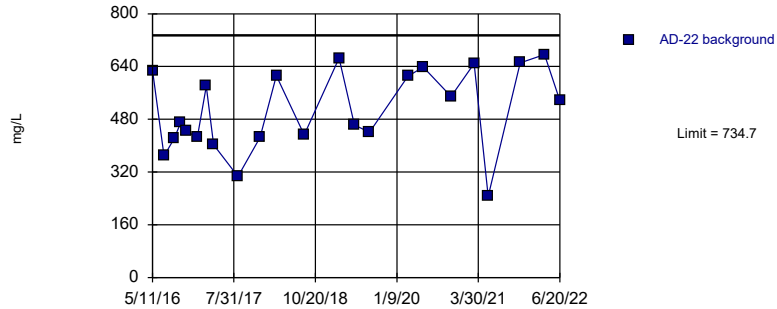
Prediction Limit
Intrawell Parametric, AD-22



Background Data Summary: Mean=4.255, Std. Dev.=0.3908, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9732, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field, Alt. Values Analysis Run 3/24/2023 12:42 PM View: Deaseasonalized Values
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit
Intrawell Parametric, AD-22



Background Data Summary: Mean=506.3, Std. Dev.=123, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9317, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS], Alt. Values Analysis Run 3/24/2023 12:43 PM View: Deaseaso
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE G
Trend Tests - Upgradient

Trend Tests - Upgradient Wells - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 10:12 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Chloride, total (mg/L)	AD-13 (bg)	3.327	143	98	Yes	23	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	AD-12 (bg)	-0.08408	-145	-98	Yes	23	39.13	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	AD-13 (bg)	5.996	124	98	Yes	23	0	n/a	n/a	0.01	NP

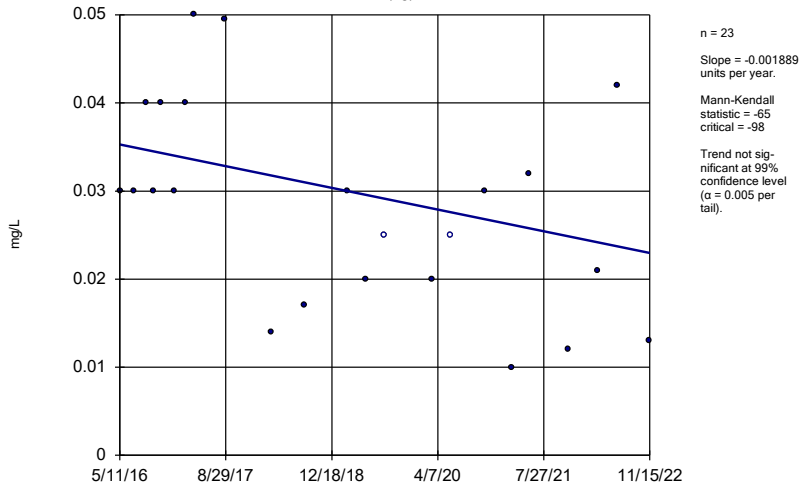
Trend Tests - Upgradient Wells - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 10:12 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron, total (mg/L)	AD-12 (bg)	-0.001889	-65	-98	No	23	8.696	n/a	n/a	0.01	NP
Boron, total (mg/L)	AD-13 (bg)	0.001622	82	98	No	23	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	AD-12 (bg)	0.09882	51	98	No	23	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	AD-13 (bg)	3.327	143	98	Yes	23	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	AD-12 (bg)	-0.08408	-145	-98	Yes	23	39.13	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	AD-13 (bg)	-0.03648	-75	-98	No	23	17.39	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	AD-12 (bg)	-0.2003	-94	-98	No	23	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	AD-13 (bg)	5.996	124	98	Yes	23	0	n/a	n/a	0.01	NP

Sen's Slope Estimator

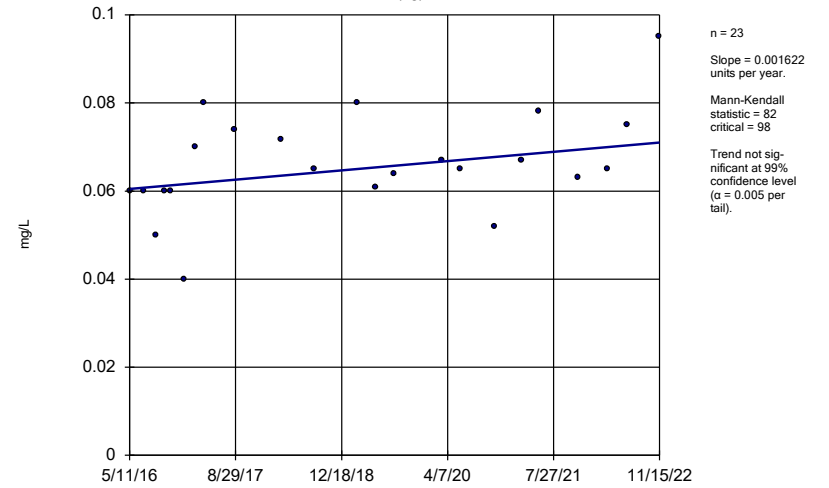
AD-12 (bg)



Constituent: Boron, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

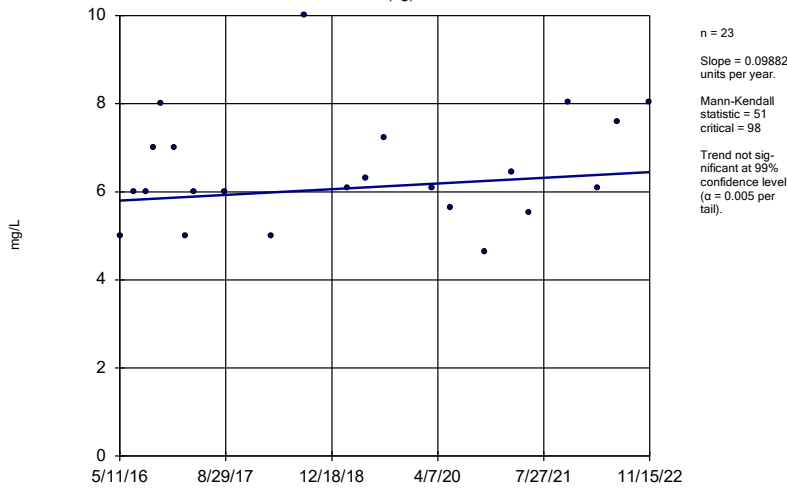
AD-13 (bg)



Constituent: Boron, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

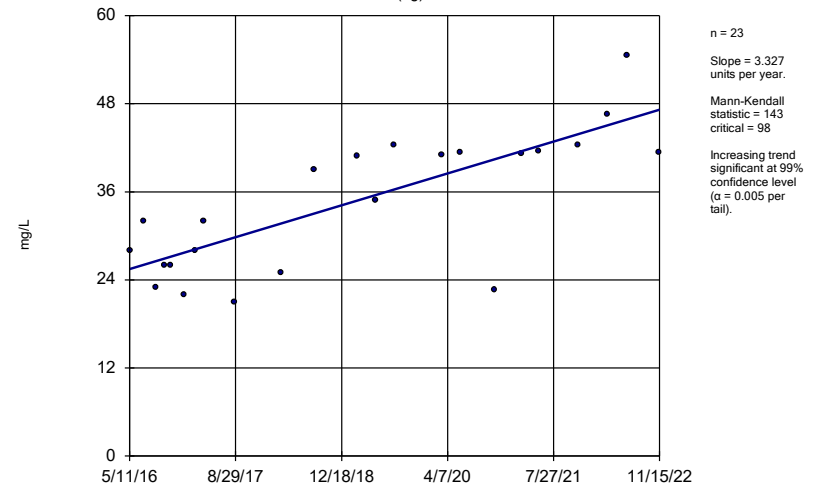
AD-12 (bg)



Constituent: Chloride, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

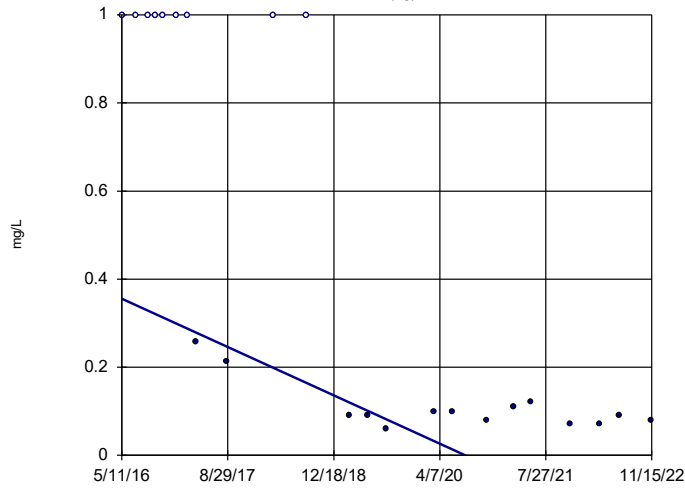
AD-13 (bg)



Constituent: Chloride, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-12 (bg)

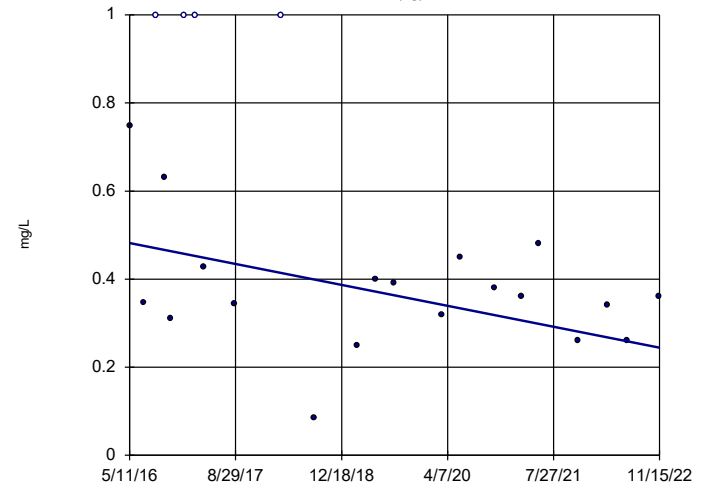


n = 23
Slope = -0.08408
units per year.
Mann-Kendall
statistic = -145
critical = -98
Decreasing trend
significant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Fluoride, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)

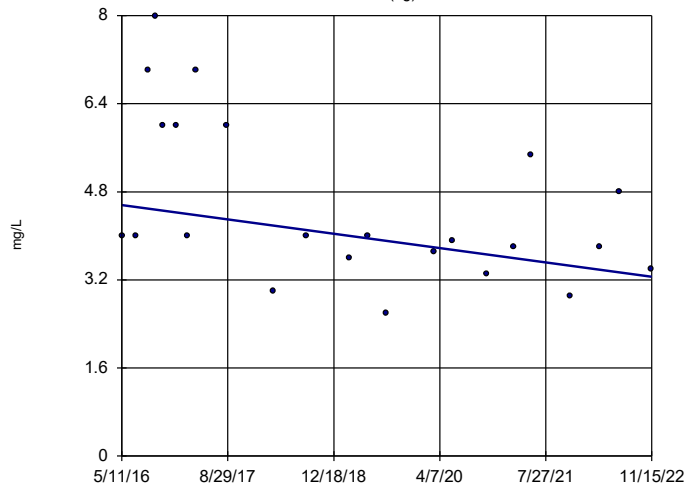


n = 23
Slope = -0.03648
units per year.
Mann-Kendall
statistic = -75
critical = -98
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Fluoride, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-12 (bg)

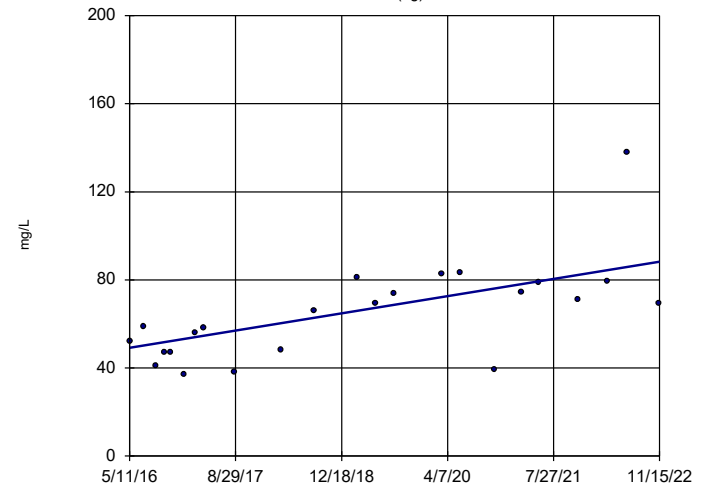


n = 23
Slope = -0.2003
units per year.
Mann-Kendall
statistic = -94
critical = -98
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Sulfate, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)



n = 23
Slope = 5.996
units per year.
Mann-Kendall
statistic = 124
critical = 98
Increasing trend
significant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Sulfate, total Analysis Run 2/20/2023 10:11 AM View: Trend Tests
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

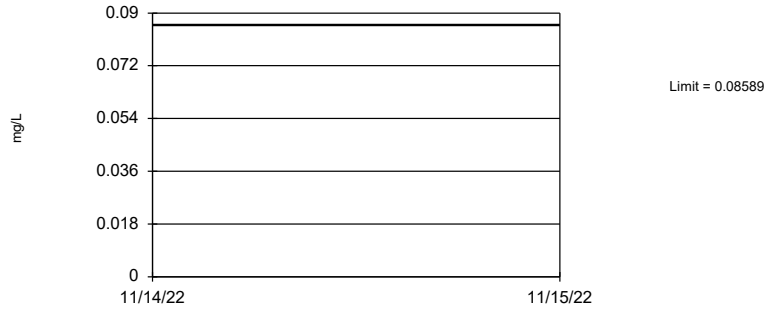
FIGURE H
Interwell PLs

Interwell Prediction Limits - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 10:10 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Boron, total (mg/L)	n/a	0.08589	n/a	n/a	3 future	n/a	46	0.04725	0.02229	4.348	None	No	0.002505	Param Inter 1 of 2
Chloride, total (mg/L)	n/a	54.5	n/a	n/a	3 future	n/a	46	n/a	n/a	0	n/a	n/a	0.0009064	NP Inter (normality) 1 of 2
Fluoride, total (mg/L)	n/a	1	n/a	n/a	3 future	n/a	46	n/a	n/a	28.26	n/a	n/a	0.0009064	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	n/a	138	n/a	n/a	3 future	n/a	46	n/a	n/a	0	n/a	n/a	0.0009064	NP Inter (normality) 1 of 2

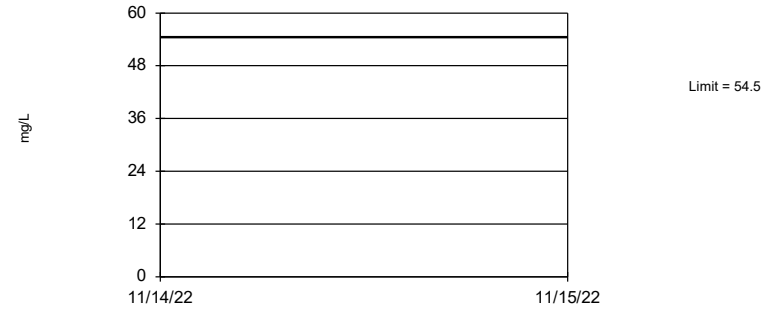
Prediction Limit
Interwell Parametric



Background Data Summary: Mean=0.04725, Std. Dev.=0.02229, n=46, 4.348% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9451, critical = 0.927. Kappa = 1.734 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.002505. Assumes 3 future values.

Constituent: Boron, total Analysis Run 2/20/2023 10:07 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. Annual per-constituent alpha = 0.005426. Individual comparison alpha = 0.0009064 (1 of 2). Assumes 3 future values.

Constituent: Chloride, total Analysis Run 2/20/2023 10:07 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

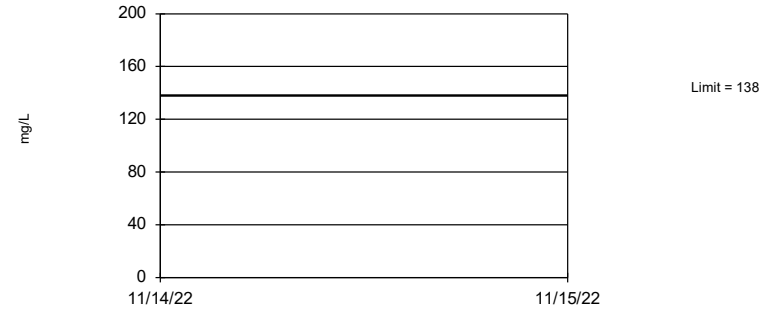
Prediction Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. 28.26% NDs. Annual per-constituent alpha = 0.005426. Individual comparison alpha = 0.0009064 (1 of 2). Assumes 3 future values.

Constituent: Fluoride, total Analysis Run 2/20/2023 10:07 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

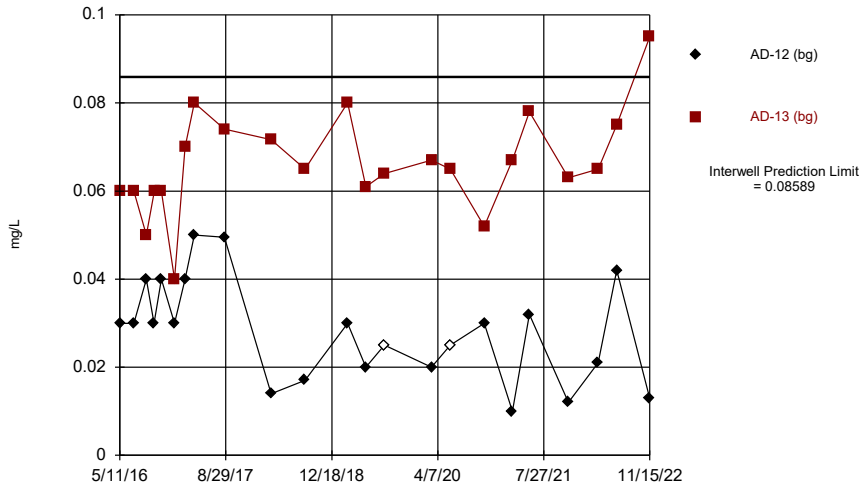
Prediction Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. Annual per-constituent alpha = 0.005426. Individual comparison alpha = 0.0009064 (1 of 2). Assumes 3 future values.

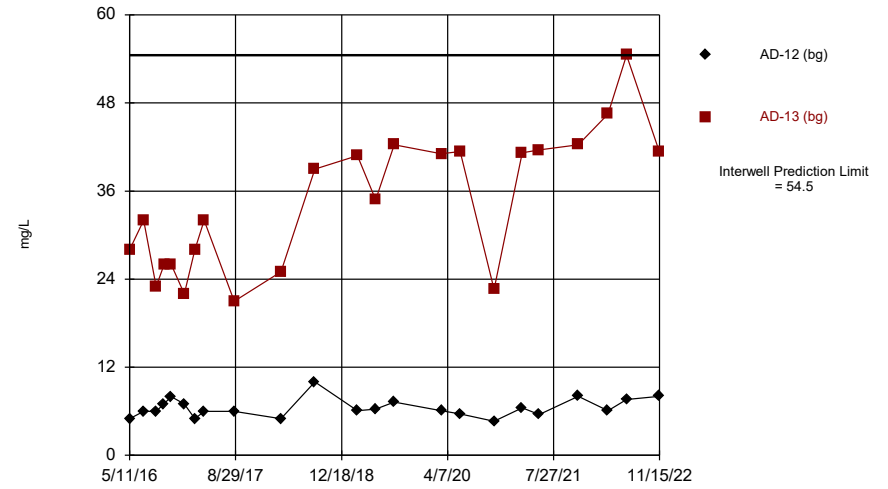
Constituent: Sulfate, total Analysis Run 2/20/2023 10:07 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



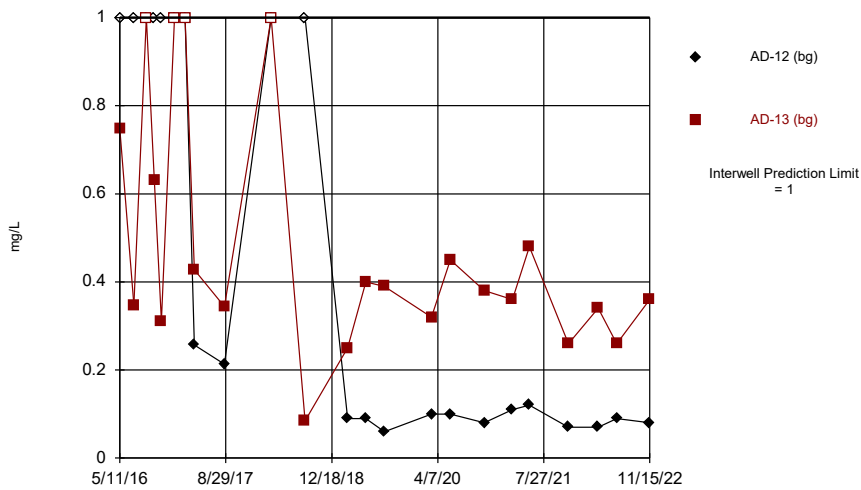
Constituent: Boron, total Analysis Run 2/20/2023 10:09 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



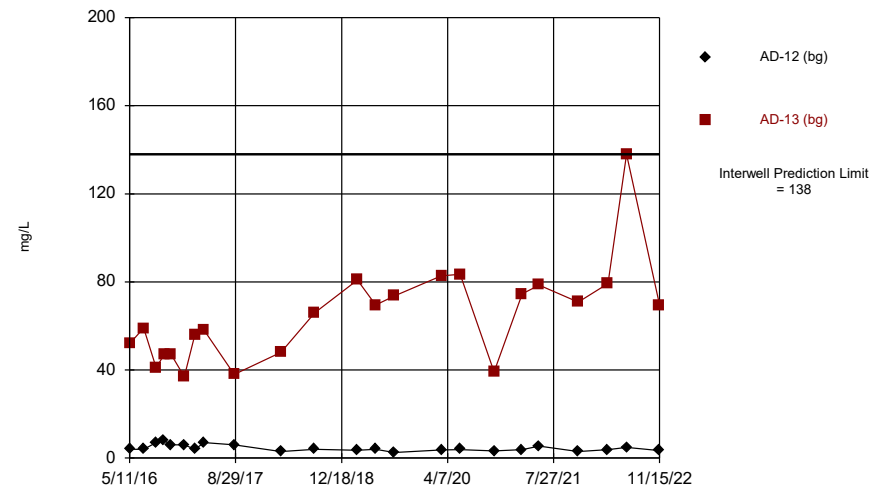
Constituent: Chloride, total Analysis Run 2/20/2023 10:09 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Fluoride, total Analysis Run 2/20/2023 10:09 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Sulfate, total Analysis Run 2/20/2023 10:09 AM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

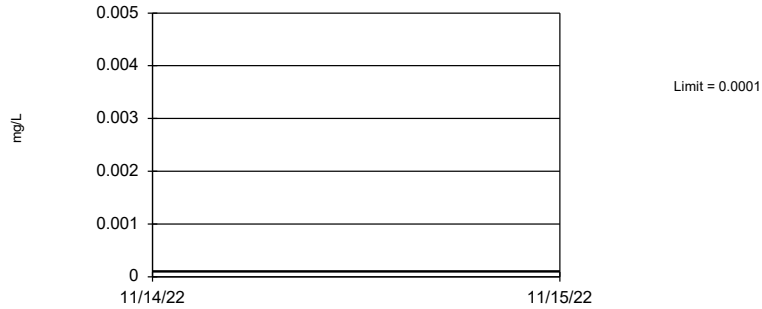
FIGURE I
UTLs

Upper Tolerance Limits Summary Table

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 10:14 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	n/a	0.0001	n/a	n/a	n/a	n/a 44	n/a	n/a	93.18	n/a	n/a	0.1047	NP Inter(NDs)
Arsenic, total (mg/L)	n/a	0.009	n/a	n/a	n/a	n/a 44	n/a	n/a	27.27	n/a	n/a	0.1047	NP Inter(normality)
Barium, total (mg/L)	n/a	0.05279	n/a	n/a	n/a	n/a 44	0.03267	0.009586	0	None	No	0.05	Inter
Beryllium, total (mg/L)	n/a	0.002	n/a	n/a	n/a	n/a 44	n/a	n/a	9.091	n/a	n/a	0.1047	NP Inter(normality)
Cadmium, total (mg/L)	n/a	0.00086	n/a	n/a	n/a	n/a 43	n/a	n/a	67.44	n/a	n/a	0.1102	NP Inter(NDs)
Chromium, total (mg/L)	n/a	0.004	n/a	n/a	n/a	n/a 44	n/a	n/a	29.55	n/a	n/a	0.1047	NP Inter(normality)
Cobalt, total (mg/L)	n/a	0.0562	n/a	n/a	n/a	n/a 44	n/a	n/a	0	n/a	n/a	0.1047	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	n/a	2.887	n/a	n/a	n/a	n/a 44	1.279	0.7661	0	None	No	0.05	Inter
Fluoride, total (mg/L)	n/a	1	n/a	n/a	n/a	n/a 46	n/a	n/a	28.26	n/a	n/a	0.09447	NP Inter(normality)
Lead, total (mg/L)	n/a	0.005	n/a	n/a	n/a	n/a 44	n/a	n/a	72.73	n/a	n/a	0.1047	NP Inter(NDs)
Lithium, total (mg/L)	n/a	0.165	n/a	n/a	n/a	n/a 44	n/a	n/a	2.273	n/a	n/a	0.1047	NP Inter(normality)
Mercury, total (mg/L)	n/a	0.00001928	n/a	n/a	n/a	n/a 44	n/a	n/a	90.91	n/a	n/a	0.1047	NP Inter(NDs)
Molybdenum, total (mg/L)	n/a	0.005	n/a	n/a	n/a	n/a 40	n/a	n/a	95	n/a	n/a	0.1285	NP Inter(NDs)
Selenium, total (mg/L)	n/a	0.00386	n/a	n/a	n/a	n/a 44	n/a	n/a	56.82	n/a	n/a	0.1047	NP Inter(NDs)
Thallium, total (mg/L)	n/a	0.001443	n/a	n/a	n/a	n/a 42	n/a	n/a	85.71	n/a	n/a	0.116	NP Inter(NDs)

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 44 background values. 93.18% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Antimony, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

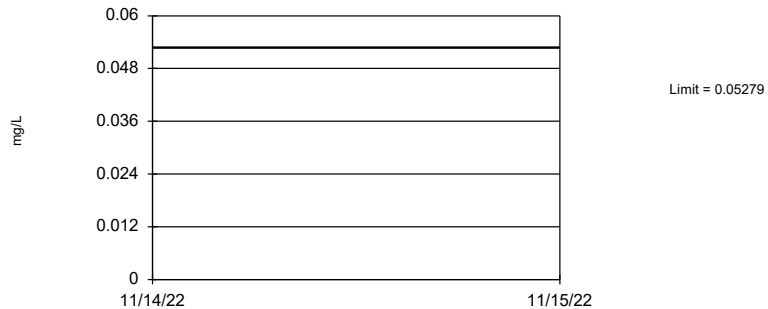
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 27.27% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Arsenic, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

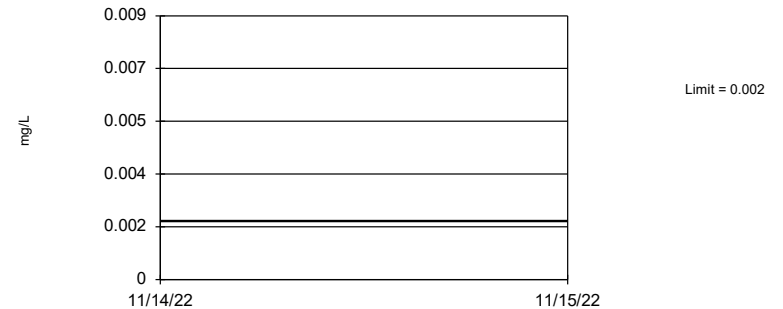
Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary: Mean=0.03267, Std. Dev.=0.009586, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9353, critical = 0.924. Report alpha = 0.05.

Constituent: Barium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

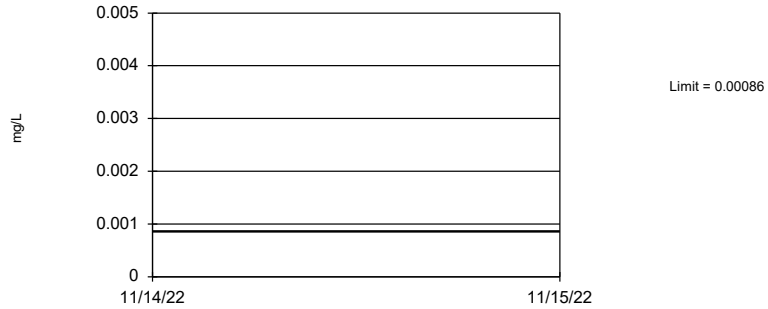
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 9.091% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Beryllium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

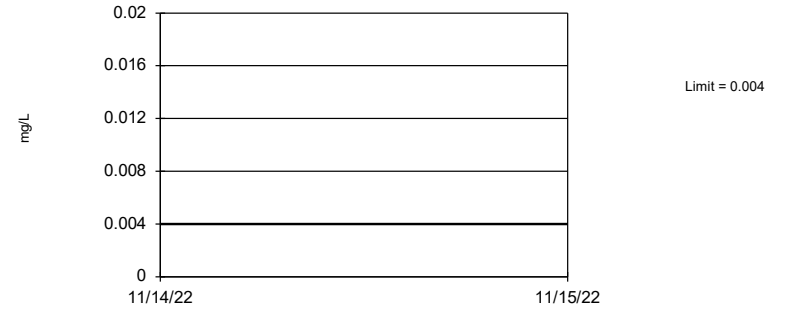
Tolerance Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 43 background values. 67.44% NDs. 90.04% coverage at alpha=0.01; 93.16% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1102.

Constituent: Cadmium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 29.55% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Chromium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Cobalt, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit
Interwell Parametric



95% coverage. Background Data Summary: Mean=1.279, Std. Dev.=0.7661, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9421, critical = 0.924. Report alpha = 0.05.

Constituent: Combined Radium 226 + 228 Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limit
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. 28.26% NDs. 90.43% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.09447.

Constituent: Fluoride, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 44 background values. 72.73% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Lead, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 2.273% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Lithium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 44 background values. 90.91% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Mercury, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

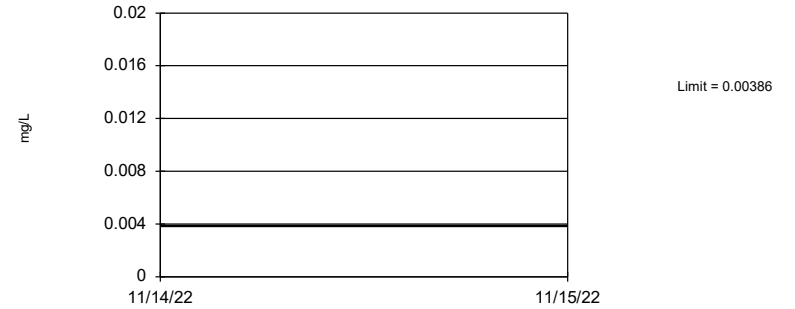
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 40 background values. 95% NDs. 89.26% coverage at alpha=0.01; 92.77% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1285.

Constituent: Molybdenum, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

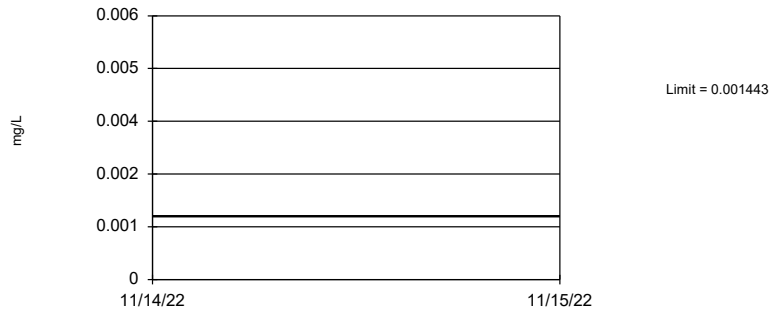
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 44 background values. 56.82% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Selenium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 42 background values. 85.71% NDs. 89.65% coverage at alpha=0.01; 93.16% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.116.

Constituent: Thallium, total Analysis Run 2/20/2023 10:13 AM View: Upper Tolerance Limits
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE J
GWPS

PIRKEY STACKOUT GWPS			
Constituent Name	MCL	Background Limit	GWPS
Antimony, Total (mg/L)	0.006	0.0001	0.006
Arsenic, Total (mg/L)	0.01	0.009	0.01
Barium, Total (mg/L)	2	0.053	2
Beryllium, Total (mg/L)	0.004	0.002	0.004
Cadmium, Total (mg/L)	0.005	0.00086	0.005
Chromium, Total (mg/L)	0.1	0.004	0.1
Cobalt, Total (mg/L)	n/a	0.056	0.056
Combined Radium, Total (pCi/L)	5	2.89	5
Fluoride, Total (mg/L)	4	1	4
Lead, Total (mg/L)	n/a	0.005	0.005
Lithium, Total (mg/L)	n/a	0.17	0.17
Mercury, Total (mg/L)	0.002	0.000019	0.002
Molybdenum, Total (mg/L)	n/a	0.005	0.005
Selenium, Total (mg/L)	0.05	0.0039	0.05
Thallium, Total (mg/L)	0.002	0.0014	0.002

*MCL = Maximum Contaminant Level

*GWPS = Groundwater Protection Standard

FIGURE K
Confidence Intervals

Appendix IV Confidence Intervals - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 1:03 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Beryllium, total (mg/L)	AD-22	0.008768	0.004683	0.004	Yes	22	0.006726	0.003805	0	None	No	0.01	Param.
Mercury, total (mg/L)	AD-33	0.006946	0.002163	0.002	Yes	9	0.004722	0.003906	0	None	In(x)	0.01	Param.

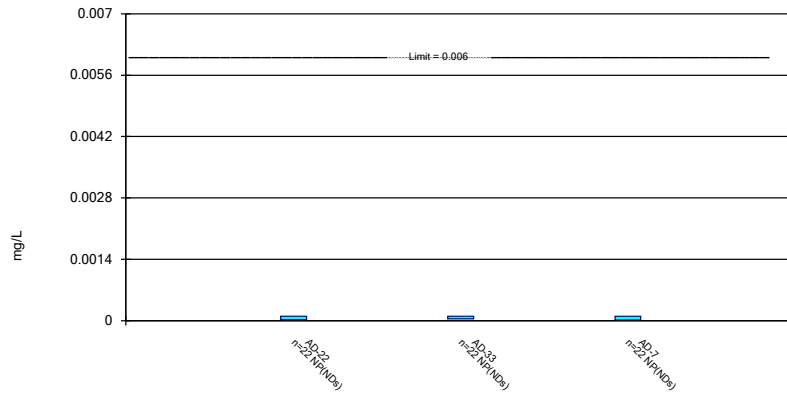
Appendix IV Confidence Intervals - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 1:03 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	AD-22	0.0001	0.00002	0.006	No	22	0.00009636	0.00001706	95.45	None	No	0.01	NP (NDs)
Antimony, total (mg/L)	AD-33	0.0001	0.00004	0.006	No	22	0.00009318	0.00002255	90.91	None	No	0.01	NP (NDs)
Antimony, total (mg/L)	AD-7	0.0001	0.00001	0.006	No	22	0.00009591	0.00001919	95.45	None	No	0.01	NP (NDs)
Arsenic, total (mg/L)	AD-22	0.006897	0.002994	0.01	No	22	0.006306	0.006155	0	None	ln(x)	0.01	Param.
Arsenic, total (mg/L)	AD-33	0.001467	0.0006527	0.01	No	21	0.001191	0.001034	9.524	None	x^(1/3)	0.01	Param.
Arsenic, total (mg/L)	AD-7	0.0013	0.0007791	0.01	No	22	0.002196	0.001806	27.27	Kaplan-Meier	ln(x)	0.01	Param.
Barium, total (mg/L)	AD-22	0.054	0.017	2	No	22	0.03778	0.03235	0	None	No	0.01	NP (normality)
Barium, total (mg/L)	AD-33	0.05371	0.04601	2	No	21	0.04986	0.006979	0	None	No	0.01	Param.
Barium, total (mg/L)	AD-7	0.05226	0.04251	2	No	22	0.04739	0.009085	0	None	No	0.01	Param.
Beryllium, total (mg/L)	AD-22	0.008768	0.004683	0.004	Yes	22	0.006726	0.003805	0	None	No	0.01	Param.
Beryllium, total (mg/L)	AD-33	0.00135	0.000945	0.004	No	22	0.001282	0.0006866	0	None	No	0.01	NP (normality)
Beryllium, total (mg/L)	AD-7	0.005641	0.003951	0.004	No	22	0.004796	0.001575	0	None	No	0.01	Param.
Cadmium, total (mg/L)	AD-33	0.001	0.000043	0.005	No	22	0.0004841	0.0004812	40.91	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	AD-7	0.0008368	0.0007154	0.005	No	22	0.0007761	0.0001131	0	None	No	0.01	Param.
Chromium, total (mg/L)	AD-22	0.002913	0.0005827	0.1	No	22	0.00439	0.008401	13.64	None	ln(x)	0.01	Param.
Chromium, total (mg/L)	AD-33	0.002298	0.000473	0.1	No	21	0.001751	0.002206	14.29	None	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	AD-7	0.0005018	0.0002002	0.1	No	22	0.001417	0.001724	22.73	Kaplan-Meier	ln(x)	0.01	Param.
Cobalt, total (mg/L)	AD-33	0.01029	0.008462	0.056	No	21	0.009377	0.001658	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-7	0.03942	0.03072	0.056	No	22	0.03507	0.008109	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-22	5.203	3.511	5	No	22	4.357	1.577	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-33	3.159	1.609	5	No	22	2.607	1.919	0	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-7	4.414	3.149	5	No	22	3.782	1.178	0	None	No	0.01	Param.
Fluoride, total (mg/L)	AD-22	1.196	0.3891	4	No	24	0.8297	0.3814	25	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	AD-33	1	0.23	4	No	23	0.5616	0.3742	39.13	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	AD-7	1	0.4117	4	No	23	0.6644	0.2946	39.13	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-22	0.005	0.00022	0.005	No	22	0.001979	0.0022	31.82	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-33	0.005	0.000208	0.005	No	21	0.002495	0.002447	47.62	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-7	0.005	0.0008	0.005	No	22	0.002504	0.002134	40.91	None	No	0.01	NP (normality)
Lithium, total (mg/L)	AD-33	0.0267	0.0185	0.17	No	22	0.02271	0.008291	4.545	None	No	0.01	NP (normality)
Lithium, total (mg/L)	AD-7	0.1011	0.08156	0.17	No	22	0.09132	0.01818	0	None	No	0.01	Param.
Mercury, total (mg/L)	AD-22	0.0006604	0.00001606	0.002	No	9	0.0003328	0.0004943	11.11	None	sqrt(x)	0.01	Param.
Mercury, total (mg/L)	AD-33	0.006946	0.002163	0.002	Yes	9	0.004722	0.003906	0	None	ln(x)	0.01	Param.
Mercury, total (mg/L)	AD-7	0.0002865	0.0001285	0.002	No	22	0.0002075	0.0001472	4.545	None	No	0.01	Param.
Molybdenum, total (mg/L)	AD-22	0.005	0.0001	0.005	No	20	0.004508	0.001513	90	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-33	0.005	0.0007365	0.005	No	20	0.004787	0.0009533	95	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-7	0.005	0.0001	0.005	No	21	0.004767	0.001069	95.24	None	No	0.01	NP (NDs)
Selenium, total (mg/L)	AD-22	0.00592	0.002213	0.05	No	22	0.005447	0.004074	27.27	Kaplan-Meier	sqrt(x)	0.01	Param.
Selenium, total (mg/L)	AD-33	0.005	0.00127	0.05	No	22	0.002923	0.001725	36.36	None	No	0.01	NP (normality)
Selenium, total (mg/L)	AD-7	0.003814	0.002091	0.05	No	22	0.003864	0.001687	36.36	Kaplan-Meier	No	0.01	Param.
Thallium, total (mg/L)	AD-22	0.002	0.000162	0.002	No	21	0.0008333	0.0008234	28.57	None	No	0.01	NP (normality)
Thallium, total (mg/L)	AD-33	0.001192	0.00005	0.002	No	21	0.0002981	0.0003672	80.95	None	No	0.01	NP (NDs)
Thallium, total (mg/L)	AD-7	0.0005	0.0002	0.002	No	21	0.000371	0.0002113	42.86	None	No	0.01	NP (normality)

Non-Parametric Confidence Interval

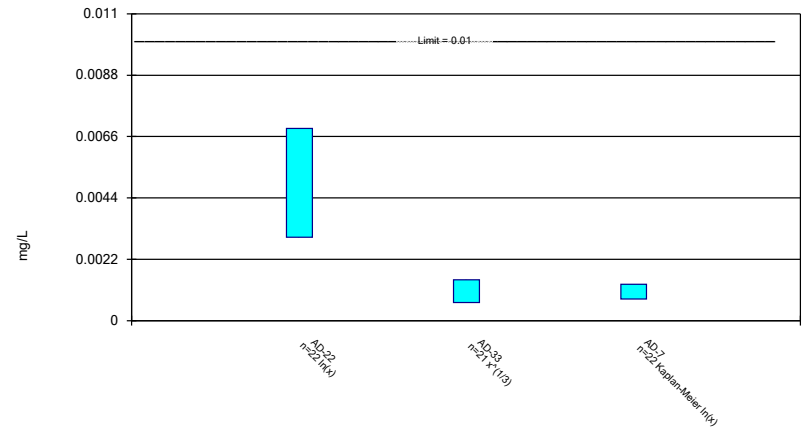
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Antimony, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

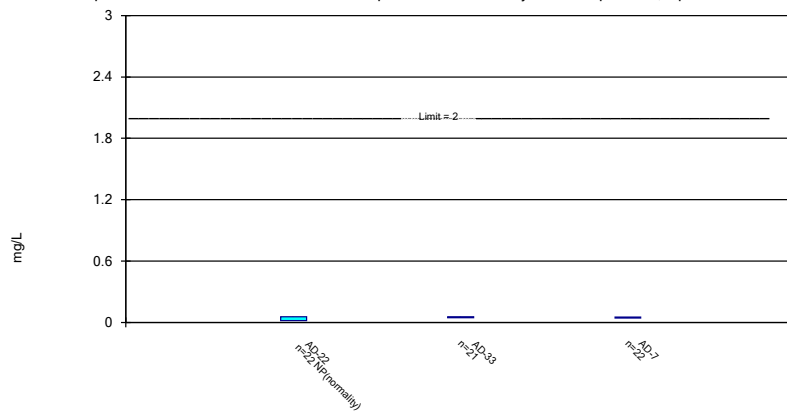
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

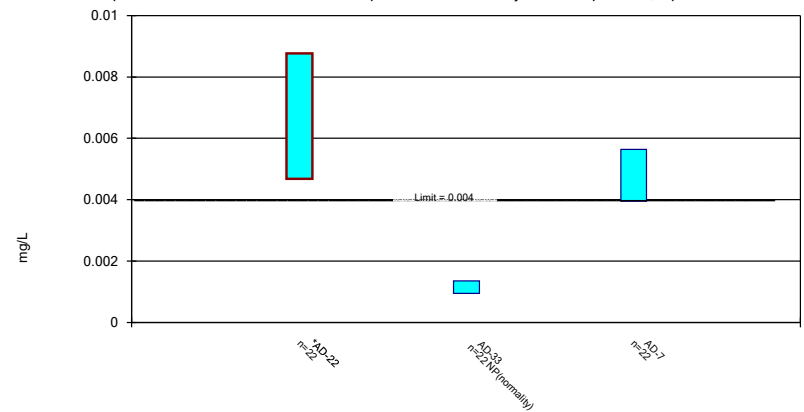
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

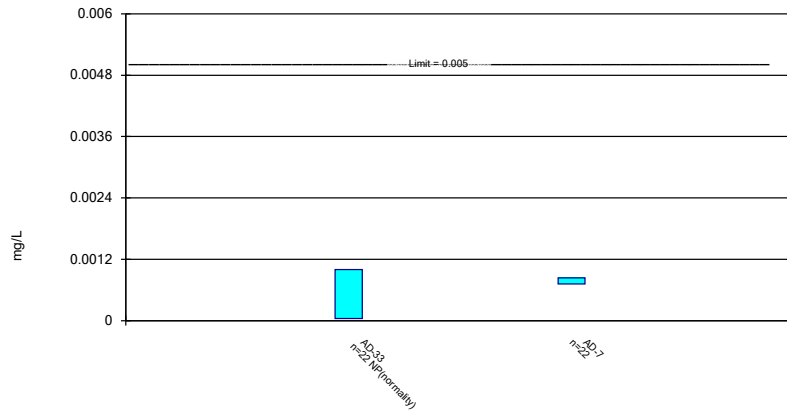
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

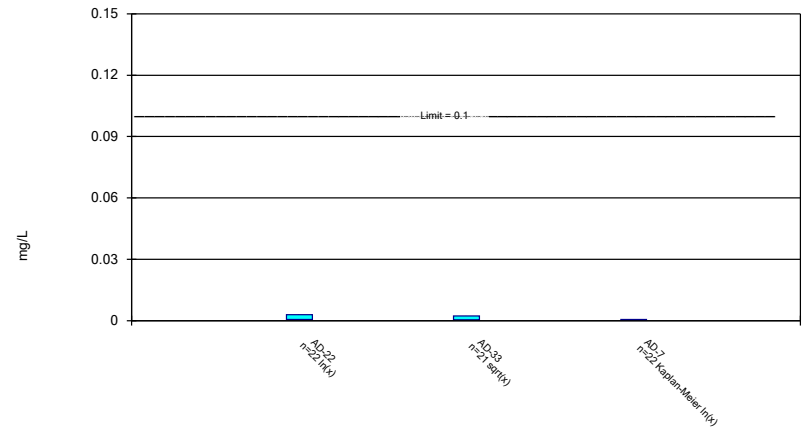
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

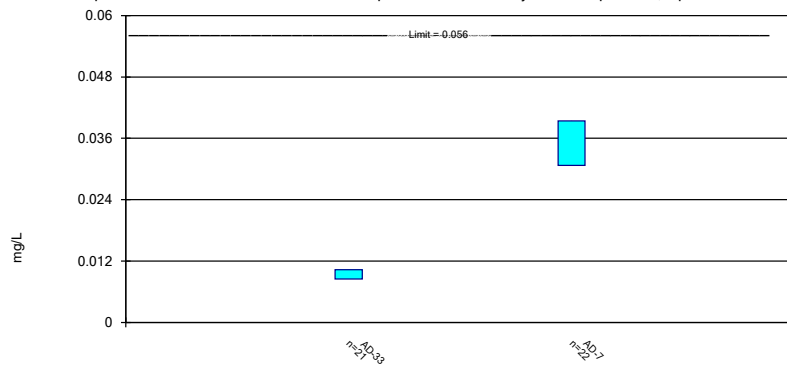
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

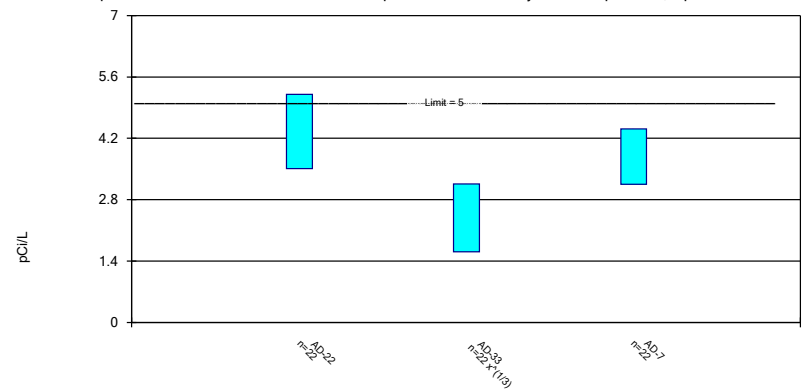
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

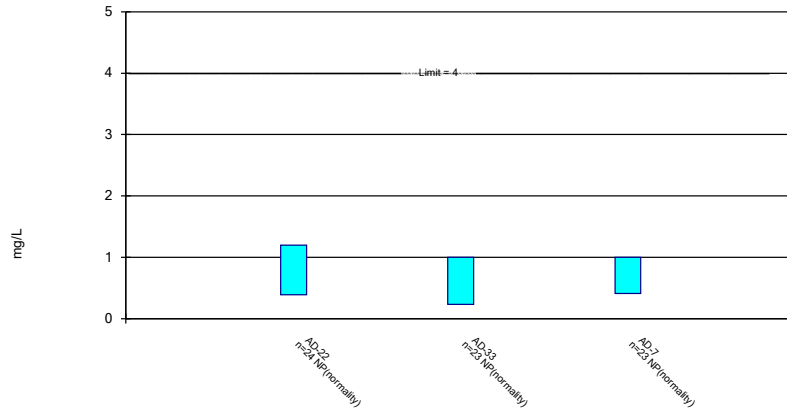
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

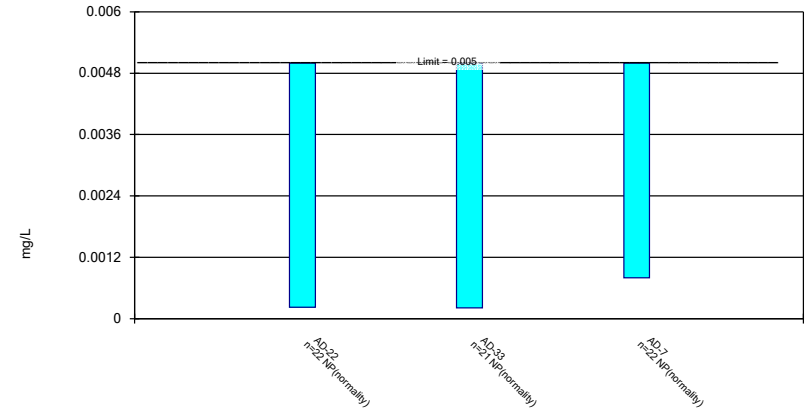
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Fluoride, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

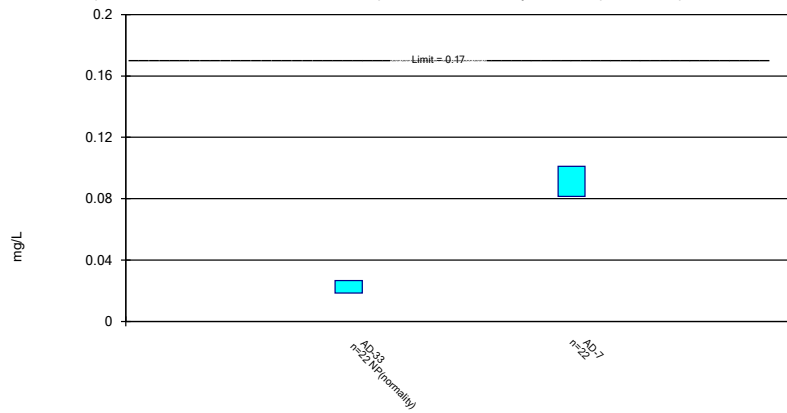
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lead, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

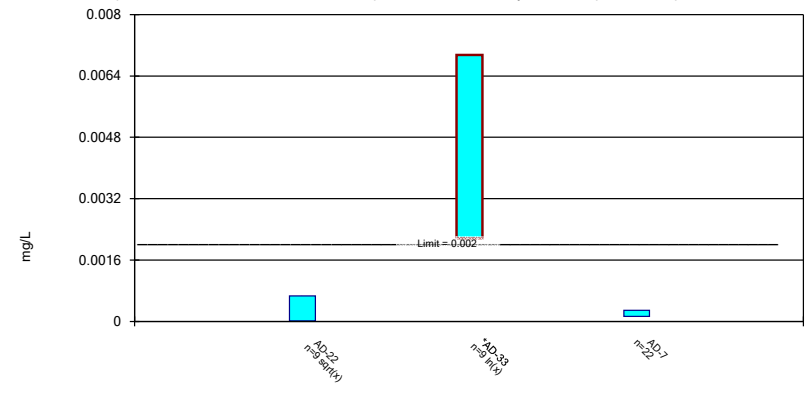
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

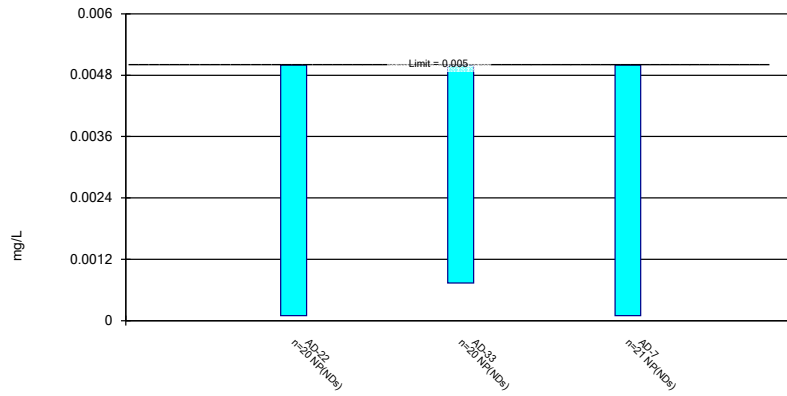
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Mercury, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

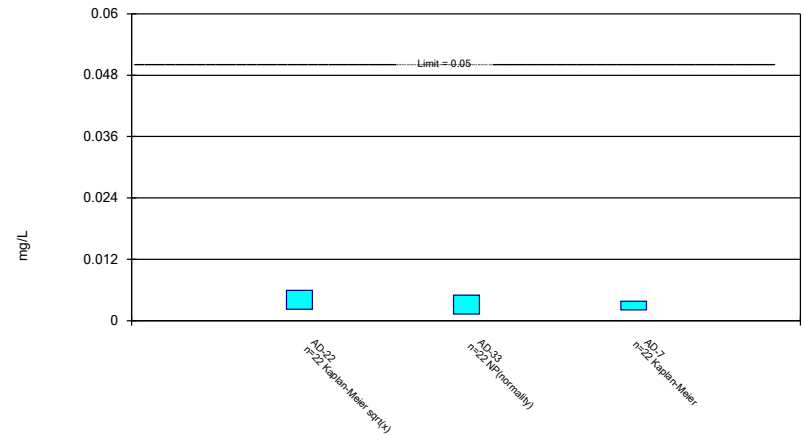
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Molybdenum, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

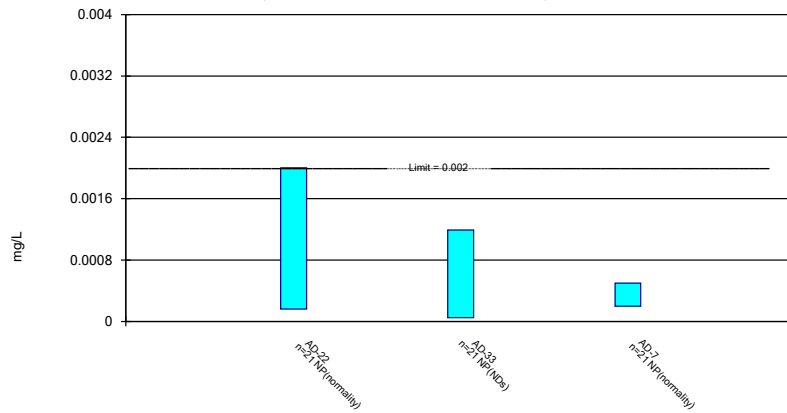
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Thallium, total Analysis Run 3/24/2023 1:02 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Deseasonalized Confidence Intervals - Well AD-22 - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 1:08 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Cobalt, total (mg/L)	AD-22	0.09726	0.07131	0.056	Yes	22	0.08429	0.02417	0	None	No	0.01	Param.

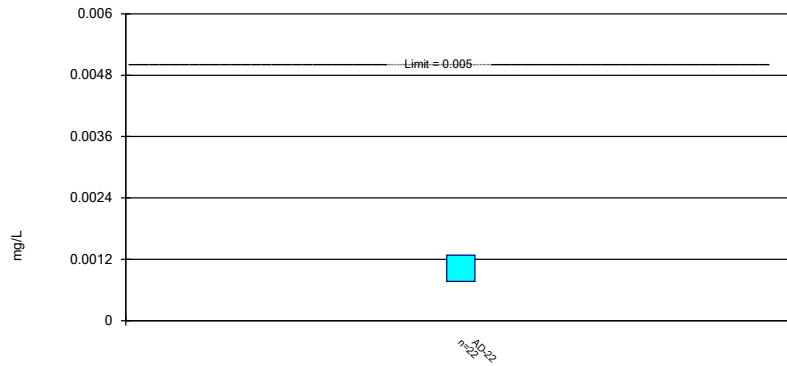
Deseasonalized Confidence Intervals - Well AD-22 - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 1:08 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Cadmium, total (mg/L)	AD-22	0.001281	0.0007639	0.005	No	22	0.001023	0.0004819	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-22	0.09726	0.07131	0.056	Yes	22	0.08429	0.02417	0	None	No	0.01	Param.
Lithium, total (mg/L)	AD-22	0.1891	0.1369	0.17	No	22	0.1654	0.0522	0	None	sqrt(x)	0.01	Param.

Parametric Confidence Interval

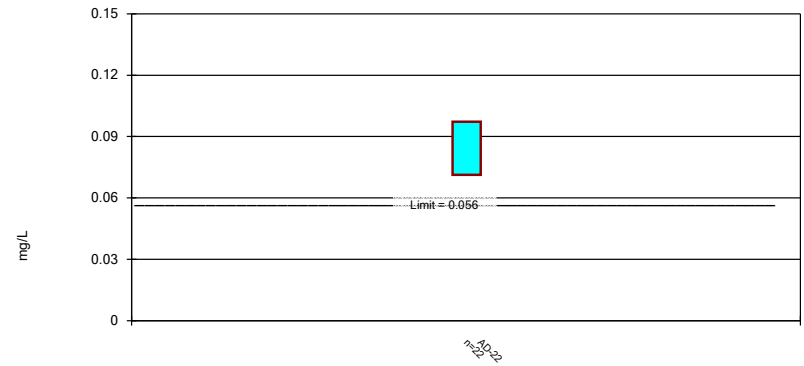
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total, Alt. Values Analysis Run 3/24/2023 1:05 PM View: Deseasonalized Confidence
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

Compliance limit is exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total, Alt. Values Analysis Run 3/24/2023 1:06 PM View: Deseasonalized Confidence
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total, Alt. Values Analysis Run 3/24/2023 1:06 PM View: Deseasonalized Confidence
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Memorandum

Date: January 25, 2024

To: Leslie Fuerschbach (AEP)

Copies to: Brian Newton (AEP)

From: Allison Kreinberg (Geosyntec)

Subject: Evaluation of 2023 Reissued Analytical Laboratory Data for
H.W. Pirkey Power Plant's FGD Stackout Area

In accordance with Texas Commission on Environmental Quality (TCEQ) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Title 30 Chapter 352, "CCR rule") groundwater sampling was completed in 2023 to support assessment monitoring at the Flue Gas Desulfurization (FGD) Stackout Area, an existing CCR unit at the H.W. Pirkey Power Plant in Hallsville, Texas. After the statistical evaluation was completed using data from the first semiannual assessment monitoring event,¹ select analytical laboratory reports were reissued to correct an inconsistent number of significant figures in electronic data deliverables and the published laboratory reports.

A review of the reissued analytical laboratory reports identified reported lithium and mercury results that had the number of significant figures changed (Table 1). The site-specific background value for lithium was not updated as part of the first semiannual assessment monitoring event; therefore, the lithium result at background location AD-12 was not used in the statistical evaluation before the reissued analytical laboratory reports were reviewed. Both the initial reported lithium value and the revised lithium value at downgradient location AD-33 were below the site-specific groundwater protection standard of 0.165 milligrams per liter (mg/L), and no statistically significant levels of lithium were identified during the first semiannual assessment monitoring event.¹

¹ Geosyntec. 2023. *Statistical Analysis Summary – Flue Gas Desulfurization (FGD) Stackout Area. H.W. Pirkey Power Plant, Hallsville, Texas.* Geosyntec Consultants, Inc. October.

The mercury value at downgradient location AD-33 was revised slightly higher due to the additional significant figures which were reported in the reissued report. Both the initial reported value and revised value for mercury at AD-33 were above the site-specific groundwater protection standard of 0.00200 mg/L and a statistically significant level of mercury was identified at AD-33 during the first semiannual assessment monitoring event.¹ Therefore, no changes to the statistical outcome of the first semiannual assessment monitoring event would occur.

The revised lithium and mercury values in the reissued laboratory analytical reports will be used in future reporting and statistical evaluations.

**Table 1. 2023 Revised Analytical Results
H.W. Pirkey Power Plant - FGD Stackout Area**

Geosyntec Consultants, Inc.

Sample Date	Well ID	Well Location	Constituent	Units	Initial Reported Value	Revised Value
6/26/2023	AD-12	Background	Lithium	mg/L	0.0049	0.00487
6/26/2023	AD-33	Downgradient	Lithium	mg/L	0.025	0.0246
6/26/2023	AD-33	Downgradient	Mercury	ng/L	5600	5610

Notes:

mg/L: milligrams per liter

ng/L: nanograms per liter

STATISTICAL ANALYSIS SUMMARY FLUE GAS DESULFURIZATION (FGD) STACKOUT AREA

**H.W. Pirkey Power Plant
Hallsville, Texas**

Prepared for

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Project Number: CHA8500B

October 31, 2023

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ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
CCR	coal combustion residuals
CCV	continuing calibration verification
CFR	Code of Federal Regulations
FGD	Flue Gas Desulfurization
GWPS	groundwater protection standard
LCL	lower confidence limit
LFB	laboratory fortified blanks
LPL	lower prediction limit
LRB	laboratory reagent blanks
MCL	maximum contaminant level
NELAP	National Environmental Laboratory Accreditation Program
QA/QC	quality assurance and quality control
SSI	statistically significant increase
SSL	statistically significant level
SU	standard units
TCEQ	Texas Commission on Environmental Quality
TDS	total dissolved solids
UPL	upper prediction limit
UTL	upper tolerance limit

1. INTRODUCTION

In accordance with Texas Commission on Environmental Quality (TCEQ) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Texas Administrative Code [TAC] Title 30, Chapter 352), groundwater monitoring has been conducted at the Flue Gas Desulfurization (FGD) Stackout Area, an existing CCR unit at the Pirkey Power Plant in Hallsville, Texas. Recent groundwater monitoring results were used to identify concentrations of Appendix IV constituents that are above site-specific groundwater protection standards (GWPSs).

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, chloride, and sulfate at the FGD Stackout Area. An alternative source was not identified at the time, so assessment monitoring was initiated and GWPSs were set in accordance with § 352.951(b). Two assessment monitoring events were conducted at the FGD Stackout Area in February and June 2023 in accordance with § 352.951(a). The results of these annual and semiannual assessment events are documented in this report.

Prior to conducting the statistical analyses, the groundwater data underwent several validation tests, including those for completeness, sample tracking accuracy, transcription errors, and consistent use of measurement units. No data quality issues were identified which would impact data usability.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at statistically significant levels (SSLs) above previously established GWPSs. SSLs were identified for beryllium, cobalt, and mercury. Thus, either the unit will move to an assessment of corrective measures or an alternative source demonstration (ASD) will be conducted to evaluate if the unit can remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

2. FGD STACKOUT AREA EVALUATION

2.1 Data Validation and QA/QC

During the assessment monitoring program, two sets of samples (February and June 2023) were collected for analysis from each background and compliance well to meet the requirements of § 352.951(a). The sample bottle for analysis of select parameters from well AD-22 was not usable upon receipt at the laboratory, so a replacement sample was collected from AD-22 in March 2023. Samples from both sampling events were analyzed for all Appendix III and Appendix IV parameters. A summary of data collected during these assessment monitoring events are presented in Table 1.

Chemical analysis was completed by an analytical laboratory certified by the National Environmental Laboratory Accreditation Program (NELAP). Quality assurance and quality control (QA/QC) samples completed by the analytical laboratory included the use of laboratory reagent blanks (LRBs), continuing calibration verification (CCV) samples, and laboratory fortified blanks (LFBs).

A data quality review was completed to assess if the data met the objectives outlined in TCEQ Draft Technical Guidance No. 32 related to groundwater sampling and analysis (TCEQ 2020). The data were determined usable for supporting project objectives, as documented in the review memorandum provided in Attachment B. The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.9.6.36 statistics software. The export file was checked against the analytical data for transcription errors and completeness.

2.2 Statistical Analysis

Statistical analyses for the FGD Stackout Area were conducted in accordance with the November 2021 *Statistical Analysis Plan* (Geosyntec 2021). Time series plots and results for all completed statistical tests are provided in Attachment C.

The data obtained in February and June 2023 were screened for potential outliers. No outliers were identified for these events.

2.2.1 Evaluation of Potential Appendix IV SSLs

A confidence interval was constructed for each Appendix IV parameter at each compliance well. Confidence limits were generally calculated parametrically ($\alpha = 0.01$); however, nonparametric confidence limits were calculated in some cases (e.g., when the data did not appear to be normally distributed or when the nondetect frequency was too high). For mercury at AD-22 and AD-33, earlier values were different than recent values and previous analyses identified statistically significant trends for mercury at these locations (Geosyntec 2023). Therefore, the confidence intervals for mercury at AD-22 and AD-33 were calculated using only the most recent eleven samples to better reflect recent conditions (Attachment C).

Seasonal patterns were observed for several parameters at AD-22 based on the time series graphs (Attachment C). Kruskal Wallis tests were performed during the previous statistical evaluation to test whether differences between the results from different seasons were statistically significant for all Appendix IV constituents at AD-22. Statistically significant differences were found for cadmium, cobalt, and lithium at AD-22. Where the Kruskal-Wallis test found significant seasonal effects, the data for these well/parameter pairs were deseasonalized so that the resulting confidence limits correctly account for seasonality as a predictable pattern rather than a random variation or a release. The results of the Kruskal-Wallis tests are provided in Attachment C. The tests will be rerun on an annual basis if apparent season patterns continue to be observed in the data.

An SSL was concluded if the lower confidence limit (LCL) was above the GWPS (i.e., if the entire confidence interval was above the GWPS). The calculated confidence limits (Attachment C) were compared to the GWPSs provided in Table 2. The GWPSs were established during a previous statistical analysis as either the greater value of the background concentration or the maximum contaminant level (Geosyntec 2023). The following SSLs was identified at the Pirkey FGD Stackout Area:

- The LCL for beryllium was above the GWPS of 0.00400 mg/L at AD-7 (0.00406 mg/L) and AD-22 (0.00502 mg/L).
- The deseasonalized LCL for cobalt was above the GWPS of 0.0562 mg/L at AD-22 (0.0737 mg/L).
- The LCL for mercury was above the GWPS of 0.00200 mg/L at AD-33 (0.00252 mg/L).

As a result, the Pirkey FGD Stackout Area will either move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring.

2.2.2 Evaluation of Potential Appendix III SSIs

While SSLs were identified, a review of the Appendix III results were also completed to assess whether concentrations of Appendix III parameters at the compliance wells were above background concentrations. Data collected during the June 2023 assessment monitoring event from each compliance well were compared to previously established prediction limits to assess whether the results are above background values (Table 3). The following concentrations were above the upper prediction limits (UPLs):

- Boron concentrations were above the interwell UPL of 0.0859 mg/L at AD-7 (2.02 mg/L) and AD-33 (0.114 mg/L).
- Chloride concentrations were above the interwell UPL of 54.5 mg/L at AD-22 (93.9 mg/L).
- Sulfate concentrations were above the interwell UPL of 138 mg/L at AD-22 (350 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the June 2023 sample was above the UPL or below the lower prediction

limit in the case of pH. Based on these results, concentrations of Appendix III constituents appear to be above background concentrations.

2.3 Conclusions

An annual and semiannual assessment monitoring event were conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis and no QA/QC issues that impacted data usability were identified. A review of outliers identified no potential outliers in the February and June 2023 data. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval was above the GWPS. SSLs were identified for beryllium, cobalt, and mercury. Appendix III parameters were compared to calculated prediction limits, with exceedances identified for boron, chloride, and sulfate.

Based on this evaluation, the Pirkey FGD Stackout Area CCR unit will either move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring.

3. REFERENCES

Geosyntec. 2021. Statistical Analysis Plan – H.W. Pirkey Power Plant. Geosyntec Consultants, Inc. November.

Geosyntec. 2023. Statistical Analysis Summary – Flue Gas Desulfurization Stackout Area, Pirkey, Hallsville, Texas. Geosyntec Consultants, Inc. March.

Texas Commission on Environmental Quality (TCEQ). 2020. Draft Technical Guidance No. 32. Coal Combustion Residuals Groundwater Monitoring and Corrective Action. May.

TABLES

**Table 1. Groundwater Data Summary
Statistical Analysis Summary
Pirkey Plant - FGD Stackout Pad**

Parameter	Unit	AD-7	AD-7	AD-12	AD-12	AD-13	AD-13	AD-22	AD-22	AD-22	AD-33	AD-33
		2/28/2023	6/27/2023	2/27/2023	6/26/2023	2/27/2023	6/26/2023	2/27/2023	3/22/2023	6/26/2023	2/27/2023	6/26/2023
Antimony	µg/L	0.1 U1	0.1 U1	0.1 U1	0.015 J1	0.1 U1	0.1 U1	0.1 U1	--	0.5 U1	0.1 U1	0.021 J1
Arsenic	µg/L	1.09	1.14	0.07 J1	0.11	0.39	1.56	3.66	--	3.4	0.76	1.08
Barium	µg/L	44.6	40.3	27.5	16.3	66.8	39.8	18.0	--	13.5	44.4	41.4
Beryllium	µg/L	5.41	5.11	0.155	0.11	1.23	0.234	10.2	--	7.71	1.50	1.48
Boron	mg/L	1.90	2.02	0.021 J1	0.019 J1	0.080	0.067	0.068	--	0.06 J1	0.179	0.114
Cadmium	µg/L	0.704	0.691	0.013 J1	0.007 J1	0.02 U1	0.02 U1	1.37	--	1.09	0.064	0.056
Calcium	mg/L	5.06	5.73	0.34	0.21	15.1	10.6	14.9	--	15.5	2.48	1.73
Chloride	mg/L	30.9	31.2	6.51	4.68	51.8	48.7		72.4	93.9	10.9	9.50
Chromium	µg/L	0.37	0.47	0.36	0.45	0.26	0.31	0.46	--	0.7 J1	0.31	0.39
Cobalt	µg/L	41.1	39.3	1.50	0.932	60.0	51.5	113	--	109	12.4	10.7
Combined Radium	pCi/L	4.93	4.69	1.17	0.45	3.76	1.61	4.86	--	3.77	2.85	1.96
Fluoride	mg/L	0.53	0.40	0.07	0.06	0.26	0.23	--	0.90	0.63	0.34	0.21
Lead	µg/L	0.85	0.88	0.1 J1	0.11 J1	0.2 U1	0.2 U1	0.21	--	1 U1	0.32	0.48
Lithium	mg/L	0.0804	0.0780	0.00885	0.0049	0.161	0.142	0.194	--	0.236	0.0233	0.025
Mercury	µg/L	1.520	1.220	0.005 U1	0.005 U1	0.05 U1	0.005 U1	0.040 J1	--	0.029	6.000	5.600
Molybdenum	µg/L	0.5 U1	0.5 U1	0.5 U1	0.7	0.5 U1	0.5 U1	0.5 U1	--	2.5 U1	0.5 U1	0.5 U1
Selenium	µg/L	3.46	4.53	0.35 J1	0.23 J1	0.5 U1	0.5 U1	7.39	--	7.0	2.54	4.21
Sulfate	mg/L	77.5	74.6	3.90	2.9	98.5	112	--	357	350	74.5	58.4
Thallium	µg/L	0.20	0.20	0.2 U1	0.2 U1	0.2 U1	0.03 J1	0.24	--	0.2 J1	0.04 J1	0.03 J1
Total Dissolved Solids	mg/L	270	290	70	80	250	280	--	680 S7	680	190	200
pH	SU	3.63	3.76	3.77	4.6	4.78	5.47	4.06	3.79	4.07	4.07	4.08

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U1: Non-detect value. For statistical analysis, parameters which were not detected were replaced with the reporting limit.

J1: Estimated value. Parameter was detected in concentrations below the reporting limit.

S7: Sample did not achieve constant weight.

**Table 2. Appendix IV Groundwater Protection Standards
Statistical Analysis Summary
Pirkey Plant - FGD Stackout Area**

Constituent Name	MCL	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600	0.000100	0.00600
Arsenic, Total (mg/L)	0.0100	0.00900	0.0100
Barium, Total (mg/L)	2.00	0.0528	2.00
Beryllium, Total (mg/L)	0.00400	0.00200	0.00400
Cadmium, Total (mg/L)	0.00500	0.000860	0.00500
Chromium, Total (mg/L)	0.100	0.00400	0.100
Cobalt, Total (mg/L)	n/a	0.0562	0.0562
Combined Radium, Total (pCi/L)	5.00	2.89	5.00
Fluoride, Total (mg/L)	4.00	1.00	4.00
Lead, Total (mg/L)	n/a	0.00500	0.00500
Lithium, Total (mg/L)	n/a	0.165	0.165
Mercury, Total (mg/L)	0.00200	0.0000193	0.00200
Molybdenum, Total (mg/L)	n/a	0.00500	0.00500
Selenium, Total (mg/L)	0.0500	0.00386	0.0500
Thallium, Total (mg/L)	0.00200	0.00144	0.00200

Notes:

1. Calculated UTL (Upper Tolerance Limit) represents site-specific background values.
2. Gray cells indicate the GWPS is based on the calculated UTL. Either the UTL is higher than the MCL or an MCL does not exist.

FGD: flue gas desulfurization

GWPS: groundwater protection standard

MCL: maximum contaminant level

mg/L: milligrams per liter

pCi/L: picocuries per liter

**Table 3. Appendix III Data Summary
Statistical Analysis Summary
Pirkey - FGD Stackout Pad**

Analyte	Unit	Description	AD-7	AD-22	AD-33
			6/27/2023	6/26/2023	6/26/2023
Boron	mg/L	Interwell Background Value (UPL)	0.0859		
		Analytical Result	2.02	0.06	0.114
Calcium	mg/L	Intrawell Background Value (UPL)	6.26	16.3	2.22
		Analytical Result	5.73	15.5	1.73
Chloride	mg/L	Interwell Background Value (UPL)	54.5		
		Analytical Result	31.2	93.9	9.50
Fluoride	mg/L	Interwell Background Value (UPL)	1.00		
		Analytical Result	0.40	0.63	0.21
pH	SU	Intrawell Background Value (UPL)	4.2	5.0	4.6
		Intrawell Background Value (LPL)	3.0	3.5	3.1
		Analytical Result	3.8	4.1	4.1
Sulfate	mg/L	Interwell Background Value (UPL)	138		
		Analytical Result	74.6	350	58.4
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	332	735	217
		Analytical Result	290	680	200

Notes:

1. Bold values exceed the background value.

2. Background values are shaded gray.

LPL: lower prediction limit

mg/L: milligrams per liter

SU: standard units

UPL: upper prediction limit

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

I certify that selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Pirkey FGD Stackout Area CCR management area and that the requirements of § 352.931(a) have been met.

David Anthony Miller
Printed Name of Licensed Professional Engineer

David Anthony Miller
Signature



112498
License Number

Texas
Licensing State

11.02.2023
Date

ATTACHMENT B
Data Quality Review Memorandum

Memorandum

Date: April 28, 2023
To: David Miller (AEP)
Copies to: Jill Parker-Witt (AEP)
From: Allison Kreinberg (Geosyntec)
Subject: Data Quality Review – Pirkey Power Plant
February 2023 Sampling Event

This memorandum summarizes the findings of a data quality review for groundwater samples collected at the Pirkey Power Plant, located in Hallsville, Texas in February and March 2023. The groundwater samples were collected to comply with the Texas Commission on Environmental Quality's (TCEQ's) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Title 30 Chapter 352, "CCR Rule"). 40 CFR 257 Appendix III and IV constituents were analyzed.

The following sample data groups (SDGs) were associated with the groundwater samples collected during the February 2023 sampling event and are reviewed in this memorandum:

- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 230658
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 230698
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 230895

The data included in these SDGs were reviewed to assess if they met the objectives outlined in TCEQ Draft Technical Guideline No. 32¹ prior to submittal of this data to TCEQ.

The following data quality issues were identified:

- Mercury data for SDG 230698 had an inconsistent number of significant figures reported between the electronic data deliverables and the published laboratory reports. The

¹ TCEQ. Topic: Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action: Technical Guidance No. 32. May 2020.

published laboratory report for SDG 230698 will be reissued with the appropriate number of significant figures for mercury.

- As reported in SDG 230698, antimony, beryllium, chromium, cobalt, and lead were detected in the field blank sample “FIELD BLANK” collected on 2/27/23. The estimated detected beryllium concentration in the field blank (0.033 µg/L) was more than 10% of the detected values for beryllium in samples AD-12 (0.155 µg/L), AD-18 (0.085 µg/L), and “Duplicate 1” (0.155 µg/L), which could result in high bias in the AD-12, AD-18, and “Duplicate 1” beryllium results. The detected chromium concentration in the field blank (0.23 µg/L) was more than 10% of the detected values for chromium in all groundwater samples, which could result in high bias in the chromium results for all groundwater samples. The detected lead concentration in the field blank (2.57 µg/L) was more than 10% of the detected values for lead in all groundwater samples, which could result in high bias in the lead results for all groundwater samples
- As reported in SDG 230698, beryllium, chromium, cobalt, and lead were detected in the equipment blank sample “EQUIPMENT BLANK” collected on 2/27/23. The detected beryllium concentration in the equipment blank (0.034 µg/L) was more than 10% of the detected values for beryllium in samples AD-12 (0.155 µg/L), AD-18 (0.085 µg/L), and “Duplicate 1” (0.155 µg/L), which could result in high bias in the AD-12, AD-18, and “Duplicate 1” beryllium results. The detected chromium concentration in the equipment blank (0.44 µg/L) was more than 10% of the detected values for chromium in all groundwater samples, which could result in high bias in the chromium results for all groundwater samples. The detected lead concentration in the equipment blank (0.38 µg/L) was more than 10% of the detected values for lead in all groundwater samples, which could result in high bias in the lead results for all groundwater samples
- As reported in SDG 230698, the RPD for boron concentrations from parent sample “AD-12” and duplicate sample “Duplicate 1” was 55%. The RPD for selenium concentrations was 22%. The AD-12 results for boron and selenium should be considered estimated.
- As reported in SDG 230698, the RPD for boron concentrations from parent sample “AD-4” and duplicate sample “Duplicate 2” was 49%. The RPD for chromium concentrations was 52%. The RPD for mercury concentrations was 29%. The RPD for thallium concentrations was 20%. The AD-4 results for boron, chromium, mercury, and thallium should be considered estimated.
- As reported in SDG 230698, the matrix spike duplicate (MSD) for sodium was below the acceptable limit of 75%. The associated sample (AD-2) was flagged M1 for sodium: the

associated matrix spike (MS) or MSD recovery outside acceptance limits. The AD-2 sodium result should be considered estimated. Sodium is not a regulated Appendix III or IV constituent.

- As reported in SDG 230698, the RPD for the laboratory duplicate for radium-226 was above the acceptable limit of 25%. The associated sample (AD-12) was flagged P1 for radium-226: the precision between duplicate results was above the acceptance limits. The AD-12 radium-226 result should be considered estimated.
- As reported in SDG 230698, the MSD RPD for radium-228 was above the acceptable limit of 25%. The associated sample (AD-12) was flagged P3 for radium-228: the precision on the MSD was above acceptance limits. The AD-12 radium-228 result should be considered estimated.
- As reported in SDG 230895, the total dissolved solids (TDS) analysis for sample AD-22 did not achieve constant weight and was flagged S7: the sample did not achieve constant weight. The AD-22 TDS result should be considered estimated.

Based on these findings, the majority of the data reported in these SDGs are considered accurate and complete. Although the QC failures mentioned above will result in some limitations of data use since the affected results are considered estimated or have elevated reporting limits, the data are considered usable for supporting project objectives.

Memorandum

Date: September 19, 2023
To: David Miller (AEP)
Copies to: Leslie Fuerschbach (AEP)
From: Allison Kreinberg (Geosyntec)
Subject: Data Quality Review – Pirkey Power Plant
June 2023 Sampling Event

This memorandum summarizes the findings of a data quality review for groundwater samples collected at the Pirkey Power Plant in Hallsville, Texas in June 2023. The groundwater samples were collected to comply with the Texas Commission on Environmental Quality’s (TCEQ’s) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Title 30 Chapter 352, “CCR Rule”). 40 CFR 257 Appendix III and IV constituents were analyzed.

The following sample data groups (SDGs) were associated with the groundwater samples collected during the June 2023 sampling event and are reviewed in this memorandum:

- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 231960
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 231985

The data included in these SDGs were reviewed to assess if they met the objectives outlined in TCEQ Draft Technical Guideline No. 32¹ prior to submittal of this data to TCEQ.

The following data quality issues were identified:

- The chains of custody listed a sample collection date of 6/23/2023 for sample “AD-33”, but a review of the sample bottles and the field forms noted that the sample was collected on 6/26/2023. The laboratory report used a sample collection date of 6/26/2023.

¹ TCEQ. Topic: Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action: Technical Guidance No. 32. May 2020.

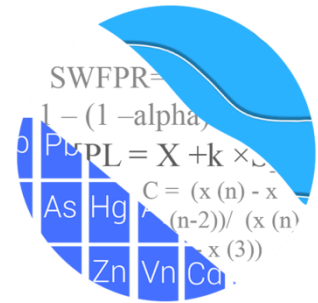
- Mercury data for SDG 231985 had an inconsistent number of significant figures reported between the electronic data deliverables and the published laboratory reports. The published laboratory report for SDG 231985 was reissued with the appropriate number of significant figures for mercury.
- As reported in SDG 231960, chloride was detected in the field blank sample “FIELD BLANK” collected on 6/26/23. The detected chloride concentration in the field blank (0.27 mg/L) was less than 10% of the detected values for chloride in all groundwater samples.
- As reported in SDG 231985, beryllium, chromium, and cobalt were detected in the field blank sample “FIELD BLANK” collected on 6/26/23. The estimated detected beryllium concentration in the field blank (0.015 µg/L) was more than 10% of the detected values for beryllium in samples AD-12 (0.11 µg/L), AD-18 (0.132 µg/L), and AD-30 (0.086 µg/L), which could result in high bias in the AD-12, AD-18, and AD-30 beryllium results. The detected chromium concentration in the field blank (0.53 µg/L) was more than 10% of the detected values for chromium in all groundwater samples, which could result in high bias in the chromium results for all groundwater samples.
- As reported in SDG 231985, beryllium, chromium, and cobalt were detected in the equipment blank sample “EQUIPMENT BLANK” collected on 6/26/23. The estimated detected beryllium concentration in the equipment blank (0.027 µg/L) was more than 10% of the detected values for beryllium in samples AD-3 (0.2 µg/L), AD-12 (0.11 µg/L), AD-13 (0.234 µg/L), AD-18 (0.132 µg/L), AD-30 (0.086 µg/L) and “Duplicate 1” (0.223 µg/L), which could result in high bias in the AD-3, AD-12, AD-13, AD-18, AD-30, and “Duplicate 1” beryllium results. The detected chromium concentration in the equipment blank (0.32 µg/L) was more than 10% of the detected values for chromium in all groundwater samples, which could result in high bias in the chromium results for all groundwater samples.

Based on these findings, the majority of the data reported in these SDGs are considered accurate and complete. Although the QC failures mentioned above will result in some limitations of data use since the affected results are considered estimated or have elevated reporting limits, the data are considered usable for supporting project objectives.

ATTACHMENT C

Statistical Analysis Output

GROUNDWATER STATS CONSULTING



October 10, 2023

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
500 W. Wilson Bridge Road, Ste. #250
Worthington, OH 43085

Re: Pirkey Stackout
Assessment Monitoring Event – March & June 2023

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis of groundwater data for the March and June 2023 Assessment Monitoring sample events for American Electric Power Inc.'s Pirkey Stackout. The analysis complies with the Texas Commission of Environmental Quality rule 30 TAC 352 as well as with the United States Environmental Protection Agency (USEPA) Unified Guidance (2009).

Sampling began at the site for the Coal Combustion Residual (CCR) program in 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** AD-12 and AD-13
- **Downgradient wells:** AD-22, AD-33, and AD-7

Data were sent electronically to GSC, and the statistical analysis was conducted according to the Statistical Analysis Plan and screening evaluation prepared by GSC and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GSC. The analysis was reviewed by Kristina Rayner, Senior Statistician and Founder of Groundwater Stats Consulting.

The CCR Assessment Monitoring program consists of the following constituents:

- **Appendix IV** (Assessment Monitoring) – antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium

Time series graphs for Appendix IV parameters are provided for all wells and are used to evaluate concentrations over the entire record (Figure A). Additionally, box plots are included for all constituents at upgradient and downgradient wells (Figure B). The time series plots are used to initially screen for suspected outliers and trends, while the box plots provide visual representation of variation within individual wells and between all wells. Values in background, which have previously been flagged as outliers, may be seen in a lighter font and disconnected symbol on the graphs. Additionally, a summary of flagged values follows this letter (Figure C).

Note that a reporting limit of 0.0005 mg/L was recorded for the June 2023 sample event for antimony at downgradient well AD-22, compared to the previously recorded reporting limit of 0.0001 mg/L, due to a higher dilution factor. Since no detections are present in this well for antimony, the slightly higher reporting limit had no effect on the statistical analysis.

A change in reported concentrations of more recent data was noted for mercury relative to historical concentrations in wells AD-22 and AD-33. The Sen's Slope/Mann Kendall trend test was previously used to evaluate the entire record of data for mercury at these wells to identify whether data are stable or have either statistically significant increasing or decreasing trends. A statistically significant increasing trend was identified for mercury in well AD-33 and a statistically significant decreasing trend was identified for mercury in well AD-22. In order to construct confidence intervals that represent current groundwater quality conditions and eliminate the influence of the trend, earlier concentrations were truncated from the records. A list of well/constituent pairs using truncated records follows this report.

Summary of Statistical Methods

Assessment monitoring for Appendix IV parameters involves the comparison of confidence intervals for parameters at each downgradient well against the corresponding Groundwater Protection Standard (GWPS). The GWPS is determined for each parameter as the highest limit of the Maximum Contaminant Levels (MCLs) or background limits determined from tolerance limits constructed from pooled upgradient well data.

Prior to computing tolerance limits on pooled upgradient well data or constructing confidence intervals on downgradient well data, the distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (US EPA, 2009), data are analyzed using either parametric or non-parametric tolerance limits and confidence intervals as appropriate, based on the following criteria.

- No statistical analyses are required on wells and analytes containing 100% non-detects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% non-detects, the reporting limit utilized for non-detects is the practical quantification limit (PQL) as reported by the laboratory. For several constituents, the most recent reporting limits are significantly lower than those reported historically. This is a conservative approach for tolerance limits and confidence intervals at this site.
- When data contain between 15-50% non-detects, the Kaplan-Meier non-detect adjustment is applied to the background data for parametric limits. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.
- Nonparametric tolerance limits and confidence intervals are used on data sets containing greater than 50% non-detects.

Background Update Summary – Conducted in March 2023

Outlier Analysis

Prior to evaluating Appendix IV parameters, upgradient well data were screened through visual screening and Tukey's outlier test for potential outliers and extreme trending patterns that would lead to artificially elevated statistical limits. A discussion of those findings is provided below.

Tukey's outlier test on pooled upgradient well data for Appendix IV parameters through November 2022 identified high values for selenium. These values were well below the MCL of 0.05 mg/L; therefore, no new values were flagged and no changes to previous outliers were made. As mentioned above, a list of flagged values follows this report (Figure C).

Additionally, downgradient well data through November 2022 were screened through visual screening using time series graphs. Since the downgradient well data are used to construct confidence intervals, a regulatory conservative approach is taken in that values that are marginally high relative to the rest of the data are retained unless there is

particular justification for excluding them. No changes were to previously flagged data were made. All flagged values may be seen on the Outlier Summary following this letter (Figure C).

Interwell Upper Tolerance Limits

Interwell upper tolerance limits were established in the Spring 2023 using all available pooled upgradient well data for each Appendix IV parameter through November 2022 (Figure D). GWPS will be updated during Fall 2023. When data followed a normal or transformed-normal distribution, parametric tolerance limits were used to calculate background limits for Appendix IV parameters with a target of 95% confidence and 95% coverage. Nonparametric tolerance limits are constructed when data do not follow a normal or transformed-normal distribution or when there are greater than 50% non-detects. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples.

Groundwater Protection Standards

Background limits were compared to the Maximum Contaminant Levels (MCLs) in the Groundwater Protection Standard (GWPS) table following this letter to determine the highest limit for use as the GWPS in the Confidence Interval comparisons (Figure E).

Seasonality

Seasonal patterns were observed on the time series plots for several constituents in well AD-22. Therefore, all constituents at this well were tested for seasonality using the Kruskal-Wallis test. Appendix IV constituents with significant seasonality were cadmium, cobalt, and lithium. When seasonal patterns are observed, data are deseasonalized so that the resulting limits will correctly account for the seasonality as a predictable pattern rather than random variation or a release. This procedure includes subtracting the seasonal mean from each value within a given season and adding the overall mean to each observation. Confidence intervals constructed with deseasonalized values may be found in Figure F following the confidence intervals which are discussed below.

Evaluation of Appendix IV Parameters – March & June 2023

Time series plots were used to visually identify potential outliers in downgradient wells through the March and June 2023 sample events. When suspected outliers are identified, Tukey's outlier test is used to formally test whether measurements are statistically significant. As mentioned above, high outliers are 'cautiously' flagged in the downgradient

wells when measurements are clearly much different from remaining data within a given well. This is intended to be a regulatory conservative approach in that it will reduce the variance and thus reduce the width of parametric confidence intervals; although it will also reduce the mean and thus lower the entire interval. The intent is to better represent the actual downgradient mean. No additional suspected outliers were identified.

Confidence Intervals

Confidence intervals were then constructed on downgradient wells with data through June 2023 for each of the Appendix IV parameters using either parametric or nonparametric intervals depending on the data distribution and percentage of non-detects (Figure F). When data followed a normal or transformed-normal distribution, parametric confidence intervals were used for Appendix IV parameters. Nonparametric confidence intervals, which use the largest and smallest order statistics depending on the sample size as interval limits, were constructed when data did not follow a normal or transformed-normal distribution or when there were greater than 50% non-detects. The lower confidence limit, which is constructed with 99% confidence for parametric confidence intervals, is compared to the GWPS prepared as described above. The confidence level associated with nonparametric confidence intervals is dependent upon the number samples available.

Each confidence interval was compared with the corresponding GWPS from Figure E. Only when the entire confidence interval is above the GWPS is the well/constituent pair considered to exceed its respective standard. Exceedances were noted for the following well/constituent pairs:

- Beryllium: AD-7 and AD-22
- Mercury: AD-33

Deseasonalized Confidence Intervals

Confidence intervals were constructed on deseasonalized data for constituents with detected seasonality in well AD-22 when at least one reported measurement was higher than the established GWPS for a given parameter. The constituents that met these criteria at well AD-22 are cadmium, cobalt, and lithium. The results are included with the confidence intervals provided in Figure G. The following confidence interval exceedance was identified:

- Cobalt: AD-22

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Pirkey Stackout. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,



Andrew T. Collins
Project Manager



Kristina L. Rayner
Senior Statistician

Date Ranges

Date: 9/15/2023 2:38 PM

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

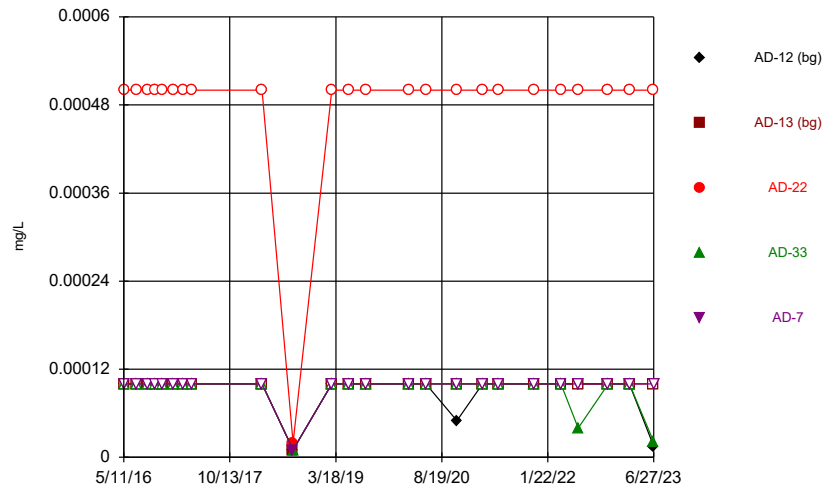
Mercury, total (mg/L)

AD-22 overall:3/10/2020-6/26/2023

AD-33 overall:3/10/2020-6/26/2023

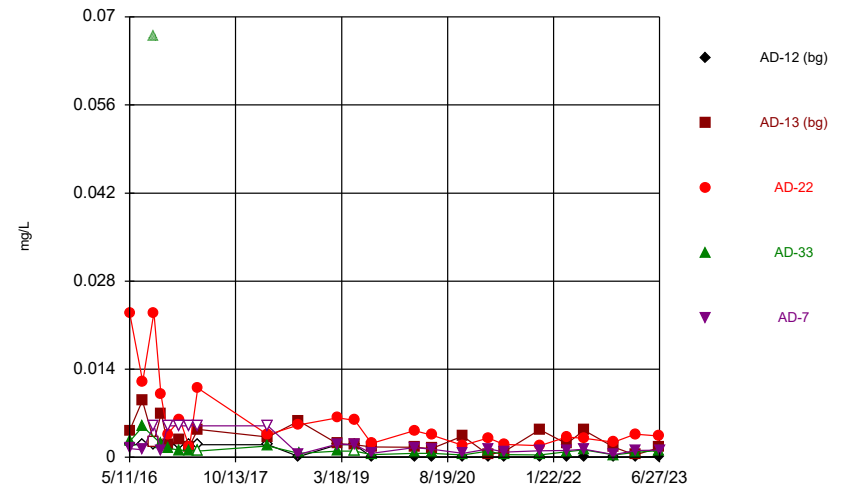
FIGURE A
Time Series

Time Series



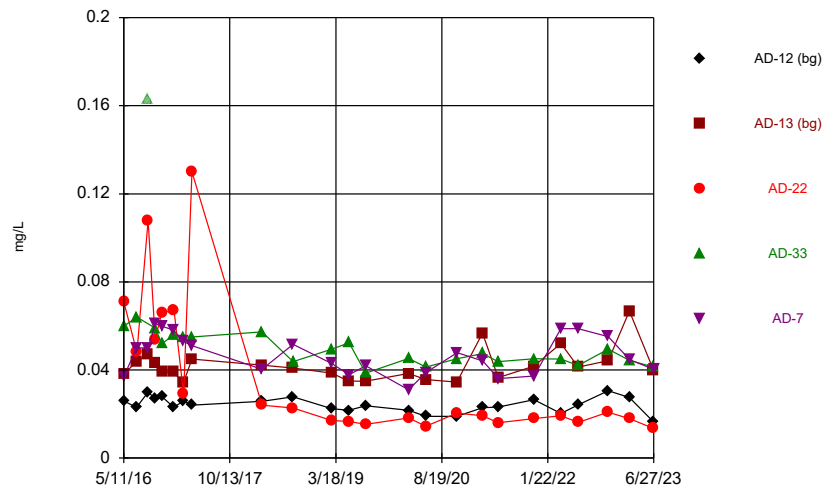
Constituent: Antimony, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



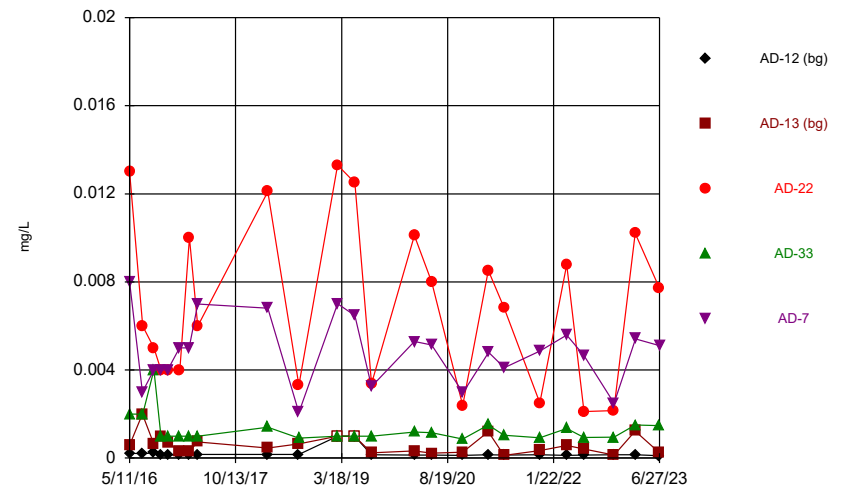
Constituent: Arsenic, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



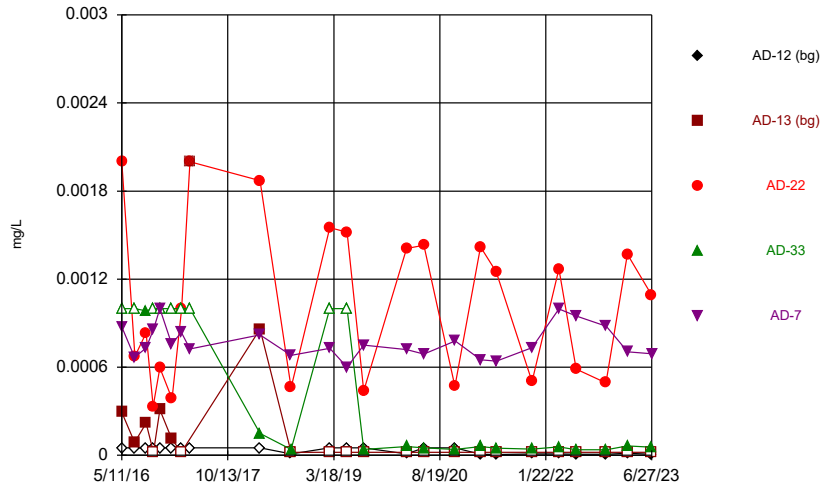
Constituent: Barium, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



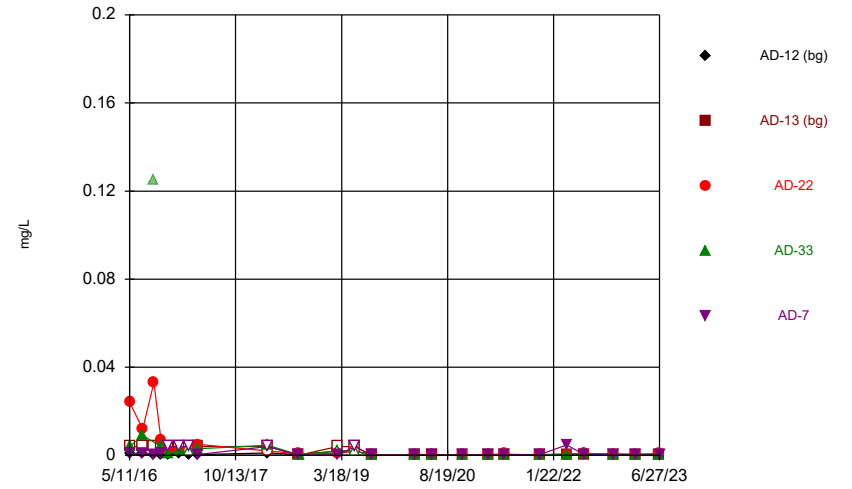
Constituent: Beryllium, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



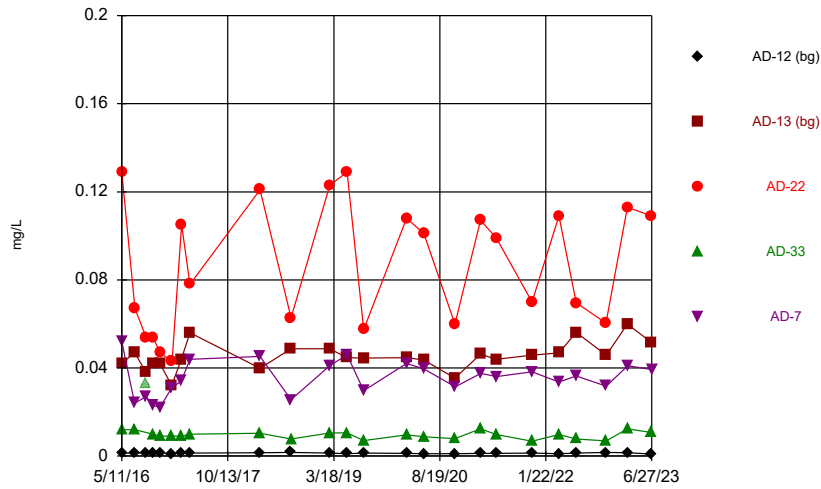
Constituent: Cadmium, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



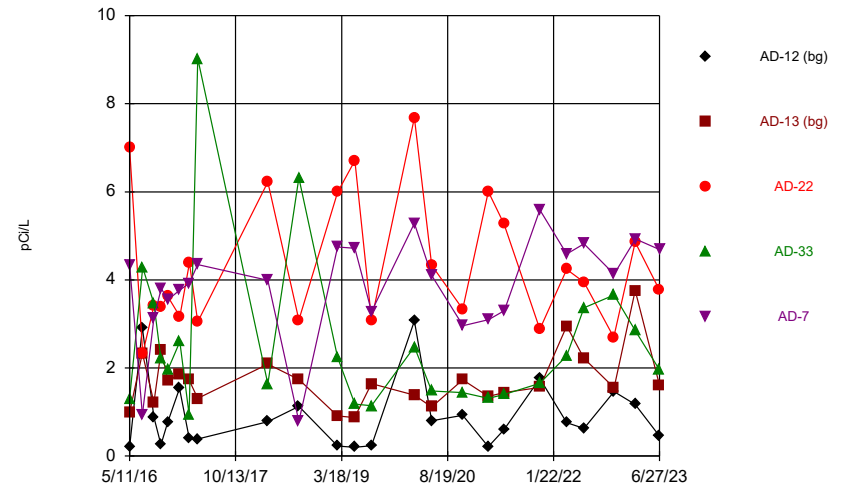
Constituent: Chromium, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



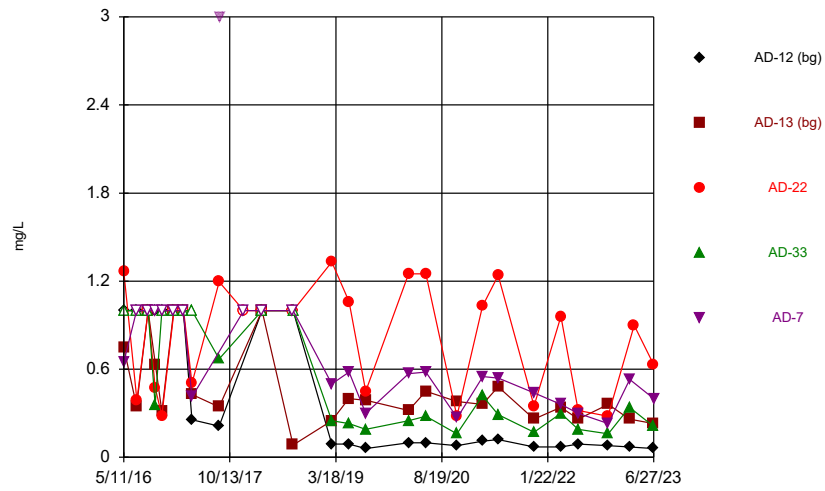
Constituent: Cobalt, total Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



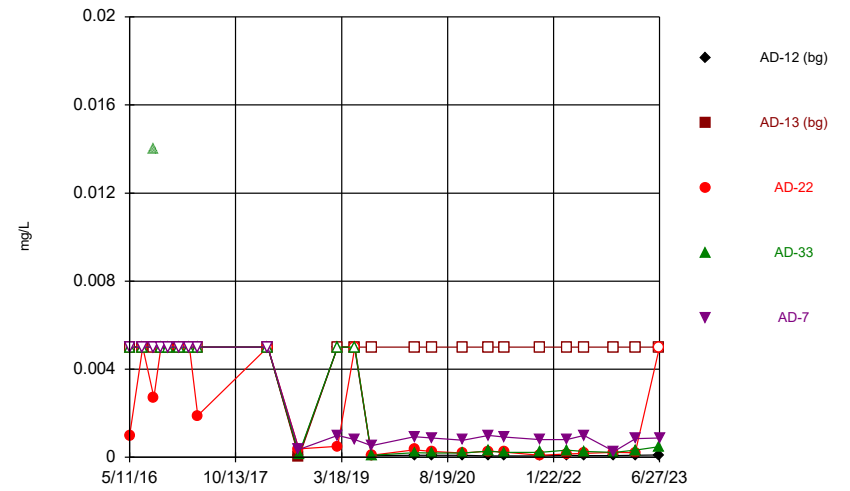
Constituent: Combined Radium 226 + 228 Analysis Run 9/15/2023 2:39 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



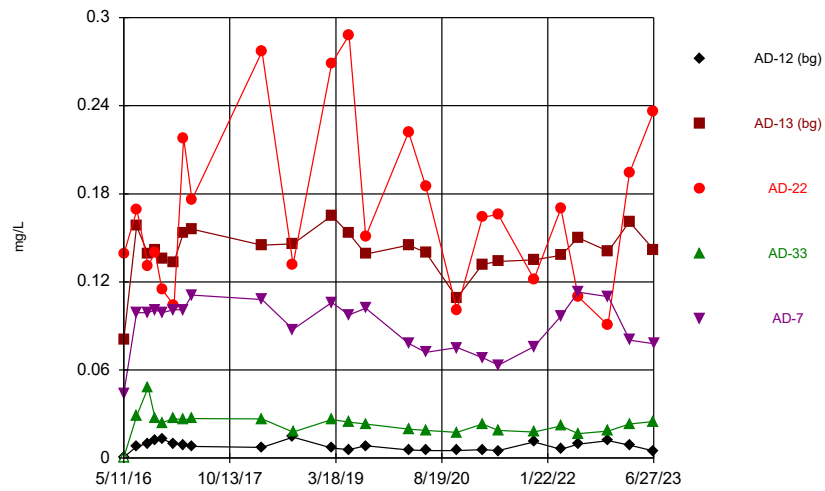
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



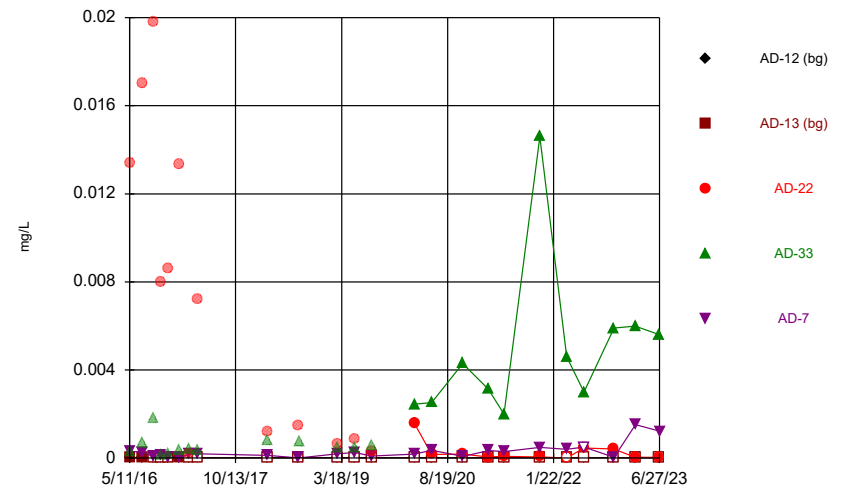
Constituent: Lead, total Analysis Run 9/15/2023 2:40 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



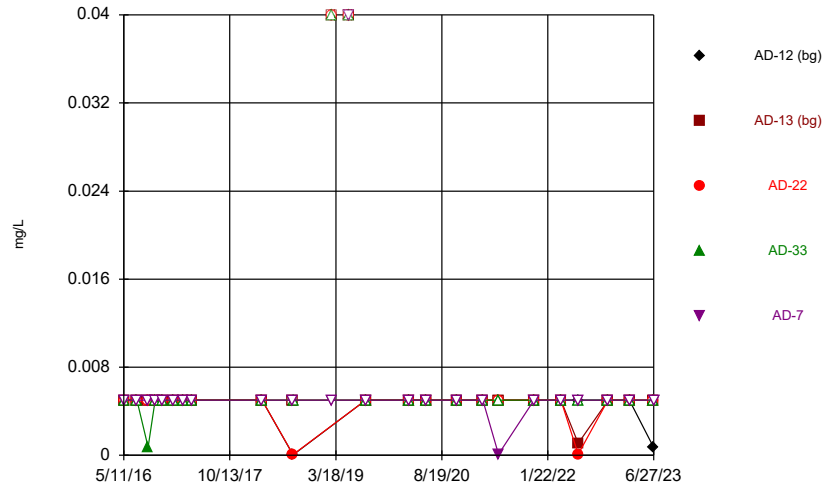
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



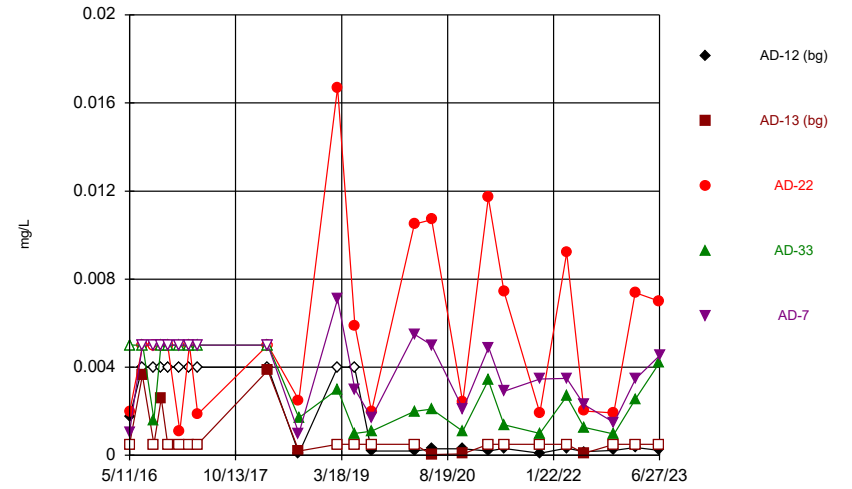
Constituent: Mercury, total Analysis Run 9/15/2023 2:40 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



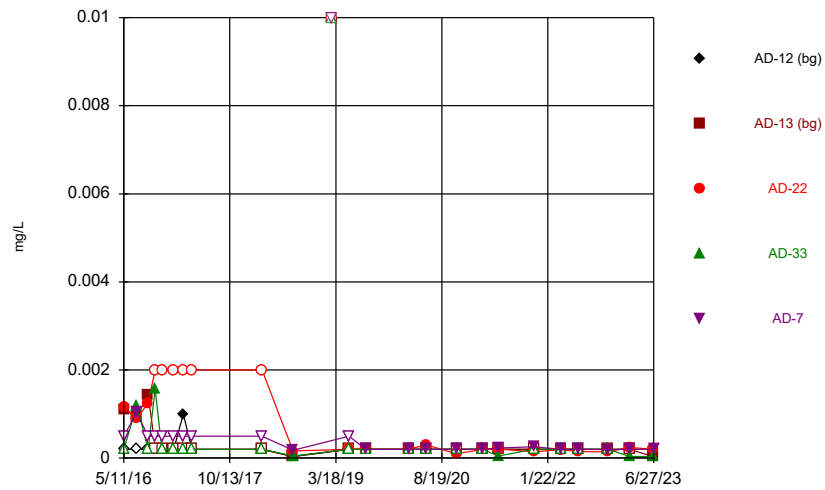
Constituent: Molybdenum, total Analysis Run 9/15/2023 2:40 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Selenium, total Analysis Run 9/15/2023 2:40 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

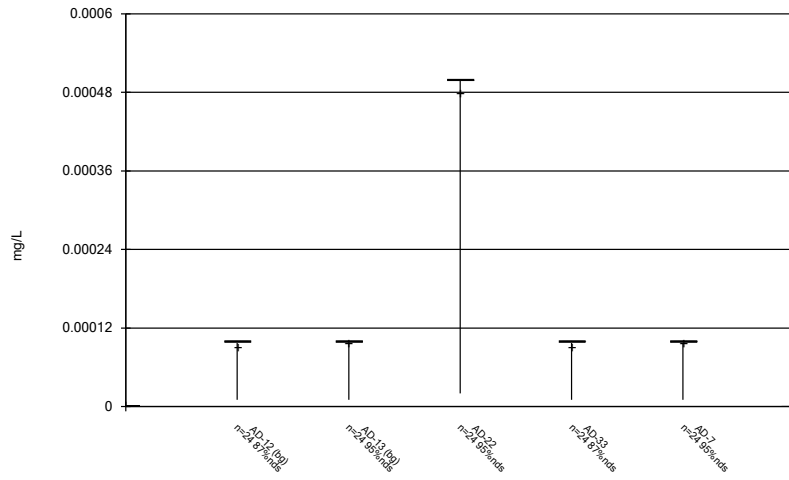
Time Series



Constituent: Thallium, total Analysis Run 9/15/2023 2:40 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

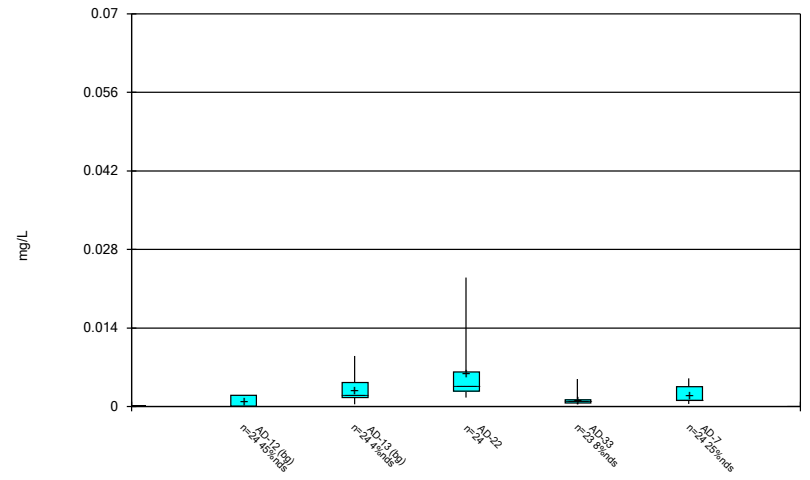
FIGURE B
Box Plots

Box & Whiskers Plot



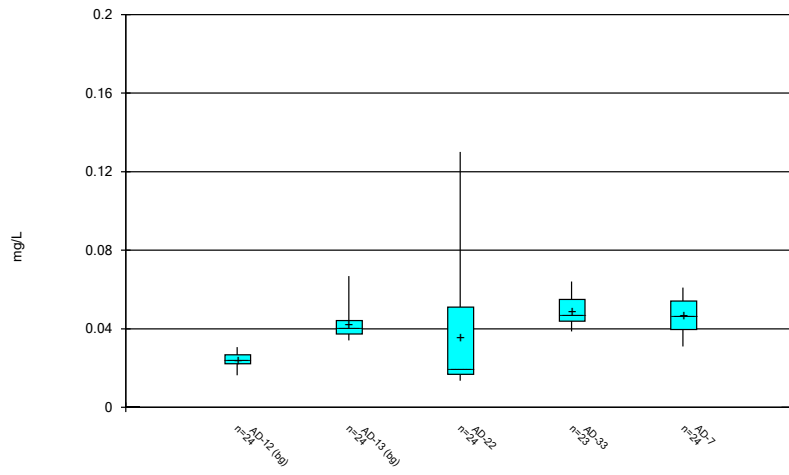
Constituent: Antimony, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



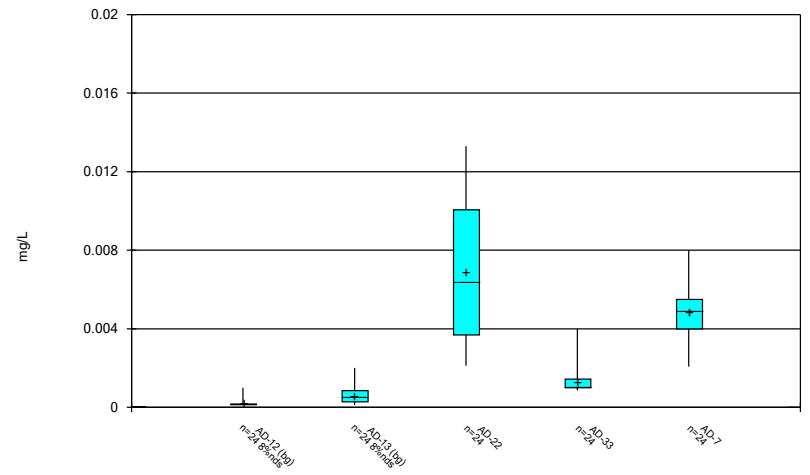
Constituent: Arsenic, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



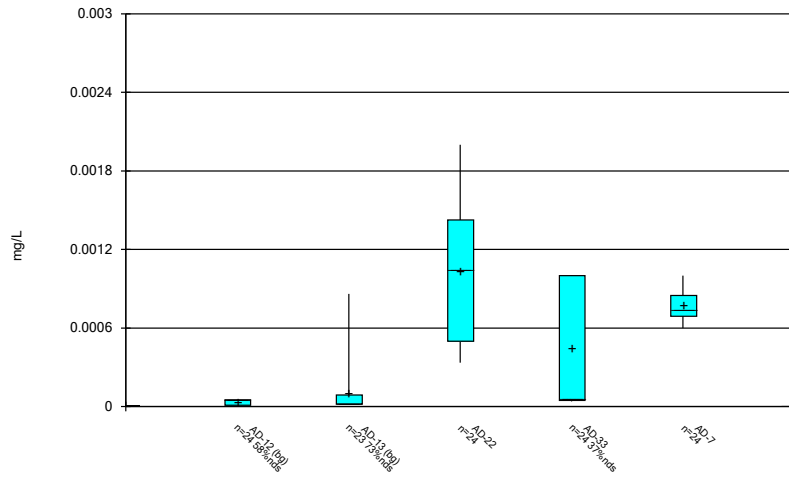
Constituent: Barium, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



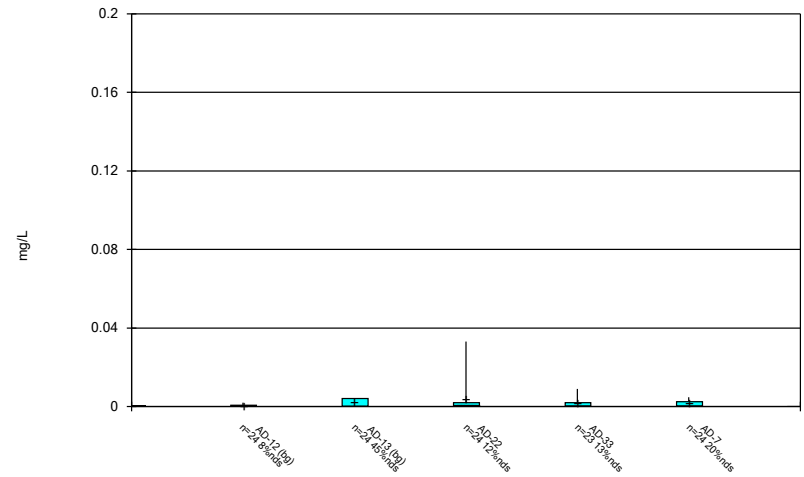
Constituent: Beryllium, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



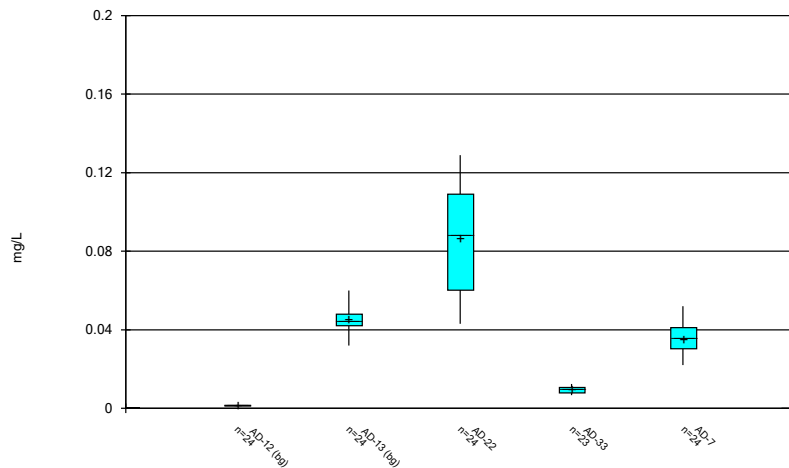
Constituent: Cadmium, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



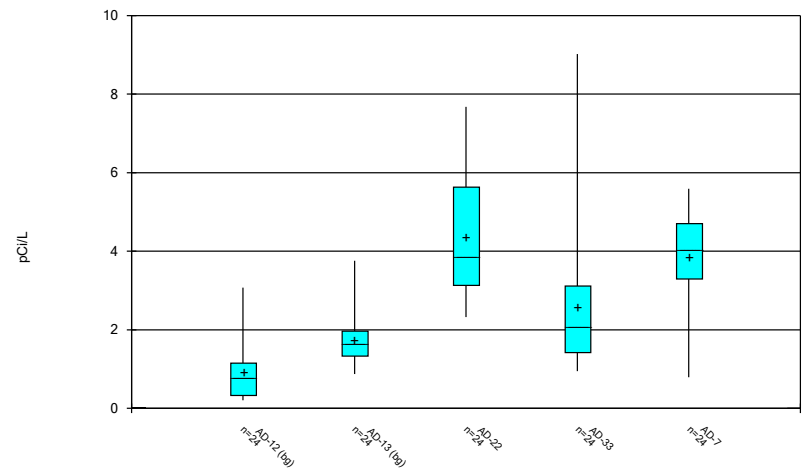
Constituent: Chromium, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



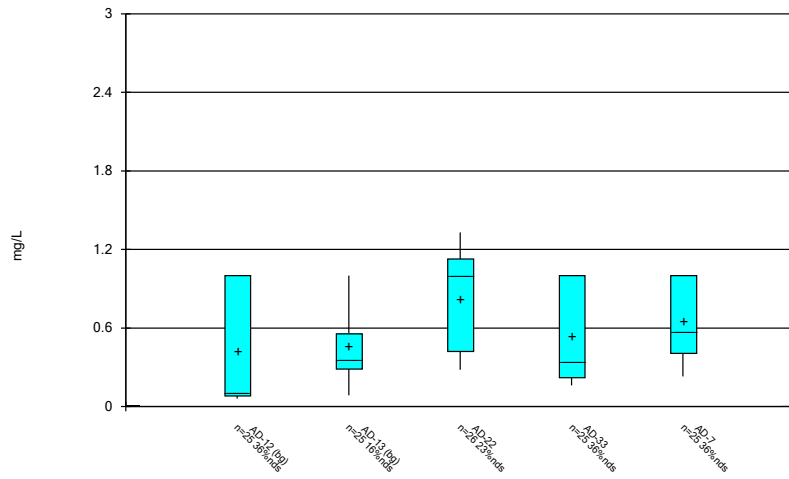
Constituent: Cobalt, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



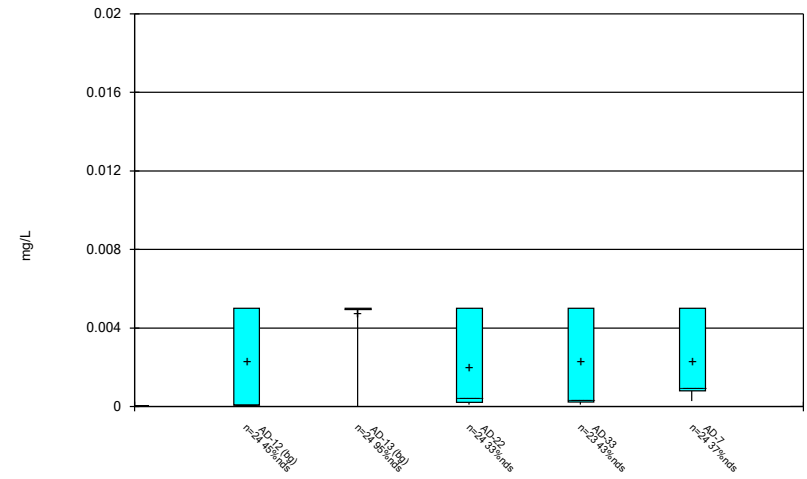
Constituent: Combined Radium 226 + 228 Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



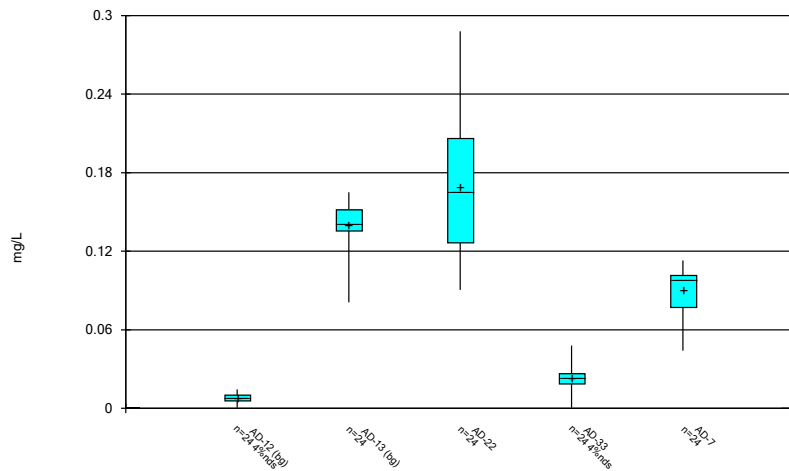
Constituent: Fluoride, total Analysis Run 9/15/2023 2:42 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



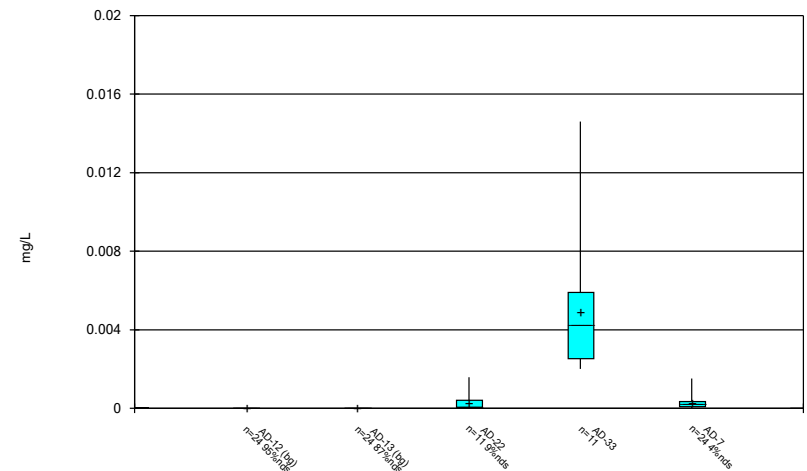
Constituent: Lead, total Analysis Run 9/15/2023 2:42 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



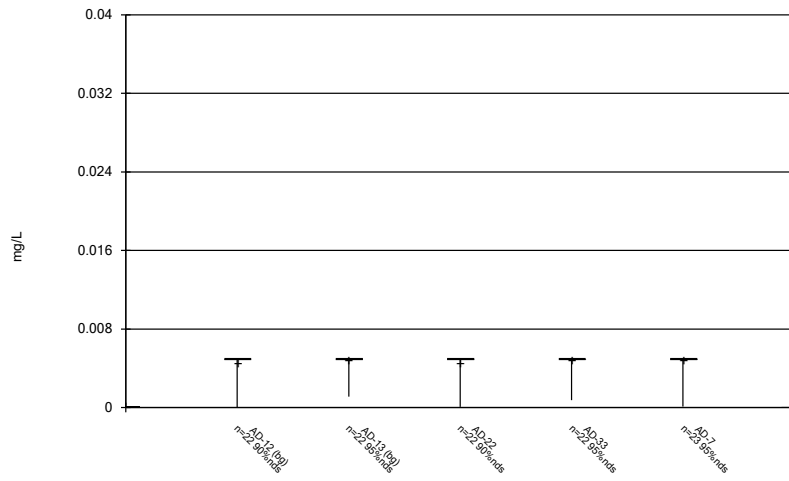
Constituent: Lithium, total Analysis Run 9/15/2023 2:42 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



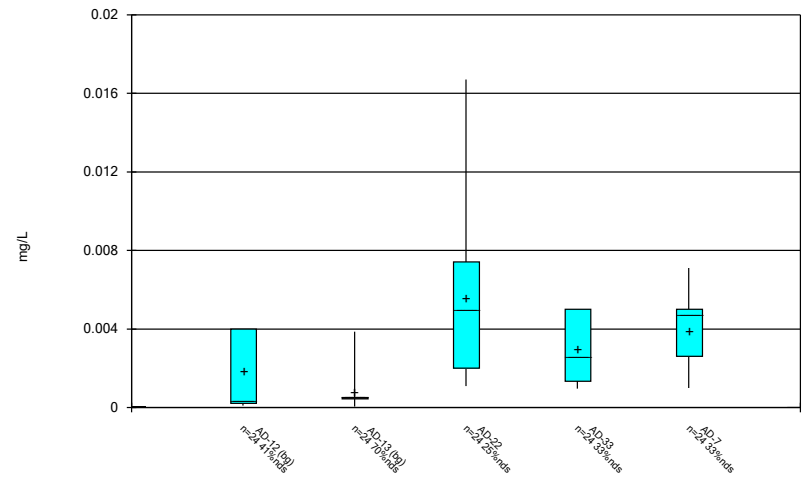
Constituent: Mercury, total Analysis Run 9/15/2023 2:42 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



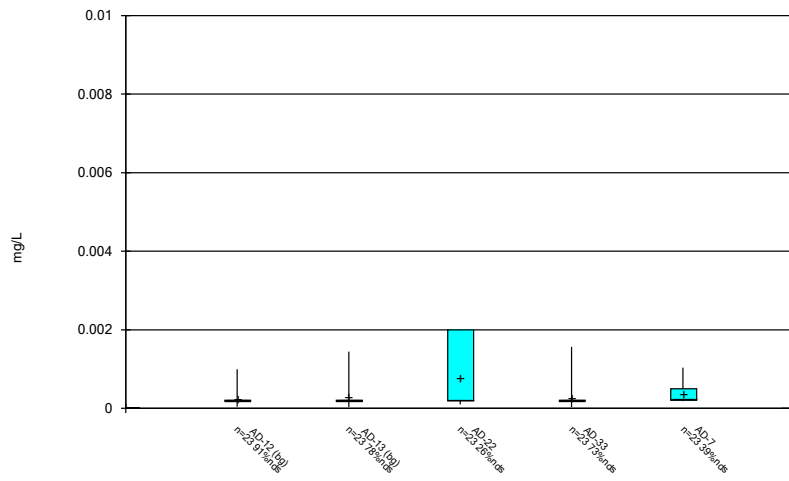
Constituent: Molybdenum, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



Constituent: Selenium, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 9/15/2023 2:42 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE C
Outlier Summary

Outlier Summary

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 9/15/2023, 2:45 PM

	AD-33 Arsenic, total (mg/L)	AD-33 Barium, total (mg/L)	AD-13 Cadmium, total (mg/L)	AD-33 Chromium, total (mg/L)	AD-33 Cobalt, total (mg/L)	AD-7 Fluoride, total (mg/L)	AD-33 Lead, total (mg/L)	AD-12 Molybdenum, total (mg/L)	AD-13 Molybdenum, total (mg/L)	AD-22 Molybdenum, total (mg/L)
9/7/2016	0.067 (o)	0.163 (o)		0.125 (o)	0.033 (o)		0.014 (o)			
4/11/2017			0.002 (o)							
8/24/2017						2.994 (o)				
2/27/2019							<0.04 (o)	<0.04 (o)	<0.04 (o)	
5/21/2019							<0.04 (o)	<0.04 (o)		
5/22/2019										<0.04 (o)

	AD-33 Molybdenum, total (mg/L)	AD-7 Molybdenum, total (mg/L)	AD-12 Thallium, total (mg/L)	AD-13 Thallium, total (mg/L)	AD-22 Thallium, total (mg/L)	AD-33 Thallium, total (mg/L)	AD-7 Thallium, total (mg/L)
9/7/2016							
4/11/2017							
8/24/2017							
2/27/2019	<0.04 (o)		<0.01 (o)	<0.01 (o)	<0.01 (o)	<0.01 (o)	<0.01 (o)
5/21/2019							
5/22/2019	<0.04 (o)	<0.04 (o)					

FIGURE D
UTLs

Upper Tolerance Limits Summary Table

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/20/2023, 10:14 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Antimony, total (mg/L)	n/a	0.0001	n/a	n/a	n/a	n/a 44	n/a	n/a	93.18	n/a	n/a	0.1047	NP Inter(NDs)
Arsenic, total (mg/L)	n/a	0.009	n/a	n/a	n/a	n/a 44	n/a	n/a	27.27	n/a	n/a	0.1047	NP Inter(normality)
Barium, total (mg/L)	n/a	0.05279	n/a	n/a	n/a	n/a 44	0.03267	0.009586	0	None	No	0.05	Inter
Beryllium, total (mg/L)	n/a	0.002	n/a	n/a	n/a	n/a 44	n/a	n/a	9.091	n/a	n/a	0.1047	NP Inter(normality)
Cadmium, total (mg/L)	n/a	0.00086	n/a	n/a	n/a	n/a 43	n/a	n/a	67.44	n/a	n/a	0.1102	NP Inter(NDs)
Chromium, total (mg/L)	n/a	0.004	n/a	n/a	n/a	n/a 44	n/a	n/a	29.55	n/a	n/a	0.1047	NP Inter(normality)
Cobalt, total (mg/L)	n/a	0.0562	n/a	n/a	n/a	n/a 44	n/a	n/a	0	n/a	n/a	0.1047	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	n/a	2.887	n/a	n/a	n/a	n/a 44	1.279	0.7661	0	None	No	0.05	Inter
Fluoride, total (mg/L)	n/a	1	n/a	n/a	n/a	n/a 46	n/a	n/a	28.26	n/a	n/a	0.09447	NP Inter(normality)
Lead, total (mg/L)	n/a	0.005	n/a	n/a	n/a	n/a 44	n/a	n/a	72.73	n/a	n/a	0.1047	NP Inter(NDs)
Lithium, total (mg/L)	n/a	0.165	n/a	n/a	n/a	n/a 44	n/a	n/a	2.273	n/a	n/a	0.1047	NP Inter(normality)
Mercury, total (mg/L)	n/a	0.00001928	n/a	n/a	n/a	n/a 44	n/a	n/a	90.91	n/a	n/a	0.1047	NP Inter(NDs)
Molybdenum, total (mg/L)	n/a	0.005	n/a	n/a	n/a	n/a 40	n/a	n/a	95	n/a	n/a	0.1285	NP Inter(NDs)
Selenium, total (mg/L)	n/a	0.00386	n/a	n/a	n/a	n/a 44	n/a	n/a	56.82	n/a	n/a	0.1047	NP Inter(NDs)
Thallium, total (mg/L)	n/a	0.001443	n/a	n/a	n/a	n/a 42	n/a	n/a	85.71	n/a	n/a	0.116	NP Inter(NDs)

FIGURE E
GWPS

PIRKEY STACKOUT GWPS			
Constituent Name	MCL	Background Limit	GWPS
Antimony, Total (mg/L)	0.006	0.0001	0.006
Arsenic, Total (mg/L)	0.01	0.009	0.01
Barium, Total (mg/L)	2	0.053	2
Beryllium, Total (mg/L)	0.004	0.002	0.004
Cadmium, Total (mg/L)	0.005	0.00086	0.005
Chromium, Total (mg/L)	0.1	0.004	0.1
Cobalt, Total (mg/L)	n/a	0.056	0.056
Combined Radium, Total (pCi/L)	5	2.89	5
Fluoride, Total (mg/L)	4	1	4
Lead, Total (mg/L)	n/a	0.005	0.005
Lithium, Total (mg/L)	n/a	0.17	0.17
Mercury, Total (mg/L)	0.002	0.000019	0.002
Molybdenum, Total (mg/L)	n/a	0.005	0.005
Selenium, Total (mg/L)	0.05	0.0039	0.05
Thallium, Total (mg/L)	0.002	0.0014	0.002

**MCL = Maximum Contaminant Level*

**GWPS = Groundwater Protection Standard*

FIGURE F
Confidence Interval

Confidence Interval Summary Table - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 9/15/2023, 2:47 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha Method
Beryllium, total (mg/L)	AD-22	0.008804	0.005019	0.004	n/a	Yes	24	0.006912	0.003708	0	None	No	0.01 Param.
Beryllium, total (mg/L)	AD-7	0.005606	0.004063	0.004	n/a	Yes	24	0.004835	0.001511	0	None	No	0.01 Param.
Mercury, total (mg/L)	AD-33	0.007009	0.002517	0.002	n/a	Yes	11	0.004918	0.003522	0	None	x^(1/3)	0.01 Param.

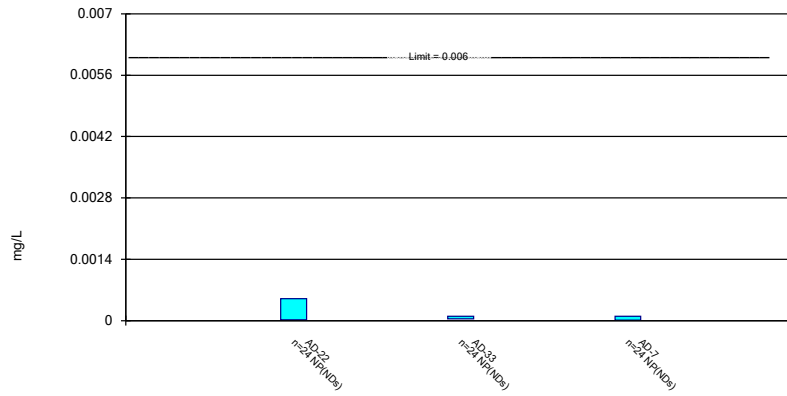
Confidence Interval Summary Table - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 9/15/2023, 2:47 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha Method
Antimony, total (mg/L)	AD-22	0.0005	0.00002	0.006	n/a	No	24	0.00048	0.00009798	95.83	None	No	0.01 NP (NDs)
Antimony, total (mg/L)	AD-33	0.0001	0.00004	0.006	n/a	No	24	0.00009046	0.00002617	87.5	None	No	0.01 NP (NDs)
Antimony, total (mg/L)	AD-7	0.0001	0.00001	0.006	n/a	No	24	0.00009625	0.00001837	95.83	None	No	0.01 NP (NDs)
Arsenic, total (mg/L)	AD-22	0.006511	0.00304	0.01	n/a	No	24	0.006074	0.005934	0	None	ln(x)	0.01 Param.
Arsenic, total (mg/L)	AD-33	0.001409	0.0006747	0.01	n/a	No	23	0.001168	0.0009902	8.696	None	x^(1/3)	0.01 Param.
Arsenic, total (mg/L)	AD-7	0.001281	0.0008087	0.01	n/a	No	24	0.002106	0.001752	25	Kaplan-Meier	ln(x)	0.01 Param.
Barium, total (mg/L)	AD-22	0.054	0.0167	2	n/a	No	24	0.03595	0.03153	0	None	No	0.01 NP (normality)
Barium, total (mg/L)	AD-33	0.0529	0.04561	2	n/a	No	23	0.04926	0.006965	0	None	No	0.01 Param.
Barium, total (mg/L)	AD-7	0.05147	0.04248	2	n/a	No	24	0.04698	0.008815	0	None	No	0.01 Param.
Beryllium, total (mg/L)	AD-22	0.008804	0.005019	0.004	n/a	Yes	24	0.006912	0.003708	0	None	No	0.01 Param.
Beryllium, total (mg/L)	AD-33	0.00148	0.000945	0.004	n/a	No	24	0.001299	0.0006587	0	None	No	0.01 NP (normality)
Beryllium, total (mg/L)	AD-7	0.005606	0.004063	0.004	n/a	Yes	24	0.004835	0.001511	0	None	No	0.01 Param.
Cadmium, total (mg/L)	AD-33	0.001	0.000043	0.005	n/a	No	24	0.0004487	0.0004751	37.5	None	No	0.01 NP (normality)
Cadmium, total (mg/L)	AD-7	0.0008259	0.0007132	0.005	n/a	No	24	0.0007696	0.0001104	0	None	No	0.01 Param.
Chromium, total (mg/L)	AD-22	0.002551	0.0005792	0.1	n/a	No	24	0.004073	0.008099	12.5	None	ln(x)	0.01 Param.
Chromium, total (mg/L)	AD-33	0.001857	0.0004196	0.1	n/a	No	23	0.001629	0.002142	13.04	None	x^(1/3)	0.01 Param.
Chromium, total (mg/L)	AD-7	0.001	0.000241	0.1	n/a	No	24	0.001334	0.001671	20.83	None	No	0.01 NP (normality)
Cobalt, total (mg/L)	AD-33	0.01046	0.008666	0.056	n/a	No	23	0.009566	0.00172	0	None	No	0.01 Param.
Cobalt, total (mg/L)	AD-7	0.03952	0.03147	0.056	n/a	No	24	0.0355	0.007887	0	None	No	0.01 Param.
Combined Radium 226 + 228 (pCi/L)	AD-22	5.126	3.58	5	n/a	No	24	4.353	1.515	0	None	No	0.01 Param.
Combined Radium 226 + 228 (pCi/L)	AD-33	3.084	1.668	5	n/a	No	24	2.59	1.839	0	None	x^(1/3)	0.01 Param.
Combined Radium 226 + 228 (pCi/L)	AD-7	4.461	3.274	5	n/a	No	24	3.868	1.163	0	None	No	0.01 Param.
Fluoride, total (mg/L)	AD-22	1.06	0.45	4	n/a	No	26	0.8247	0.3682	23.08	None	No	0.01 NP (normality)
Fluoride, total (mg/L)	AD-33	1	0.23	4	n/a	No	25	0.5387	0.3675	36	None	No	0.01 NP (normality)
Fluoride, total (mg/L)	AD-7	1	0.4117	4	n/a	No	25	0.6484	0.288	36	None	No	0.01 NP (normality)
Lead, total (mg/L)	AD-22	0.005	0.00021	0.005	n/a	No	24	0.002032	0.002225	33.33	None	No	0.01 NP (normality)
Lead, total (mg/L)	AD-33	0.005	0.00022	0.005	n/a	No	23	0.002313	0.00241	43.48	None	No	0.01 NP (normality)
Lead, total (mg/L)	AD-7	0.005	0.0008	0.005	n/a	No	24	0.002367	0.002091	37.5	None	No	0.01 NP (normality)
Lithium, total (mg/L)	AD-33	0.0267	0.0185	0.17	n/a	No	24	0.02283	0.007937	4.167	None	No	0.01 NP (normality)
Lithium, total (mg/L)	AD-7	0.09934	0.08127	0.17	n/a	No	24	0.09031	0.01771	0	None	No	0.01 Param.
Mercury, total (mg/L)	AD-22	0.0004398	0.00002542	0.002	n/a	No	11	0.0002785	0.0004583	9.091	None	x^(1/3)	0.01 Param.
Mercury, total (mg/L)	AD-33	0.007009	0.002517	0.002	n/a	Yes	11	0.004918	0.003522	0	None	x^(1/3)	0.01 Param.
Mercury, total (mg/L)	AD-7	0.0003869	0.0001185	0.002	n/a	No	24	0.0003044	0.0003598	4.167	None	sqrt(x)	0.01 Param.
Molybdenum, total (mg/L)	AD-22	0.005	0.0001	0.005	n/a	No	22	0.004553	0.001446	90.91	None	No	0.01 NP (NDs)
Molybdenum, total (mg/L)	AD-33	0.005	0.0007365	0.005	n/a	No	22	0.004806	0.000909	95.45	None	No	0.01 NP (NDs)
Molybdenum, total (mg/L)	AD-7	0.005	0.0001	0.005	n/a	No	23	0.004787	0.001022	95.65	None	No	0.01 NP (NDs)
Selenium, total (mg/L)	AD-22	0.006065	0.002491	0.05	n/a	No	24	0.005592	0.003925	25	Kaplan-Meier	sqrt(x)	0.01 Param.
Selenium, total (mg/L)	AD-33	0.005	0.00127	0.05	n/a	No	24	0.002961	0.001672	33.33	None	No	0.01 NP (normality)
Selenium, total (mg/L)	AD-7	0.003914	0.002319	0.05	n/a	No	24	0.003875	0.001621	33.33	Kaplan-Meier	No	0.01 Param.
Thallium, total (mg/L)	AD-22	0.00125	0.00019	0.002	n/a	No	23	0.0007799	0.0008047	26.09	None	No	0.01 NP (normality)
Thallium, total (mg/L)	AD-33	0.001192	0.00005	0.002	n/a	No	23	0.0002752	0.0003582	73.91	None	No	0.01 NP (NDs)
Thallium, total (mg/L)	AD-7	0.0005	0.0002	0.002	n/a	No	23	0.0003561	0.0002074	39.13	None	No	0.01 NP (normality)

Non-Parametric Confidence Interval

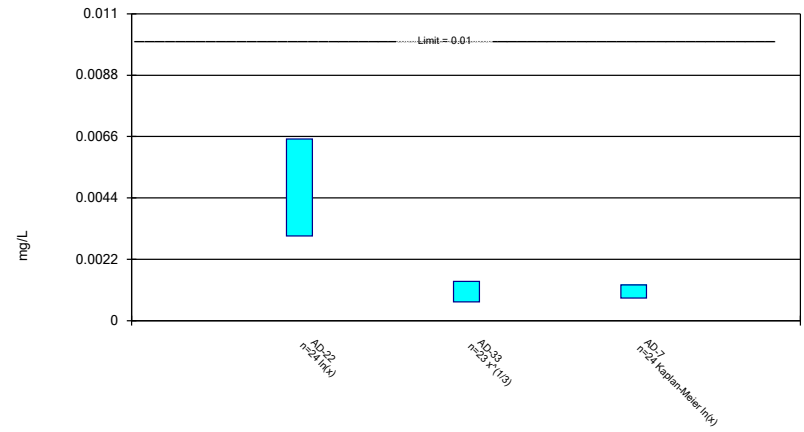
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Antimony, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

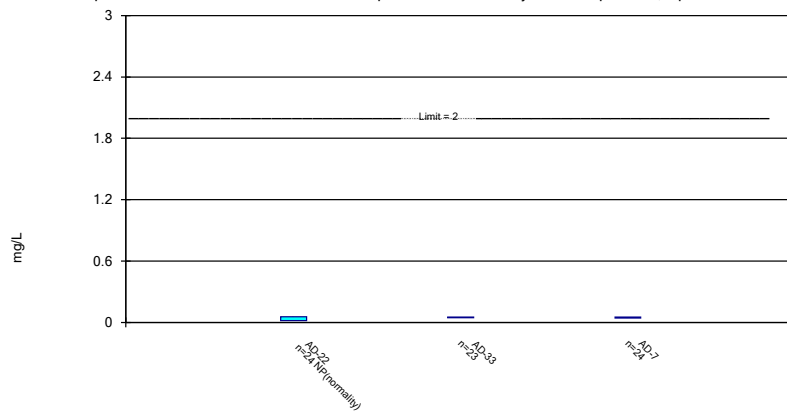
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

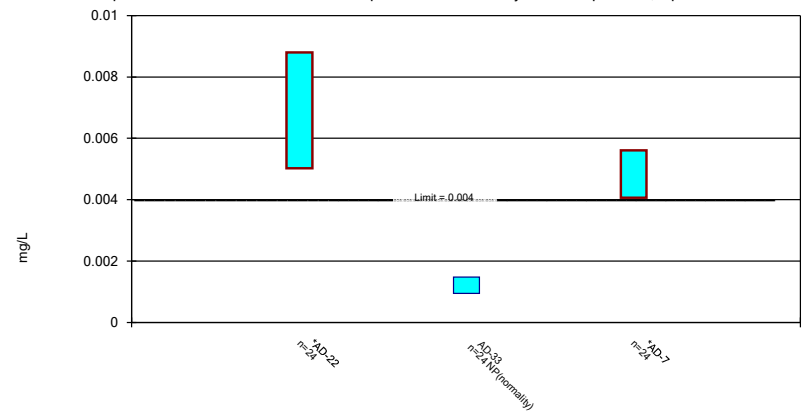
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

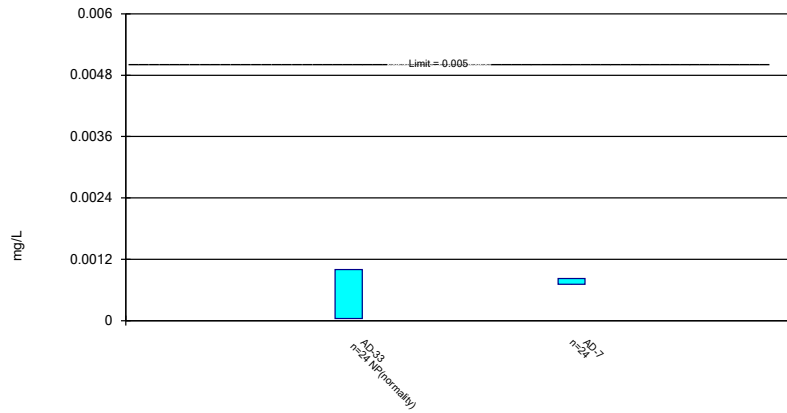
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

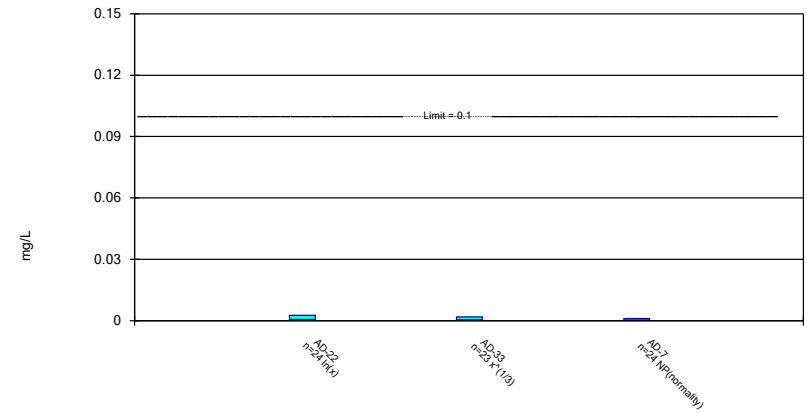
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

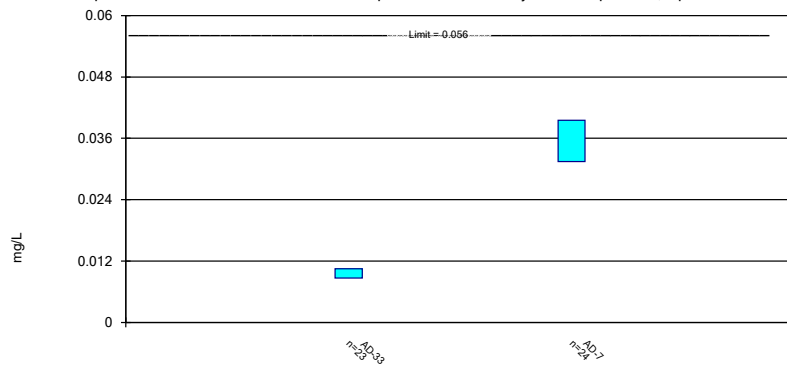
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

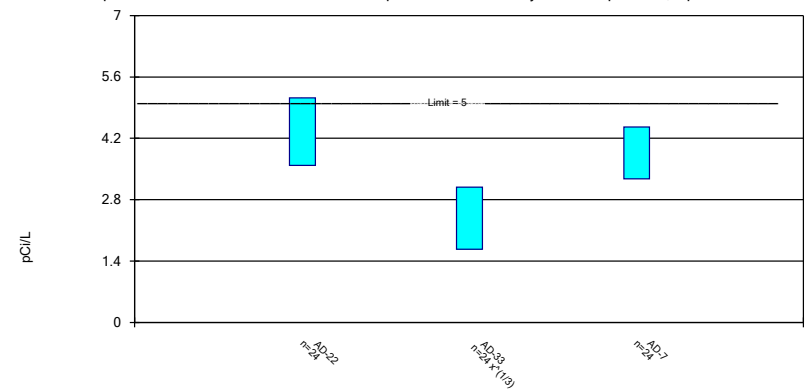
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

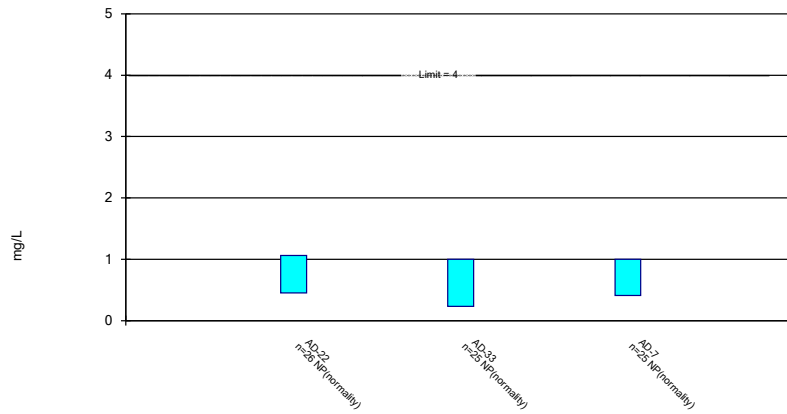
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

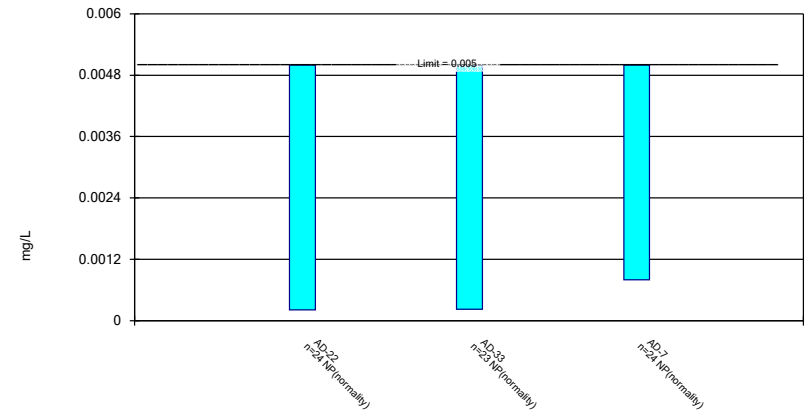
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Fluoride, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

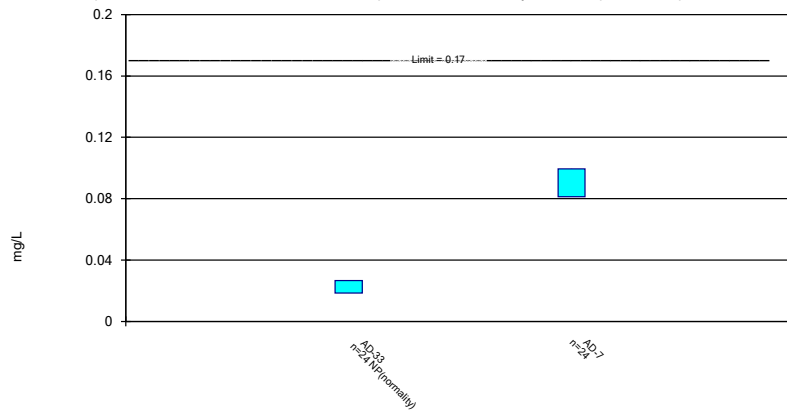
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lead, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

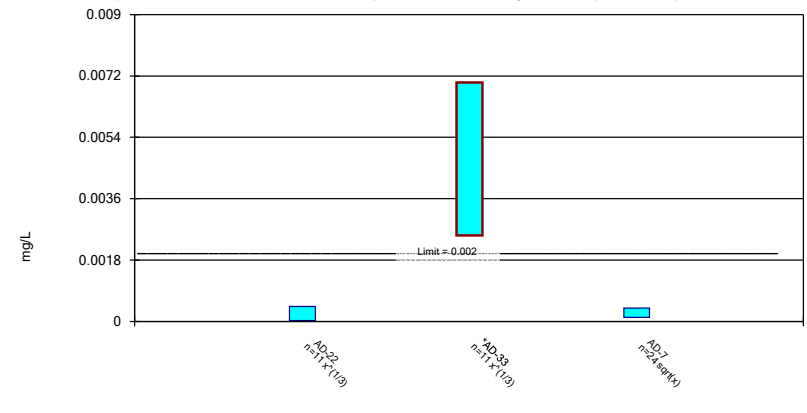
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

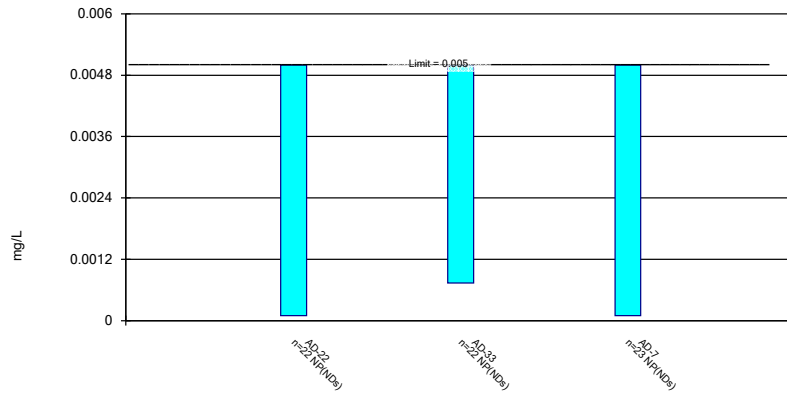
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Mercury, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

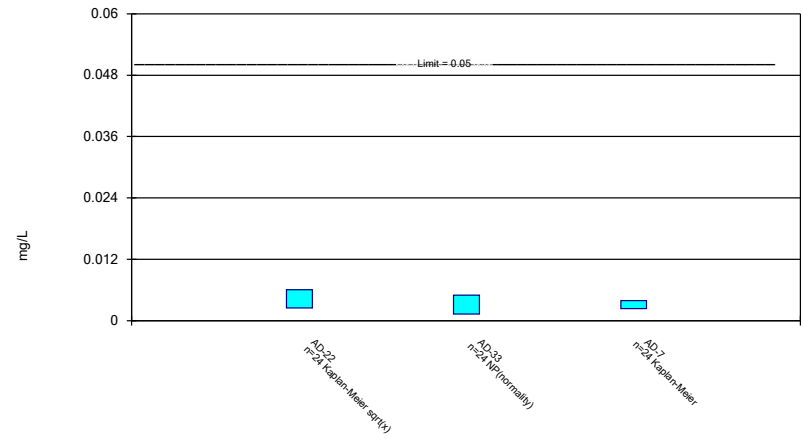
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Molybdenum, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

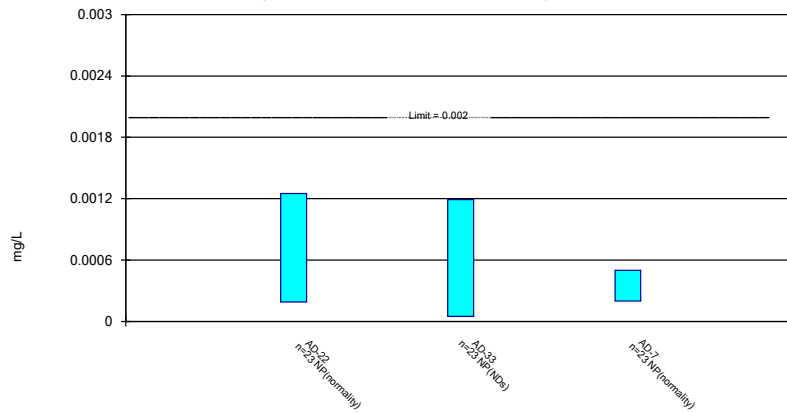
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 9/15/2023 2:46 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Thallium, total Analysis Run 9/15/2023 2:47 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Deseasonalized Confidence Intervals - Well AD-22 - Summary Table - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 9/15/2023, 2:50 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha Method
Cobalt, total (mg/L)	AD-22	0.09936	0.07367	0.056	n/a	Yes	24	0.08651	0.02517	0	None	No	0.01 Param.

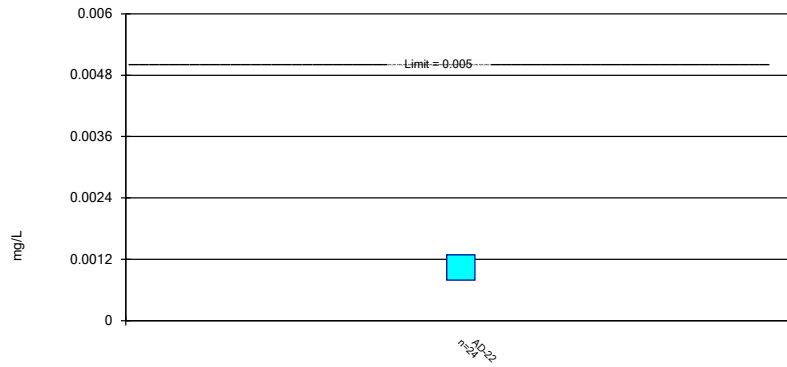
Deseasonalized Confidence Intervals - Well AD-22 - Summary Table - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 9/15/2023, 2:50 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha Method
Cadmium, total (mg/L)	AD-22	0.001286	0.0007935	0.005	n/a	No	24	0.00104	0.0004829	0	None	No	0.01 Param.
Cobalt, total (mg/L)	AD-22	0.09936	0.07367	0.056	n/a	Yes	24	0.08651	0.02517	0	None	No	0.01 Param.
Lithium, total (mg/L)	AD-22	0.1963	0.1429	0.17	n/a	No	24	0.1696	0.05234	0	None	No	0.01 Param.

Parametric Confidence Interval

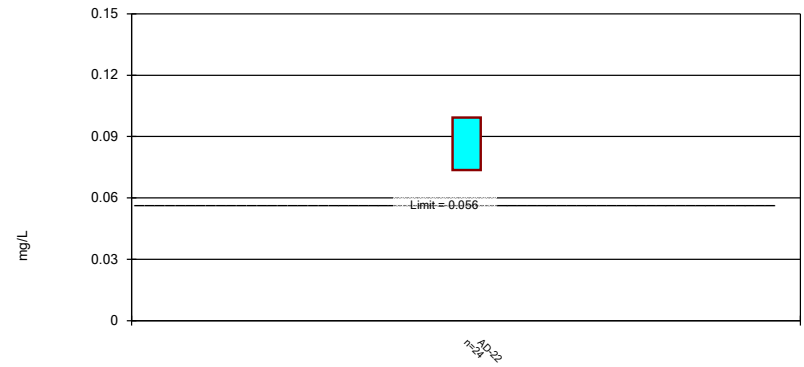
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total, Alt. Values Analysis Run 9/15/2023 2:48 PM View: Deseasonalized Confidence
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

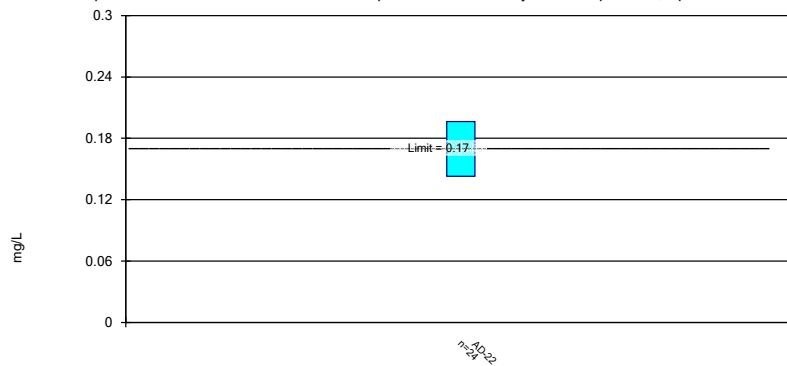
Compliance limit is exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total, Alt. Values Analysis Run 9/15/2023 2:49 PM View: Deseasonalized Confidence
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total, Alt. Values Analysis Run 9/15/2023 2:49 PM View: Deseasonalized Confidence
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality Summary Table - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 12:35 PM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>K.-W.</u>	<u>Chi-Sq.</u>	<u>df</u>	<u>N</u>	<u>Alpha</u>
Cadmium, total (mg/L)	AD-22	Yes	4.773	3.841	1	22	0.05
Calcium, total (mg/L)	AD-22	Yes	7.53	3.841	1	24	0.05
Cobalt, total (mg/L)	AD-22	Yes	6.734	3.841	1	22	0.05
Lithium, total (mg/L)	AD-22	Yes	6.727	3.841	1	22	0.05
pH, field (SU)	AD-22	Yes	4.821	3.841	1	23	0.05
Total Dissolved Solids [TDS] (mg/L)	AD-22	Yes	4.236	3.841	1	24	0.05

Seasonality Summary Table - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 3/24/2023, 12:35 PM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>K.-W.</u>	<u>Chi-Sq.</u>	<u>df</u>	<u>N</u>	<u>Alpha</u>
Antimony, total (mg/L)	AD-22	No	0.5714	3.841	1	22	0.05
Arsenic, total (mg/L)	AD-22	No	0.0571	3.841	1	22	0.05
Barium, total (mg/L)	AD-22	No	1.682	3.841	1	22	0.05
Beryllium, total (mg/L)	AD-22	No	3.406	3.841	1	22	0.05
Cadmium, total (mg/L)	AD-22	Yes	4.773	3.841	1	22	0.05
Calcium, total (mg/L)	AD-22	Yes	7.53	3.841	1	24	0.05
Chromium, total (mg/L)	AD-22	No	0.001169	3.841	1	22	0.05
Cobalt, total (mg/L)	AD-22	Yes	6.734	3.841	1	22	0.05
Combined Radium 226 + 228 (pCi/L)	AD-22	No	2.911	3.841	1	22	0.05
Fluoride, total (mg/L)	AD-22	No	3.039	3.841	1	24	0.05
Lead, total (mg/L)	AD-22	No	0.07697	3.841	1	22	0.05
Lithium, total (mg/L)	AD-22	Yes	6.727	3.841	1	22	0.05
Mercury, total (mg/L)	AD-22	No	0.06667	3.841	1	9	0.05
Molybdenum, total (mg/L)	AD-22	No	1.134	3.841	1	20	0.05
pH, field (SU)	AD-22	Yes	4.821	3.841	1	23	0.05
Selenium, total (mg/L)	AD-22	No	1.294	3.841	1	22	0.05
Thallium, total (mg/L)	AD-22	No	0.001434	3.841	1	21	0.05
Total Dissolved Solids [TDS] (mg/L)	AD-22	Yes	4.236	3.841	1	24	0.05

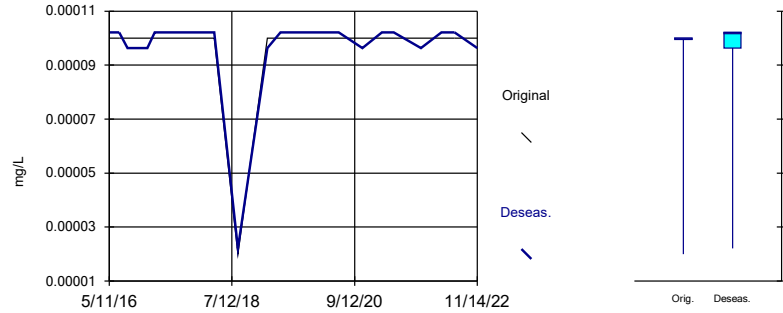
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.5714
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 0.07453
 Adjusted Kruskal-Wallis statistic (H') = 0.5714



Constituent: Antimony, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

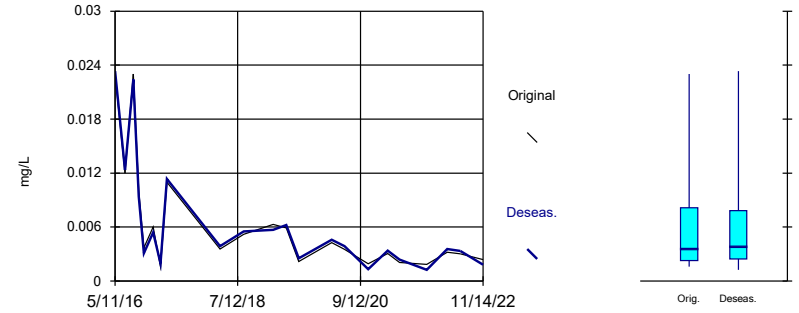
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.0571
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 0.05707
 Adjusted Kruskal-Wallis statistic (H') = 0.0571



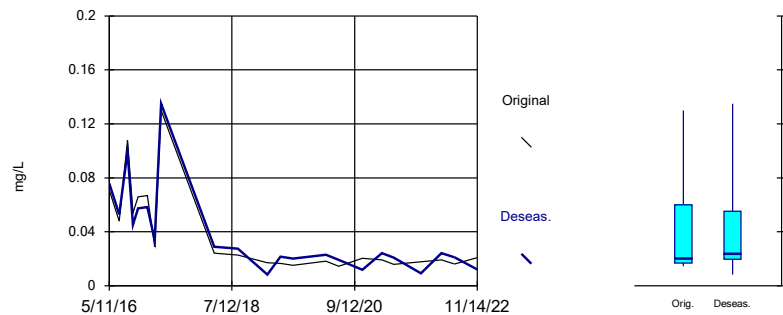
Constituent: Arsenic, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 1.682
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Barium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

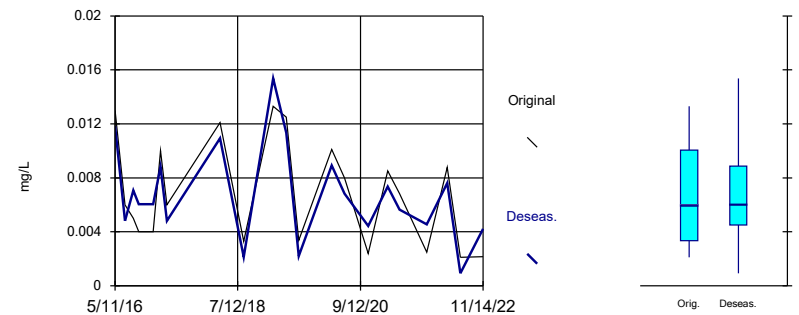
Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 3.406
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 3.396
 Adjusted Kruskal-Wallis statistic (H') = 3.406

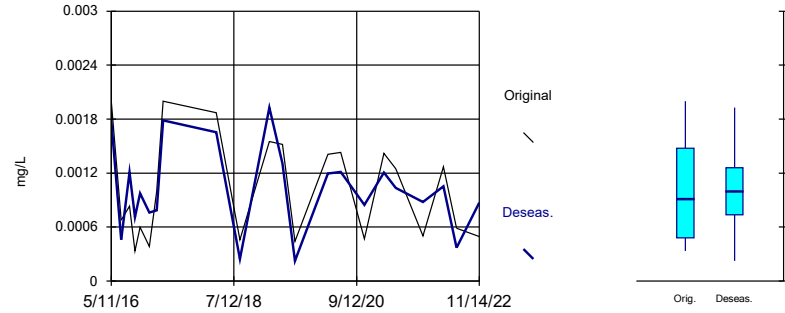


Constituent: Beryllium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 4.773
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 4.77
 Adjusted Kruskal-Wallis statistic (H') = 4.773

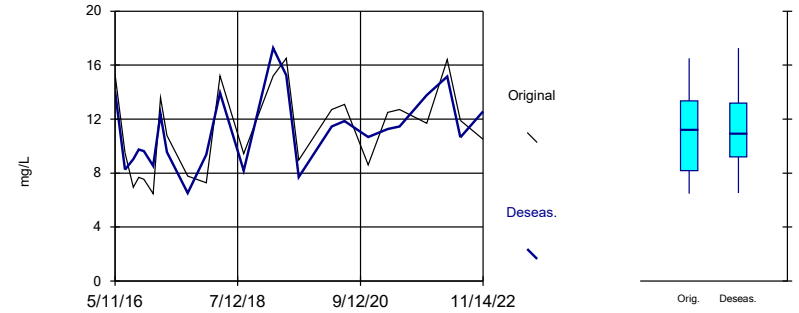


Constituent: Cadmium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 7.53
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 7.524
 Adjusted Kruskal-Wallis statistic (H') = 7.53

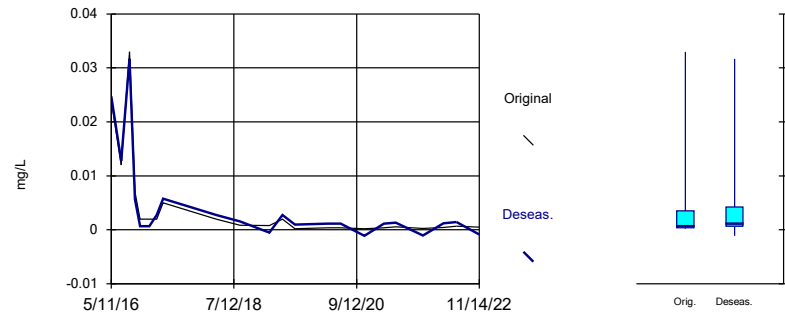


Constituent: Calcium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

Calculated Kruskal-Wallis statistic = 0.001169
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.001165
 Adjusted Kruskal-Wallis statistic (H') = 0.001169

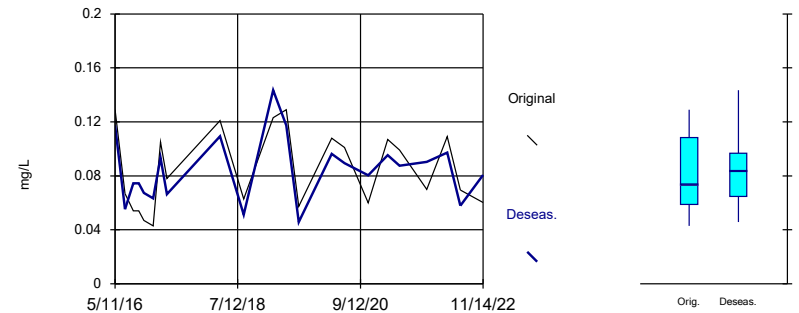


Constituent: Chromium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

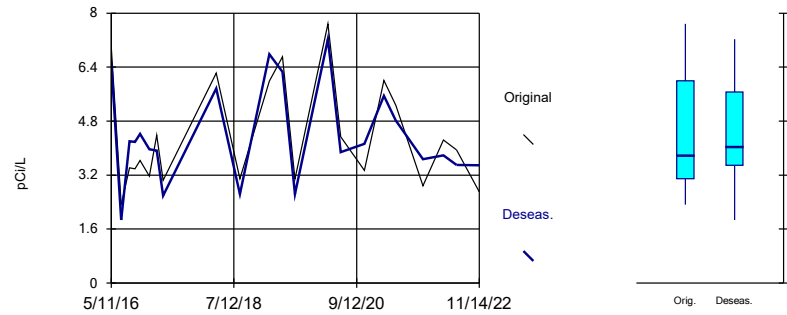
Calculated Kruskal-Wallis statistic = 6.734
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 6.727
 Adjusted Kruskal-Wallis statistic (H') = 6.734



Constituent: Cobalt, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

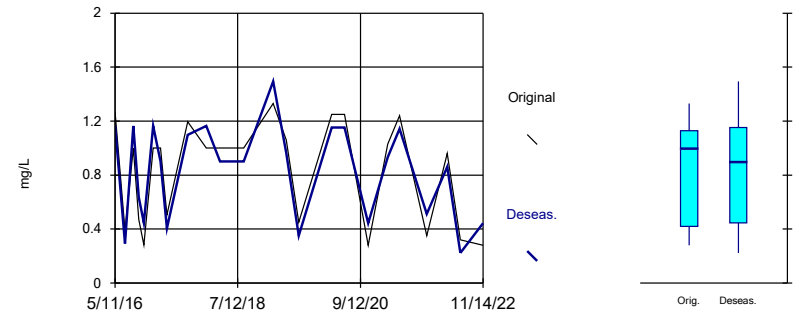
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 2.911
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Combined Radium 226 + 228 Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

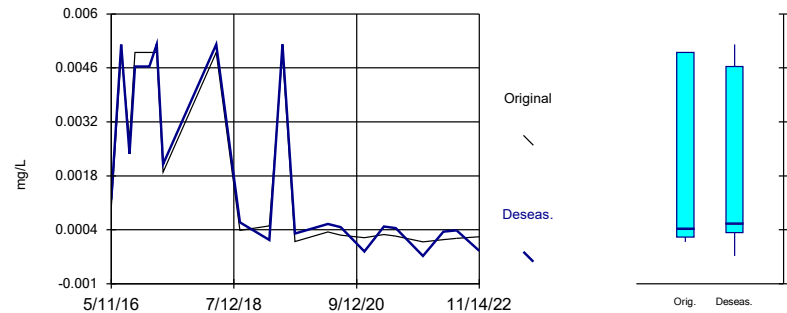
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 3.039
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 2.99
 Adjusted Kruskal-Wallis statistic (H') = 3.039



Constituent: Fluoride, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

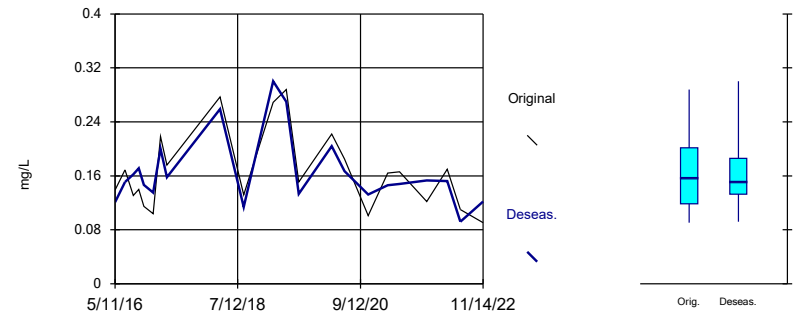
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.07697
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.07453
 Adjusted Kruskal-Wallis statistic (H') = 0.07697



Constituent: Lead, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

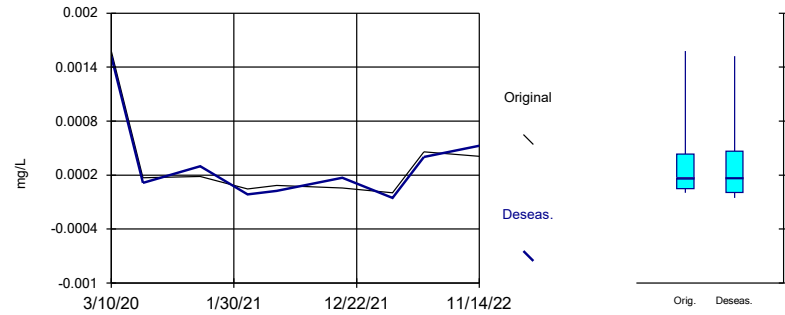
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 6.727
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Lithium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

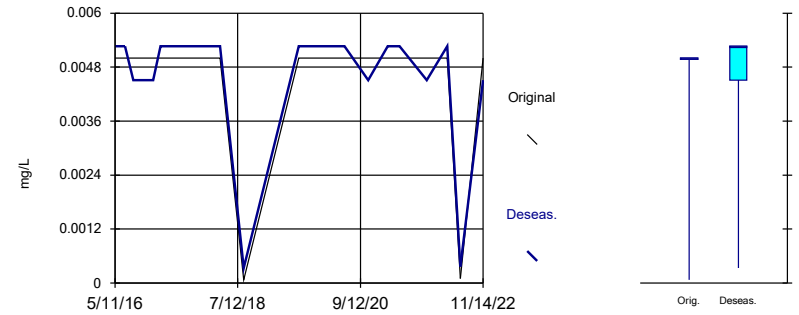
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.06667
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Mercury, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

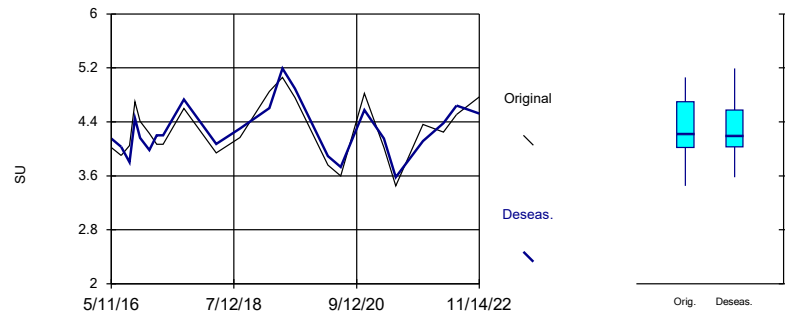
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.134
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.3077
 Adjusted Kruskal-Wallis statistic (H') = 1.134



Constituent: Molybdenum, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

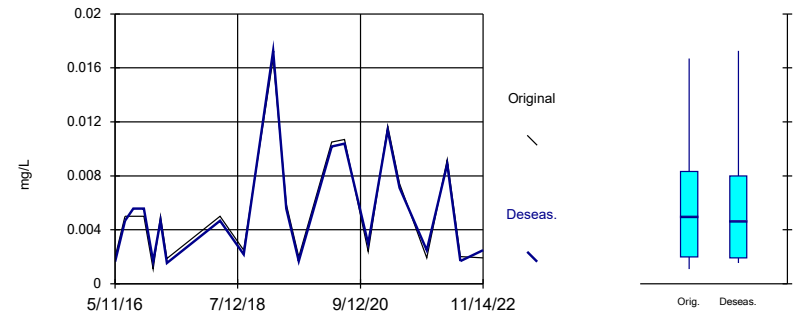
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 4.821
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 4.817
 Adjusted Kruskal-Wallis statistic (H') = 4.821



Constituent: pH, field Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.294
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 1.268
 Adjusted Kruskal-Wallis statistic (H') = 1.294



Constituent: Selenium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.

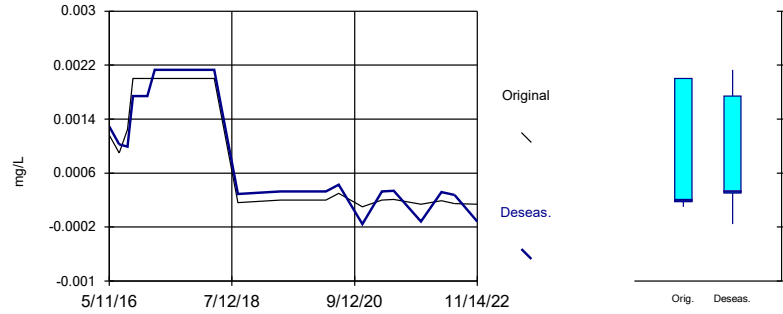
Calculated Kruskal-Wallis statistic = 0.001434

Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 0.001391

Adjusted Kruskal-Wallis statistic (H') = 0.001434



Constituent: Thallium, total Analysis Run 3/24/2023 12:33 PM View: Seasonality
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.

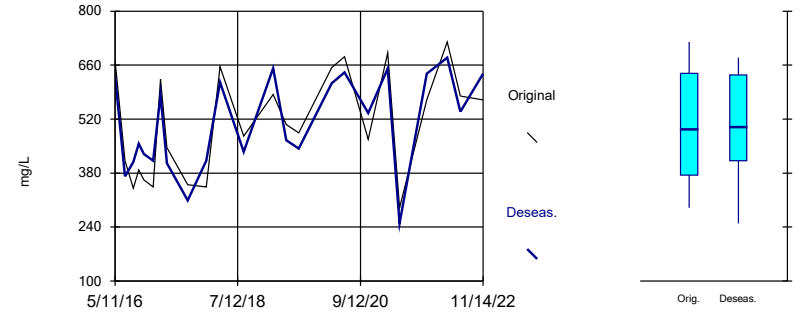
Calculated Kruskal-Wallis statistic = 4.236

Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.

Kruskal-Wallis statistic (H) = 4.232

Adjusted Kruskal-Wallis statistic (H') = 4.236



Constituent: Total Dissolved Solids [TDS] Analysis Run 3/24/2023 12:33 PM View: Seasonality
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

STATISTICAL ANALYSIS SUMMARY, FLUE GAS DESULFURIZATION (FGD) STACKOUT AREA – SECOND SEMIANNUAL EVENT 2023

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Project Number: CHA8500B

January 11, 2024

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Attachment A: Certification by Qualified Professional Engineer

Attachment B: Data Quality Review Memorandum

Attachment C: Statistical Analysis Output

ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
CCR	coal combustion residuals
FGD	flue gas desulfurization
GWPS	groundwater protection standard
LCL	lower confidence limit
LPL	lower prediction limit
mg/L	milligrams per liter
PQL	practical quantitation limit
QA/QC	quality assurance and quality control
SSI	statistically significant increase
SSL	statistically significant level
SU	standard units
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	total dissolved solids
UPL	upper prediction limit

1. INTRODUCTION

In accordance with Texas Commission on Environmental Quality (TCEQ) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Texas Administrative Code [TAC] Title 30, Chapter 352), groundwater monitoring has been conducted at the Flue Gas Desulfurization (FGD) Stackout Area, an existing CCR unit at the Pirkey Power Plant in Hallsville, Texas. Recent groundwater monitoring results were used to identify concentrations of Appendix IV constituents that are above site-specific groundwater protection standards (GWPSs).

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, chloride, and sulfate at the FGD Stackout Area. An alternative source was not identified at the time, so assessment monitoring was initiated and GWPSs were set in accordance with 30 TAC § 352.951(b). During 2023, sampling events for both Appendix III parameters and Appendix IV parameters, as required by § 352.951(a), were completed in February and June. During the June 2023 assessment monitoring event, statistically significant levels (SSLs) were observed for beryllium, cobalt, and mercury (Geosyntec 2023b). In accordance with § 352.951(e), an alternative source demonstration (ASD) was successfully completed (Geosyntec 2024). Therefore, the unit remained in assessment monitoring. One assessment monitoring event was conducted at the FGD Stackout Area in October 2023 in accordance with § 352.951(a). The results of the October 2023 assessment event are documented in this report.

Prior to conducting the statistical analyses, the groundwater data underwent several validation tests, including those for completeness, sample tracking accuracy, transcription errors, and consistent use of measurement units. No data quality issues were identified which would impact data usability.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. GWPSs were reestablished for the Appendix IV parameters. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether SSLs of Appendix IV parameters were present above the GWPS. SSLs were identified for beryllium, cobalt, and mercury. Therefore, either the unit will move to an assessment of corrective measures, or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

2. FGD STACKOUT AREA EVALUATION

2.1 Data Validation and QA/QC

During the October 2023 assessment monitoring event, one set of samples was collected for analysis from each background and compliance well to meet the requirements of § 352.951(a). Samples from the October 2023 sampling event were analyzed for all Appendix III and Appendix IV parameters. A summary of data collected during this assessment monitoring event are presented in Table 1.

Downgradient monitoring well AD-7R, which was installed in March 2020, was added to the groundwater monitoring network in December 2023 to replace AD-7, which was plugged in September 2023 due to plant demolition activities in the area (Arcadis 2023). Because this is the first statistical evaluation where AD-7R was included in the statistical evaluation, previously collected data from AD-7R were incorporated into the statistical calculations. A summary of data from AD-7R collected prior to the October 2023 assessment monitoring event that were included in the statistical evaluation is provided in Table 2.

Chemical analysis was completed by a National Environmental Laboratory Accreditation Program–certified analytical laboratory. The laboratory completed analysis of quality assurance and quality control (QA/QC) samples such as laboratory reagent blanks, continuing calibration verification samples, and laboratory fortified blanks.

A data quality review was completed to assess if the data met the objectives outlined in TCEQ Draft Technical Guidance No. 32 related to groundwater sampling and analysis (TCEQ 2020). The data were determined usable for supporting project objectives, as documented in the review memorandum provided in Attachment B. The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.10.0.15 statistics software. The export file was checked against the analytical data for transcription errors and completeness.

2.2 Statistical Analysis

Statistical analyses for the FGD Stackout Area were conducted in accordance with the November 2021 *Statistical Analysis Plan* (Geosyntec 2021). Time series plots and results for all completed statistical tests are provided in Attachment C. The data obtained in October 2023 were screened for potential outliers. No outliers were identified for these events.

2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix IV parameter in accordance with the Statistical Analysis Plan (Geosyntec 2021). The established GWPS was set to whichever was greater of the background concentration and the maximum contaminant level for each Appendix IV parameter. To determine background concentrations, an upper tolerance limit was calculated using data that were pooled from the background wells collected during the background monitoring and assessment monitoring events. Tolerance limits were calculated parametrically with 95% coverage

and 95% confidence for barium and combined radium. Nonparametric tolerance limits were calculated for arsenic, beryllium, chromium, cobalt, fluoride, and lithium due to apparent nonnormal distributions, and for antimony, cadmium, lead, mercury, molybdenum, selenium, and thallium due to a high nondetect frequency. Upper tolerance limits and the final GWPSs are summarized in Table 2.

2.2.2 Evaluation of Potential Appendix IV SSLs

A confidence interval was constructed for each Appendix IV parameter at each compliance well. Confidence limits were generally calculated parametrically ($\alpha = 0.01$). However, nonparametric confidence limits were calculated in some cases (e.g., when the data did not appear to be normally distributed or when the nondetect frequency was too high).

Seasonal patterns were observed for several parameters at AD-22 based on the time series graphs (Attachment C). Kruskal-Wallis tests were performed to test whether differences between the results from different seasons were statistically significant for all Appendix IV constituents. Statistically significant differences were found for beryllium, cadmium, cobalt, combined radium, fluoride, lithium, and selenium at AD-22. Where the Kruskal-Wallis test found significant seasonal effects, the data for these well/parameter pairs were deseasonalized so that the resulting confidence limits correctly account for seasonality as a predictable pattern rather than a random variation or a release.

An SSL was concluded if the lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval was above the GWPS). Calculated confidence limits are shown in Attachment C.

The following SSLs were identified at the Pirkey FGD Stackout Area:

- The deseasonalized LCL for beryllium was above the GWPS of 0.00400 milligrams per liter (mg/L) at AD-22 (0.00557 mg/L).
- The deseasonalized LCL for cobalt was above the GWPS of 0.0600 mg/L at AD-22 (0.0791 mg/L).
- The LCL for mercury exceeded the GWPS of 0.00200 mg/L at AD-33 (0.00275 mg/L).

As a result, the Pirkey FGD Stackout Area will either move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring.

2.2.3 Establishment of Appendix III Prediction Limits

Upper prediction limits (UPLs) were previously established for all Appendix III parameters following the background monitoring period. Intrawell tests were used to evaluate potential SSIs for calcium, pH and total dissolved solids (TDS), and interwell tests were used to evaluate potential SSIs for boron, chloride, fluoride, and sulfate. Interwell and intrawell prediction limits are updated periodically during the assessment monitoring period as sufficient data become available.

For intrawell tests, insufficient data was available to compare against the existing background dataset, and so the prediction limits were not updated for the intrawell tests at this time. The

intrawell prediction limits were previously calculated using historical data through June 2022 (Geosyntec 2023a). The established intrawell prediction limits were used to evaluate potential SSIs for calcium, pH, and TDS. Insufficient data were available to calculate intrawell prediction limits for calcium, pH, and TDS at AD-7R; therefore, previously calculated prediction limits for AD-7 were used for this statistical evaluation. The intrawell prediction limits calculated using data collected from AD-7R will be established for the next event, as sufficient data is anticipated to be available at that time.

Prediction limits for the interwell tests were recalculated using data collected during the 2023 assessment monitoring events. New background well data were tested for outliers before being added to the background data set. Background well data were also evaluated for statistically significant trends using the Sen's Slope/Mann-Kendall trend test, and the results are included in Attachment C.

After the revised background set was established, a parametric or nonparametric analysis was selected based on the distribution of the data and the frequency of nondetect data. Estimated results under the reporting limit (i.e., practical quantitation limit [PQL]) but above the method detection limit—that is, “J-flagged” data—were considered detections and the estimated results were used in the statistical analyses. Nonparametric analyses were selected for data sets with at least 50% nondetect data or data sets that could not be normalized. Parametric analyses were selected for data sets (either transformed or untransformed) that passed the Shapiro-Wilk/Shapiro-Francia test for normality. The Kaplan-Meier nondetect adjustment was applied to data sets with between 15% and 50% nondetect data. For data sets with fewer than 15% nondetect data, nondetect data were replaced with one half of the PQL. The selected analysis (i.e., parametric or nonparametric) and transformation (where applicable) for each background data set are shown in Attachment C.

Interwell UPLs were updated for boron, chloride, fluoride, and sulfate using historical data through October 2023. Intrawell UPLs for calcium, pH, and TDS and intrawell lower prediction limits (LPLs) for pH were previously updated using data through June 2022 to represent background values. The updated prediction limits are summarized in Table 3. The prediction limits were calculated for a one-of-two retesting procedure: If at least one sample in a series of two is not above the UPL (or, in the case of pH, is neither less than the LPL nor greater than the UPL), then it can be concluded that an SSI has not occurred. In practice, where the initial result does not exceed the UPL (or, in the case of pH, is neither less than the LPL nor greater than the UPL), a second sample will not be collected. The retesting procedures allow achieving an acceptably high statistical power to detect changes at downgradient wells for constituents evaluated using intrawell prediction limits.

2.2.4 Evaluation of Potential Appendix III SSIs

While SSLs were identified, a review of the Appendix III results were also completed to assess whether concentrations of Appendix III parameters at the compliance wells were above background concentrations. Data collected during the October 2023 assessment monitoring event from each compliance well were compared to calculated interwell and previously established intrawell prediction limits to assess whether the results are above background values (Table 3).

The following concentrations were above the UPLs:

- Boron concentrations were above the interwell UPL of 0.0864 mg/L at AD-7R (0.089 mg/L) and AD-33 (0.094 mg/L).
- Chloride concentrations were above the interwell UPL of 54.5 mg/L at AD-22 (80.5 mg/L).
- pH values were above the intrawell UPL of 4.2 standard units (SU) at AD-7R (5.6 SU).
- Sulfate concentrations were above the interwell UPL of 138 mg/L at AD-22 (212 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the October 2023 sample was above the UPL or below the LPL in the case of pH. Based on these results, concentrations of Appendix III constituents appear to be above background concentrations.

2.3 Conclusions

A semiannual assessment monitoring event was conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, and no QA/QC issues that impacted data usability were identified. A review of outliers identified no potential outliers in the October 2023 data. GWPSs were reestablished for the Appendix IV parameters. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval was above the GWPS. SSLs were identified for beryllium, cobalt, and mercury. Appendix III parameters were compared to calculated prediction limits, with exceedances identified for boron, chloride, pH, and sulfate.

Based on this evaluation, the Pirkey FGD Stackout Area CCR unit will either move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring.

3. REFERENCES

- Geosyntec. 2021. Statistical Analysis Plan – H.W. Pirkey Power Plant. Geosyntec Consultants, Inc. November.
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TABLES

**Table 1. Groundwater Data Summary
Statistical Analysis Summary
Pirkey Plant – Flue Gas Desulfurization Stackout Pad**

Parameter	Unit	AD-7R	AD-12	AD-13	AD-22	AD-33
		10/17/2023	10/17/2023	10/17/2023	10/17/2023	10/17/2023
Antimony	µg/L	0.009 J1	0.01 J1	0.1 U1	0.1 U1	0.009 J1
Arsenic	µg/L	1.22	0.06 J1	5.71	1.57	0.58
Barium	µg/L	64.2	23.6	41.2	19.1	45.9
Beryllium	µg/L	1.64	0.142	0.559	2.65	1.00
Boron	mg/L	0.089	0.015 J1	0.068	0.020 J1	0.094
Cadmium	µg/L	0.324	0.006 J1	0.02 U1	0.551	0.037
Calcium	mg/L	2.70	0.27	9.49	9.26	1.15
Chloride	mg/L	24.1	6.74	42.9	80.5	9.03
Chromium	µg/L	0.64	0.31	0.22 J1	0.33	0.33
Cobalt	µg/L	14.2	1.19	47.6	55.3	7.51
Combined Radium	pCi/L	3.25	1.08	1.05	2.61	1.79
Fluoride	mg/L	0.16	0.07	0.45	0.26	0.18
Lead	µg/L	0.22	0.07 J1	0.2 U1	0.18 J1	0.22
Lithium	mg/L	0.0402	0.00891	0.137	0.0772	0.0194
Mercury	µg/L	0.041	0.005 U1	0.005 U1	0.301	6.120
Molybdenum	µg/L	0.5 U1	0.5 U1	0.5 U1	0.5 U1	0.5 U1
Selenium	µg/L	2.90	0.21 J1	0.13 J1	4.78	1.97
Sulfate	mg/L	39.9	2.7	86.9	212	41.7
Thallium	µg/L	0.14 J1	0.2 U1	0.02 J1	0.15 J1	0.04 J1
Total Dissolved Solids	mg/L	190	58	280	480	130
pH	SU	5.6	3.8	5.5	4.0	4.0

Notes:

J1: Estimated value. Parameter was detected in concentrations below the reporting limit.

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U1: Non-detect value. For statistical analysis, parameters which were not detected were replaced with the reporting limit.

µg/L: micrograms per liter

**Table 2. AD-7R Groundwater Data Summary
Statistical Analysis Summary
Pirkey Plant – Flue Gas Desulfurization Stackout Pad**

Parameter	Unit	AD-7R						
		6/2/2020	11/2/2020	5/24/2021	11/15/2021	6/20/2022	11/15/2022	6/26/2023
Antimony	µg/L	0.05 J1	0.1 U1	0.1 U1	0.5 U1	0.03 J1	0.1 U1	0.009 J1
Arsenic	µg/L	1.95	0.29	0.63	1.4	2.59	0.72	0.53
Barium	µg/L	34.0	72.8	42.2	65.4	61.4	67.2	36.8
Beryllium	µg/L	1.71	2.08	1.73 M1	2.35	2.28	1.77	1.05
Boron	mg/L	0.04 J1	0.04 J1	0.037 J1	0.25 U1	0.025 J1	0.022 J1	0.029 J1
Cadmium	µg/L	0.23	0.34	0.217	0.34	0.393	0.378	0.213
Calcium	mg/L	3.97	3.90	4.0	3.6	2.80	2.81	3.38
Chloride	mg/L	15.6	20.8	15.3	23.7	24.2	26.1	20.0
Chromium	µg/L	1.37	0.08 J1	0.29	0.4 J1	2.92	0.39	0.36
Cobalt	µg/L	18.8	20.0	21.3	18.5	17.8	16.3	19.3
Combined Radium	pCi/L	0.939	3.114	3.83	2.7	3.41	3.19	1.83
Fluoride	mg/L	0.18	0.14	0.20	0.15	0.16	0.15	0.10
Lead	µg/L	0.308	0.2 U1	0.2 U1	1 U1	0.68	0.25	0.07 J1
Lithium	mg/L	0.0722	0.0563	0.0635 M1	0.0547	0.0437	0.0424	0.0558
Mercury	µg/L	0.012	0.025	0.002 J1	0.182	0.042	0.011	0.039
Molybdenum	µg/L	2 U1	2 U1	0.5 U1	2.5 U1	0.1 J1	0.5 U1	0.5 U1
Selenium	µg/L	0.5	0.4	0.22 J1	1 J1	1.36	2.15	0.68
Sulfate	mg/L	85.6	40.5	81.6	43.3	44.7	37.2	60.7
Thallium	µg/L	0.5 U1	0.5 U1	0.10 J1	1 U1	0.14 J1	0.14 J1	0.13 J1
Total Dissolved Solids	mg/L	254	183	240	180	200	180	220
pH	SU	5.1	4.8	4.3	4.4	4.6	4.9	4.9

Notes:

J1: Estimated value. Parameter was detected in concentrations below the reporting limit.

M1: The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U1: Non-detect value. For statistical analysis, parameters which were not detected were replaced with the reporting limit.

µg/L: micrograms per liter

**Table 3. Appendix IV Groundwater Protection Standards
Statistical Analysis Summary
Pirkey Plant - FGD Stackout Area**

Constituent Name	MCL	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600	0.000100	0.00600
Arsenic, Total (mg/L)	0.0100	0.00900	0.0100
Barium, Total (mg/L)	2.00	0.0552	2.00
Beryllium, Total (mg/L)	0.00400	0.00200	0.00400
Cadmium, Total (mg/L)	0.00500	0.000860	0.00500
Chromium, Total (mg/L)	0.100	0.00400	0.100
Cobalt, Total (mg/L)	n/a	0.0600	0.0600
Combined Radium, Total (pCi/L)	5.00	2.98	5.00
Fluoride, Total (mg/L)	4.00	0.748	4.00
Lead, Total (mg/L)	n/a	0.00500	0.00500
Lithium, Total (mg/L)	n/a	0.165	0.165
Mercury, Total (mg/L)	0.00200	0.0000193	0.00200
Molybdenum, Total (mg/L)	n/a	0.00500	0.00500
Selenium, Total (mg/L)	0.0500	0.00386	0.0500
Thallium, Total (mg/L)	0.00200	0.00144	0.00200

Notes:

1. Calculated UTL (Upper Tolerance Limit) represents site-specific background values.
2. Gray cells indicate the GWPS is based on the calculated UTL. Either the UTL is higher than the MCL or an MCL does not exist.

FGD: flue gas desulfurization

GWPS: groundwater protection standard

MCL: maximum contaminant level

mg/L: milligrams per liter

pCi/L: picocuries per liter

**Table 4. Appendix III Data Summary
Statistical Analysis Summary
Pirkey – Flue Gas Desulfurization Stackout Pad**

Analyte	Unit	Description	AD-7R	AD-22	AD-33
			10/17/2023	10/17/2023	10/17/2023
Boron	mg/L	Interwell Background Value (UPL)	0.0864		
		Analytical Result	0.089	0.020	0.094
Calcium	mg/L	Intrawell Background Value (UPL)	6.3	15.3	2.22
		Analytical Result	2.70	9.26	1.15
Chloride	mg/L	Interwell Background Value (UPL)	54.5		
		Analytical Result	24.1	80.5	9.03
Fluoride	mg/L	Interwell Background Value (UPL)	0.748		
		Analytical Result	0.16	0.26	0.18
pH	SU	Intrawell Background Value (UPL)	4.2	5.0	4.6
		Intrawell Background Value (LPL)	3.0	3.5	3.1
		Analytical Result	5.6	4.0	4.0
Sulfate	mg/L	Interwell Background Value (UPL)	138		
		Analytical Result	39.9	212	41.7
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	332	716	217
		Analytical Result	190	480	130

Notes:

1. Bold values exceed the background value.

2. Background values are shaded gray.

3. Intrawell prediction limits calculated for AD-7 were used for comparison at AD-7R, as insufficient data from AD-7R to calculate new prediction limits was available at this time.

LPL: lower prediction limit

mg/L: milligrams per liter

SU: standard units

UPL: upper prediction limit

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

I certify that selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Pirkey FGD Stackout Area CCR management area and that the requirements of § 352.931(a) have been met.

David Anthony Miller
Printed Name of Licensed Professional Engineer

David Anthony Miller
Signature



112498
License Number

Texas
Licensing State

01.16.2024
Date

ATTACHMENT B
Data Quality Review Memorandum

Memorandum

Date: January 9, 2024
To: David Miller (AEP)
Copies to: Leslie Fuerschbach (AEP)
From: Allison Kreinberg (Geosyntec)
Subject: Data Quality Review – Pirkey Power Plant
October 2023 Sampling Event

This memorandum summarizes the findings of a data quality review for groundwater samples collected at the Pirkey Power Plant in Hallsville, Texas in October 2023. The groundwater samples were collected to comply with the Texas Commission on Environmental Quality’s (TCEQ’s) regulations regarding the disposal of coal combustion residuals (CCRs) in landfills and surface impoundments (Title 30 Chapter 352, “CCR Rule”) for the West Bottom Ash Pond (EBAP) and Flue Gas Desulfurization (FGD) Stackout Area regulated units. 40 CFR 257 Appendix III and IV constituents were analyzed.

The following sample data groups (SDGs) were associated with the groundwater samples collected during the August 2023 sampling event and are reviewed in this memorandum:

- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 233267
- Dolan Chemical Laboratory (Groveport, Ohio) Job ID # 233279

The data included in these SDGs were reviewed to assess if they met the objectives outlined in TCEQ Draft Technical Guideline No. 32¹ prior to submittal of this data to TCEQ.

The following data quality issues were identified:

- As reported in SDG 233267, chloride and sulfate were detected in the field blank sample “FIELD BLANK” collected on 10/17/2023. The estimated sulfate concentration in the

¹ TCEQ. Topic: Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action: Technical Guidance No. 32. May 2020.

field blank (0.2 mg/L) was more than 10% of the detected value for sulfate in the AD-17 groundwater sample, which could result in high bias for the AD-17 groundwater sulfate results.

- As reported in SDG 233267, chloride and sulfate were detected in the equipment blank sample “EQUIPMENT BLANK” collected on 10/17/2023. The estimated sulfate concentration in the equipment blank (0.2 mg/L) was more than 10% of the detected value for sulfate in the AD-17 groundwater sample, which could result in high bias for the AD-17 groundwater sulfate results.
- As reported in SDG 233279, chromium and cobalt were detected in the field blank sample “FIELD BLANK” collected on 10/17/2023. The detected chromium concentration in the field blank (0.51 µg/L) was more than 10% of the detected value for chromium in all groundwater samples, which could result in high bias for all groundwater chromium results.
- As reported in SDG 233279, chromium and cobalt were detected in the equipment blank sample “EQUIPMENT BLANK” collected on 10/17/2023. The detected chromium concentration in the equipment blank (0.38 µg/L) was more than 10% of the detected value for chromium in all groundwater samples, which could result in high bias for all groundwater chromium results.
- The quality control data provided with SDG 233279 noted that the recovery on the matrix spikes for barium, beryllium, calcium, and lithium and the matrix spike duplicates for boron, barium, beryllium, calcium, cobalt, and lithium associated with sample “DUPLICATE A” (parent sample = AD-7R) had low recoveries. The barium, beryllium, calcium, cobalt, and lithium results for sample “DUPLICATE A” were qualified with “M1: the associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits”.

Based on these findings, the majority of the data reported in these SDGs are considered accurate and complete. Although the QC failures mentioned above will result in some limitations of data use since the affected results are considered estimated, the data are considered usable for supporting project objectives.

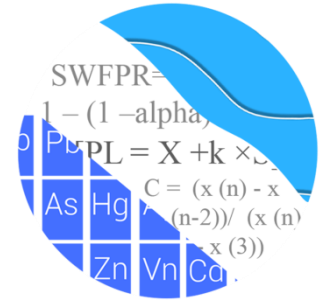
ATTACHMENT C

Statistical Analysis Output

GROUNDWATER STATS CONSULTING

January 5, 2024

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
500 W. Wilson Bridge Road, Suite 250
Worthington, OH 43085



Re: Pirkey Stackout
Background Update & Assessment Monitoring Event – October 2023

Dear Ms. Kreinberg,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the background update and statistical analysis of groundwater data for the October 2023 sample event for American Electric Power Inc.'s Pirkey Stackout. The analysis complies with the Texas Commission of Environmental Quality rule 30 TAC 352 as well as with the United States Environmental Protection Agency (USEPA) Unified Guidance (2009).

Sampling began at the site for the CCR program in 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** AD-12 and AD-13
- **Downgradient wells:** AD-22, AD-33, and AD-7R

Downgradient well AD-7 was previously in the well network, but has been removed and replacement well AD-7R has been sampled since June 2020. Appendix IV constituents are evaluated using confidence intervals, which require a minimum of 4 samples. Prediction limits will be used to evaluate Appendix III data at this well when a minimum of 8 samples are available in background, and as of this update, sufficient samples are not yet available.

Data were sent electronically to Groundwater Stats Consulting, and the statistical analysis was conducted according to the Statistical Analysis Plan and screening evaluation prepared by GSC and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GSC.

The analysis was reviewed by Kristina Rayner, Senior Statistician and Founder of Groundwater Stats Consulting.

The CCR program consists of the following constituents:

- **Appendix III** (Detection Monitoring) – boron, calcium, chloride, fluoride, pH, sulfate, and TDS
- **Appendix IV** (Assessment Monitoring) – antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium

Time series plots for these parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record (Figure A). Additionally, box plots are included for all constituents at upgradient and downgradient wells (Figure B). All flagged values may also be seen in a lighter font and disconnected symbol on the time series graphs (Figure C).

A change in reported concentrations of more recent data was previously noted for mercury relative to historical concentrations in wells AD-22 and AD-33. In order to construct confidence intervals that represent current groundwater quality conditions and eliminate the influence of the trend, earlier concentrations were truncated from the records. A list of well/constituent pairs using truncated records follows this report.

In the previous background screening, data at all wells were evaluated for the following: 1) outliers; 2) trends; 3) most appropriate statistical method for Appendix III parameters based on site characteristics of groundwater data upgradient of the facility; and 4) eligibility of downgradient wells when intrawell statistical methods are recommended. Power curves were provided with the background screening report submitted in December 2017 and demonstrated that the selected statistical methods for Appendix III parameters comply with the USEPA Unified Guidance recommendations.

Summary of Appendix III Statistical Methods

The most appropriate statistical methods for each parameter as recommended in the 2017 screening analysis were as follows:

- 1) Intrawell prediction limits, combined with a 1-of-2 resample plan, for calcium, pH, and TDS
- 2) Interwell prediction limits, combined with a 1-of-2 resample plan, for boron, chloride, fluoride, and sulfate

Parametric prediction limits are utilized when the screened historical data follow a normal or transformed-normal distribution. When data cannot be normalized or the majority of data are non-detects, a nonparametric test is utilized. The distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (US EPA, 2009), data are analyzed using either parametric or non-parametric prediction limits as appropriate. Non-detects are handled as follows:

- No statistical analyses are required on wells and analytes containing 100% non-detects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% non-detects, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for non-detects is the most practical quantification limit (PQL) as reported by the laboratory.
- When data contain between 15-50% non-detects, the Kaplan-Meier non-detect adjustment is applied to the background data for parametric limits. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.
- Nonparametric prediction limits are used on data containing greater than 50% non-detects.

Natural systems continuously evolve due to physical changes made to the environment. Examples include capping a landfill, paving areas near a well, or lining a drainage channel to prevent erosion. Periodic updating of background statistical limits will be necessary to accommodate these types of changes. In the interwell case, statistical limits may be updated with all upgradient well data after careful screening for new outliers. In the intrawell case, data for all wells and constituents are re-evaluated when a minimum of 4 new data points are available to determine whether earlier concentrations are representative of present-day groundwater quality. In some cases, the earlier portion of data are deselected prior to construction of limits in order to provide sensitive limits that will rapidly detect changes in groundwater quality. Even though the data are excluded from the calculation, the values will continue to be reported and shown in tables and graphs.

Note that while the most recent PQL is used for non-detect values, the historic reporting limit of 0.005 mg/L was used for lead and molybdenum in order to maintain statistical limits that are conservative from a regulatory perspective.

Summary of Original Background Screening Conducted in December 2017

Outlier Evaluation

Time series plots were used to identify suspected outliers, or extreme values that would result in limits that are not conservative from a regulatory perspective, in proposed background data. Suspected outliers at all wells for Appendix III and Appendix IV parameters were formally tested using Tukey's box plot method and, when identified by Tukey's test or visual comparison with other data, flagged in the computer database with "o" and deselected prior to construction of statistical limits.

Tukey's outlier test noted a few outliers, and the results were submitted with the screening report. For the downgradient well data that are used to construct confidence intervals, a regulatory conservative approach is taken in that values that are marginally high relative to the rest of the data are retained unless there is particular justification for excluding them. However, during the 9/7/16 sample event, several reported measurements for a number of constituents were remarkably high, suggesting a likely systematic error. Therefore, those values were flagged as outliers.

Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate all data at each well to identify statistically significant increasing or decreasing trends. In the absence of suspected contamination, significant trending data are typically not included as part of the background data used for construction of prediction limits. Exclusion of trending data produces conservative limits that better represent current background concentrations.

The results of the trend analyses showed no statistically significant trends; therefore, no adjustments were made to the data sets at the time of the screening.

Appendix III – Determination of Statistical Methods

The most appropriate statistical method, i.e., interwell or intrawell prediction limits as listed above for each Appendix III parameter, was recommended based on two criteria: 1) spatial variability of each parameter among upgradient wells and 2) comparison of average concentrations in each downgradient well to the expected upper limit of concentrations across all upgradient wells. The results of the application of Analysis of Variance, upgradient tolerance limits, and downgradient confidence intervals were included in the 2017 screening study report.

Summary of Background Update – Conducted in January 2024

During this analysis, Tukey's outlier test and visual screening were used to evaluate data through October 2023 at upgradient wells for boron, chloride, fluoride, and sulfate, which are tested using interwell prediction limits. (Figure C).

Outlier Analysis

Tukey's outlier test on pooled upgradient well data did not identify any values for boron, chloride, fluoride, or sulfate as outliers; therefore, no new values were flagged. Tukey's outlier test results for all Appendix III parameters are shown in Figure C. No changes to values flagged in previous background updates occurred as these measurements were confirmed by visual screening. As mentioned above, any flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages.

For parameters which use intrawell prediction limits (calcium, pH, and TDS), values were not re-evaluated for new outliers as these records had insufficient samples for updating background limits during this evaluation period.

Seasonality

Several Appendix III constituents appear to have seasonal patterns for well AD-22 and were tested for seasonality during the previous update. All Appendix III constituents evaluated with intrawell prediction limits at this well will be tested for seasonality using the Kruskal-Wallis test when intrawell prediction limits are updated in the future. Calcium, pH, and TDS were previously identified with significant seasonality.

Intrawell Prediction Limits

Intrawell prediction limits, combined with a 1-of-2 resample plan, are constructed using historical data through June 2022 for calcium, pH, and TDS at all wells (Figure D). Additionally, deseasonalized prediction limits were constructed for calcium, pH, and TDS in well AD-22 and may be found at the end of Figure D. No comparison of the October 2023 data was made in this analysis.

Interwell – Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate data at upgradient wells for boron, chloride, fluoride, and sulfate to identify statistically significant increasing or

decreasing trends at the 99% confidence level (Figure E). Statistically significant trends were identified for the following well/constituent pairs:

Increasing:

- Chloride: AD-13 (upgradient)
- Sulfate: AD-13 (upgradient)

Decreasing:

- Sulfate: AD-12 (upgradient)

Although a statistically significant decreasing trend identified for sulfate in upgradient well AD-12, the magnitude of the trend is a marginal relative to the respective concentrations; therefore, no adjustments were made at this time. The statistically significant increasing trends identified for chloride and sulfate in upgradient well AD-13 also required no adjustments at this time since the influence of the trends would not affect the respective nonparametric interwell prediction limits. All data from upgradient wells were used to construct interwell prediction limits for boron, chloride, fluoride, and sulfate.

Interwell – Prediction Limits

Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed using all pooled upgradient well data through October 2023 for boron, chloride, fluoride, and sulfate (Figure F). Time series plots were included with the interwell prediction limit graphs to display concentrations at upgradient wells that were used to construct the statistical limits. No comparison of the October 2023 data was made in this analysis.

Evaluation of Appendix IV Constituents – October 2023

As mentioned above, prior to evaluating Appendix IV parameters, background data are screened through visual screening and Tukey's outlier test for potential outliers and extreme trending patterns that would lead to artificially elevated statistical limits. For the current analysis, Tukey's outlier test on pooled upgradient well data did not identify any outliers for Appendix IV parameters; therefore, no additional values were flagged. No changes to previously flagged outliers were made among upgradient wells for Appendix IV parameters as these measurements were confirmed by visual screening.

Additionally, downgradient well data through October 2023 were screened through visual screening using time series graphs. Since the downgradient well data are used to construct confidence intervals, a regulatory conservative approach is taken in that values that are marginally high relative to the rest of the data are retained unless there is

particular justification for excluding them. No additional outliers among downgradient wells were flagged during this analysis and previously flagged values were confirmed by visual screening. All flagged values may be seen on the Outlier Summary following this letter (Figure C).

Seasonality

When seasonal patterns are observed, data are deseasonalized so that the resulting limits will correctly account for the seasonality as a predictable pattern rather than random variation or a release. This procedure includes subtracting the seasonal mean from each value within a given season and adding the overall mean to each observation. Several Appendix IV constituents appear to have seasonal patterns for well AD-22. Therefore, all constituents evaluated with confidence intervals at this well were tested for seasonality using the Kruskal-Wallis test (Figure G). Appendix IV constituents with significant seasonality were beryllium, cadmium, cobalt, combined radium 226 + 228, fluoride, lithium, and selenium.

Interwell Upper Tolerance Limits

Upper tolerance limits were used to calculate background limits from pooled upgradient well data through October 2023 for Appendix IV parameters (Figure H). These limits are updated on an annual basis and will be updated again during the Fall 2024 sample event. Parametric tolerance limits are calculated, with a target of 95% confidence and 95% coverage, when data follow a normal or transformed-normal distribution. When data contained greater than 50% non-detects or did not follow a normal or transformed-normal distribution, non-parametric tolerance limits were constructed using the highest background measurement. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples.

Groundwater Protection Standards

These background limits were compared to the Maximum Contaminant Levels (MCLs) as shown in the Groundwater Protection Standard (GWPS) table following this letter to determine the highest limit for use as the GWPS in the Confidence Interval comparisons (Figure I).

Confidence Intervals

Confidence intervals were then constructed on downgradient wells with data through October 2023 for each of the Appendix IV parameters and then compared to the GWPS,

i.e., the highest limit of the MCL, or background limit as discussed above (Figure J). These intervals were constructed as either parametric or nonparametric confidence intervals depending on the data distribution and percentage of non-detects. When data followed a normal or transformed-normal distribution, parametric confidence intervals were used for Appendix IV parameters. Nonparametric confidence intervals were constructed when data did not follow a normal or transformed-normal distribution or when there were greater than 50% non-detects. The lower confidence limit, which is constructed with 99% confidence for parametric confidence intervals, is compared to the GWPS prepared as described above. The confidence level associated with nonparametric confidence intervals is dependent upon the number samples available.

Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. Complete graphical results of the confidence intervals follow this letter. Exceedances were identified for the following well/constituent pairs:

- Beryllium: AD-22
- Cobalt: AD-22
- Mercury: AD-33

Deseasonalized Confidence Intervals

Additional confidence intervals were constructed on deseasonalized data for constituents with detected seasonality in well AD-22 when at least one reported measurement was higher than the established GWPS for a given parameter. The constituents that met these criteria at well AD-22 are beryllium, cobalt, combined radium 226 + 228, and lithium. The results are included with the confidence intervals provided in Figure J. When reported measurements approach zero for deseasonalizing data, a constant is applied to each deseasonalized measurement. In the case of beryllium at AD-22, the deseasonalized confidence interval was run in ug/L. Deseasonalized confidence intervals may be found at the end of Figure J and the deseasonalized confidence intervals for beryllium and cobalt at well AD-22 also exceeded the respective GWPS.

Trend Test Evaluation

When confidence interval exceedances are identified in downgradient wells, data are further evaluated using the Sen's Slope/Mann Kendall trend test to determine whether concentrations are statistically increasing, decreasing, or stable at the 95% confidence level (Figure K). Utilizing the 95% confidence level for trend tests readily identifies significant trends and is more sensitive than the 99% confidence level without drastically

increasing the false negative rate. Upgradient wells are included in the trend analyses for all parameters found to exceed their confidence intervals in downgradient wells. When similar patterns exist upgradient of the site, it is an indication of variability in groundwater which may be unrelated to practices at the site. Statistically significant trends were identified for the following well/constituent pairs:

Increasing:

- Cobalt: AD-13 (upgradient)
- Mercury: AD-33

Decreasing:

- Beryllium: AD-12 (upgradient)

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Pirkey Stackout. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,



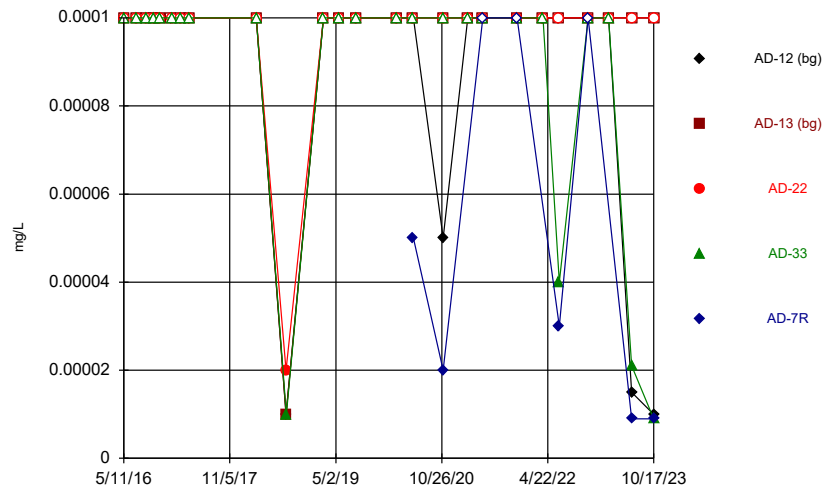
Andrew T. Collins
Project Manager



Kristina L. Rayner
Senior Statistician

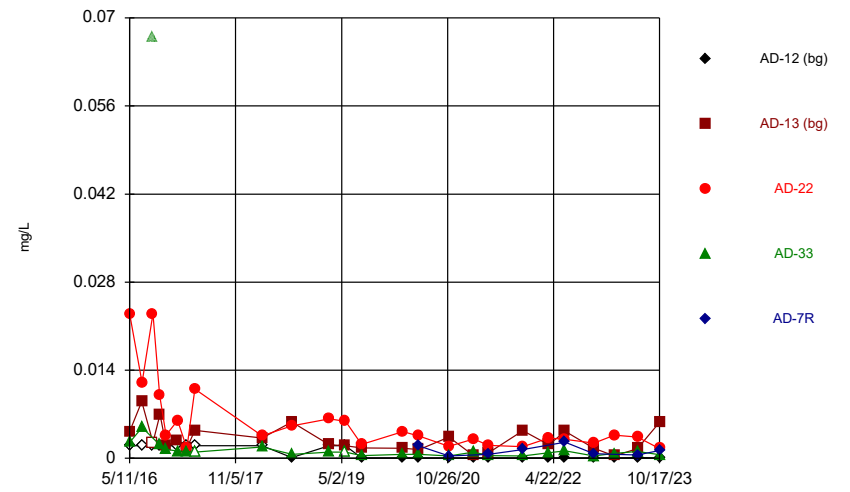
FIGURE A
Time Series

Time Series



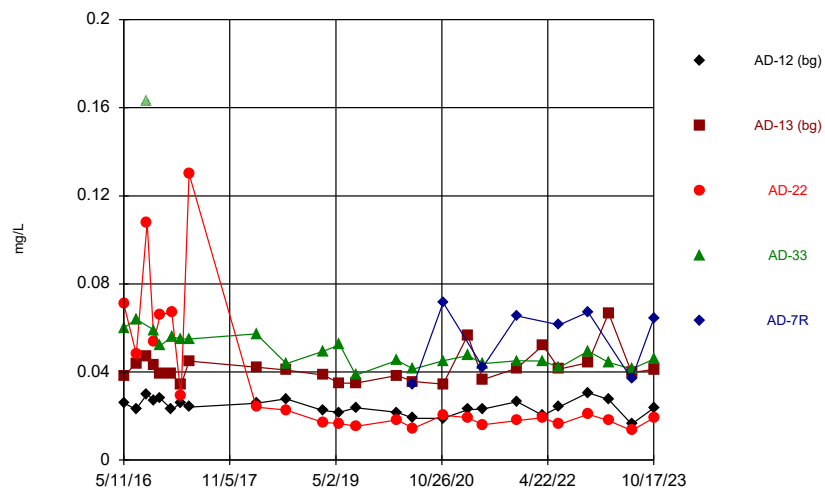
Constituent: Antimony, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



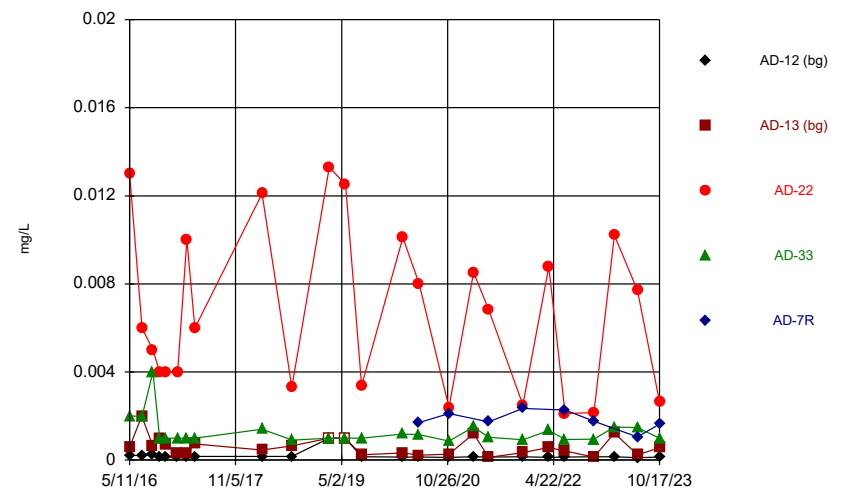
Constituent: Arsenic, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



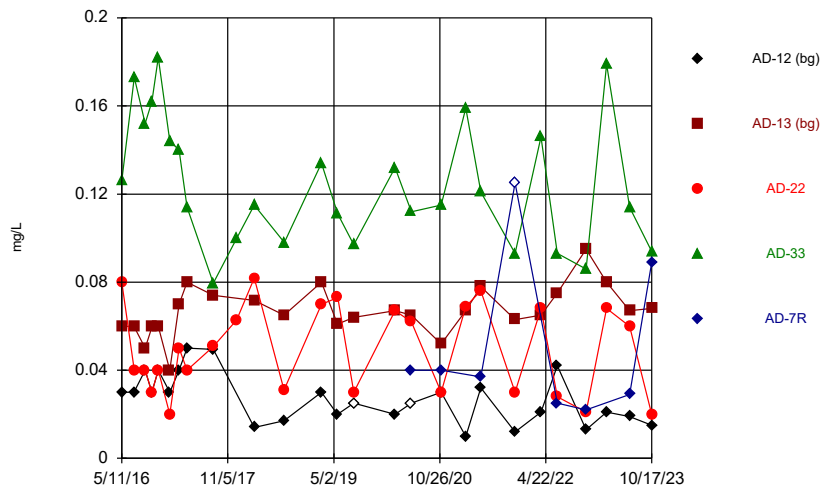
Constituent: Barium, total Analysis Run 1/3/2024 3:52 PM
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Time Series



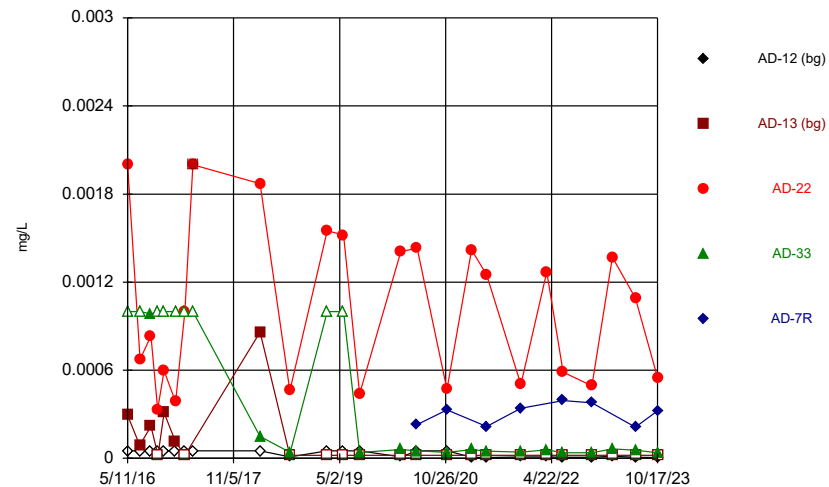
Constituent: Beryllium, total Analysis Run 1/3/2024 3:52 PM
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Time Series



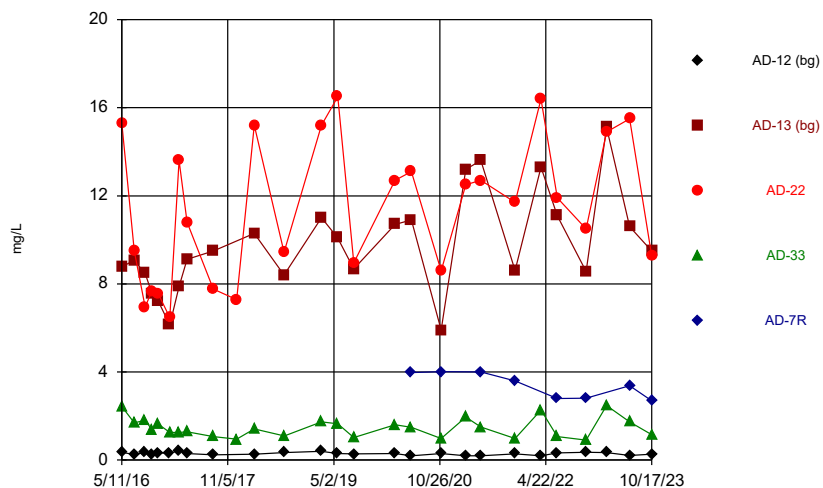
Constituent: Boron, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



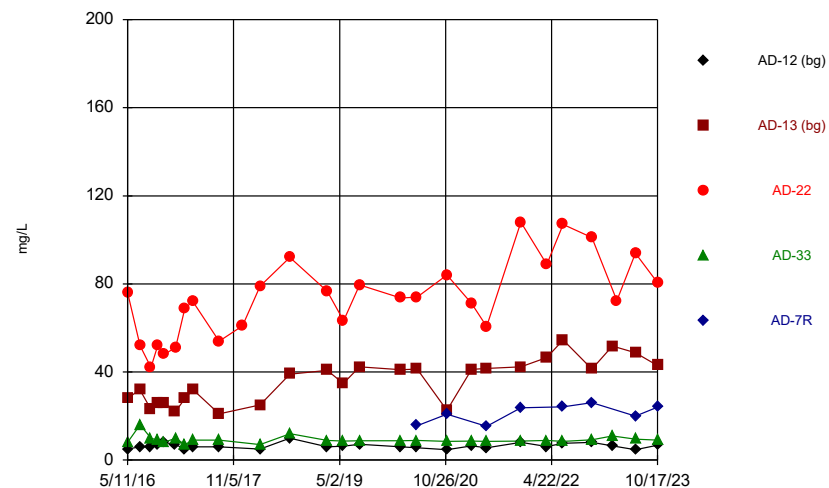
Constituent: Cadmium, total Analysis Run 1/3/2024 3:52 PM
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Time Series



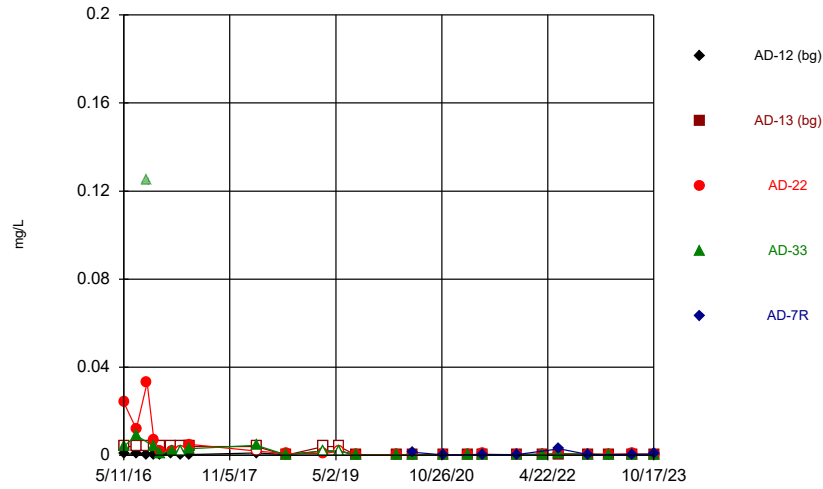
Constituent: Calcium, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



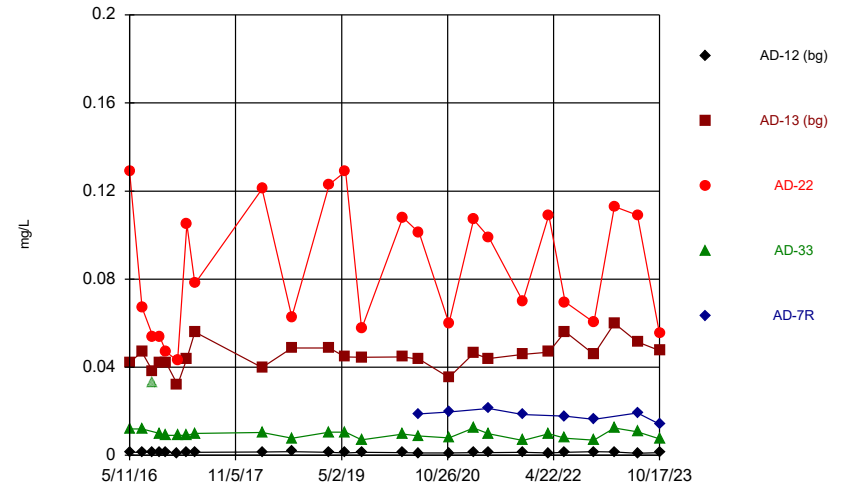
Constituent: Chloride, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



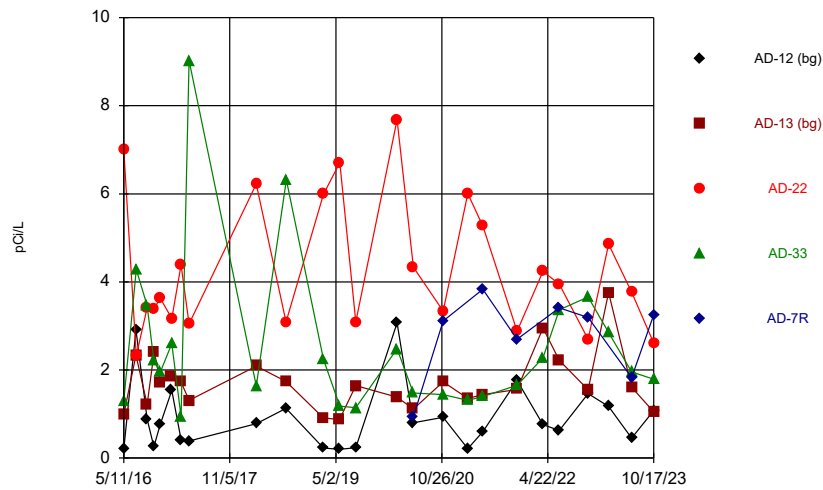
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Time Series



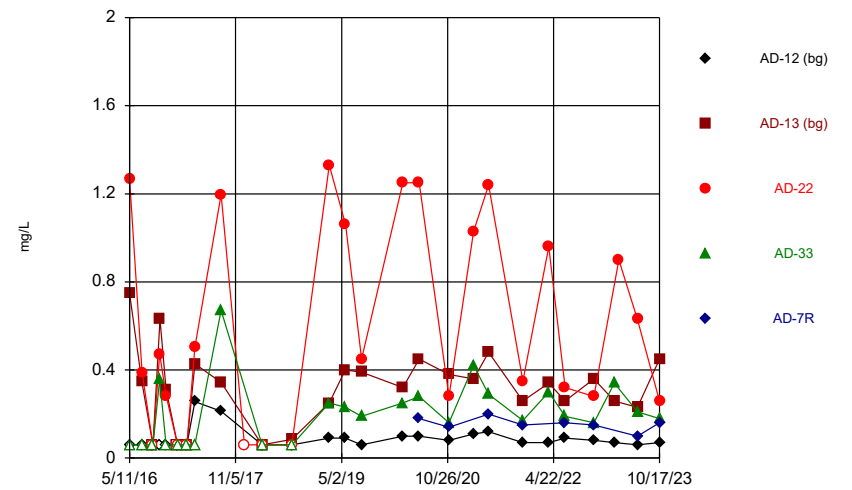
Constituent: Cobalt, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



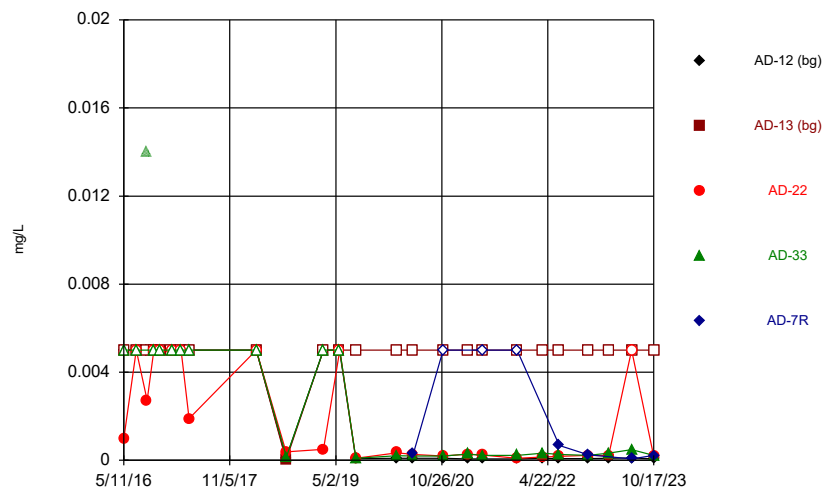
Constituent: Combined Radium 226 + 228 Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



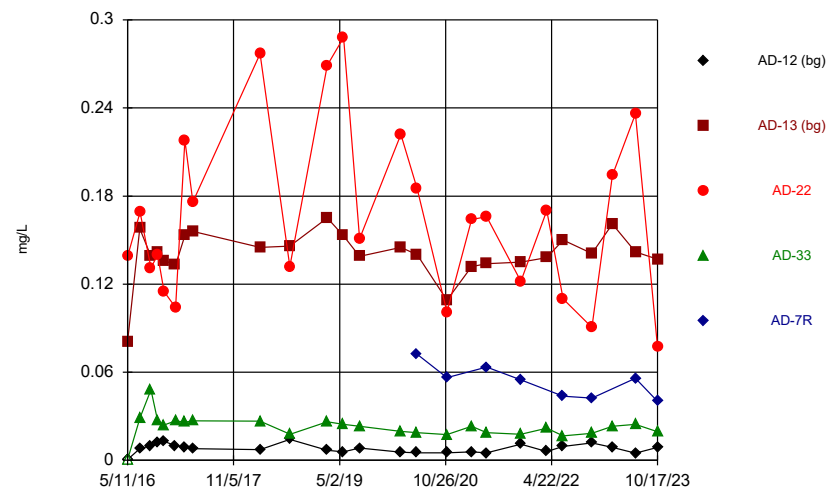
Constituent: Fluoride, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



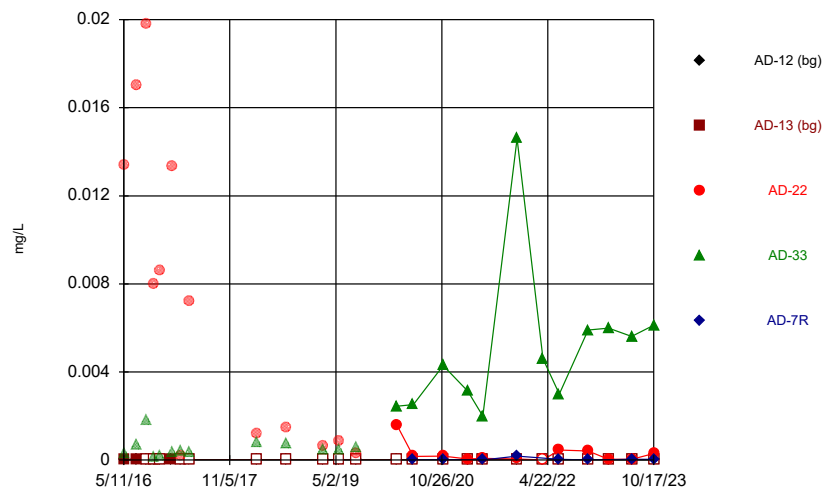
Constituent: Lead, total Analysis Run 1/3/2024 3:52 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



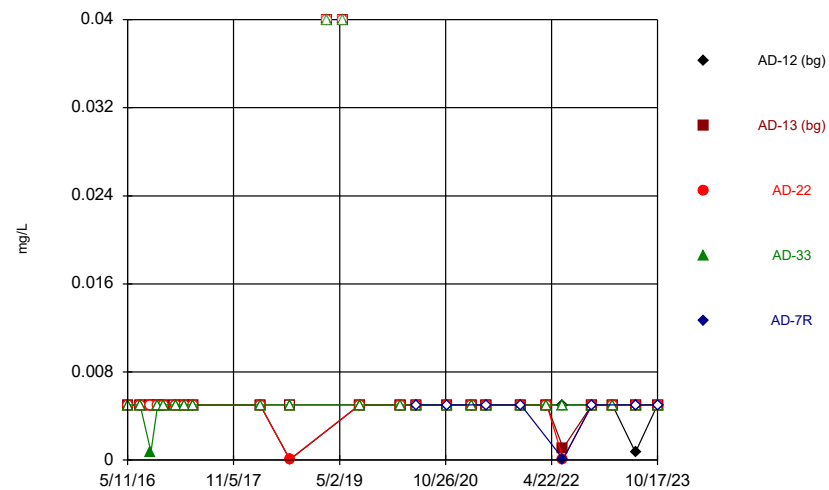
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



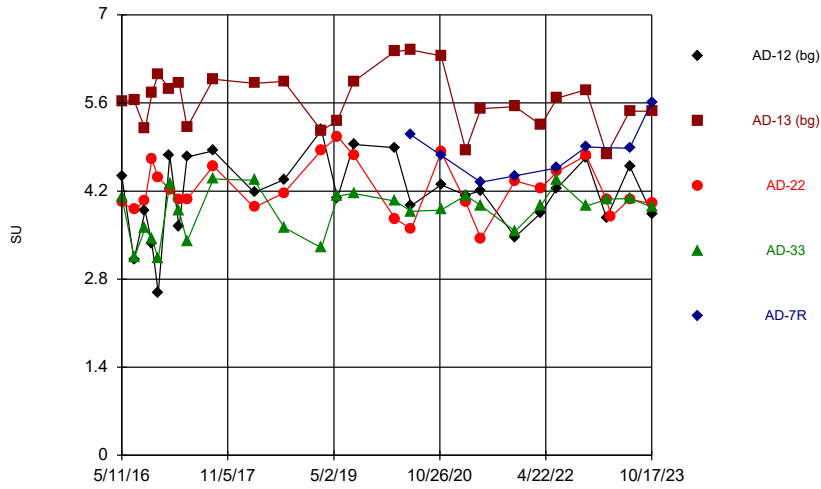
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Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



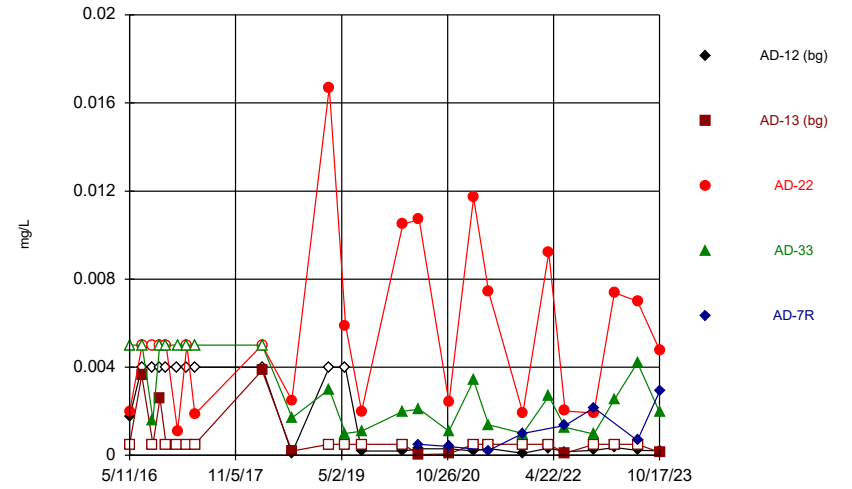
Constituent: Molybdenum, total Analysis Run 1/3/2024 3:53 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



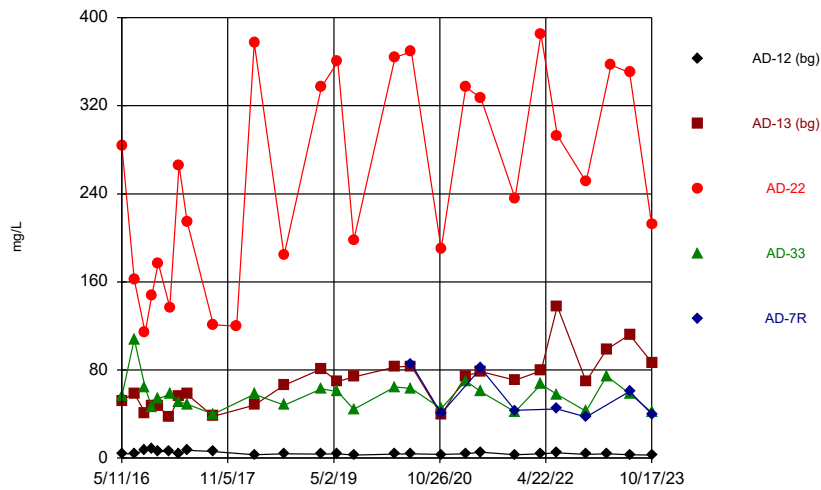
Constituent: pH, field Analysis Run 1/3/2024 3:53 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



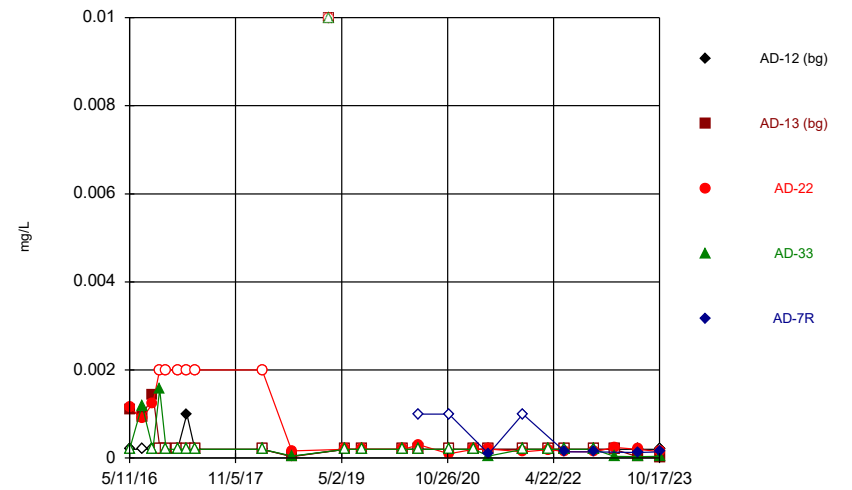
Constituent: Selenium, total Analysis Run 1/3/2024 3:53 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



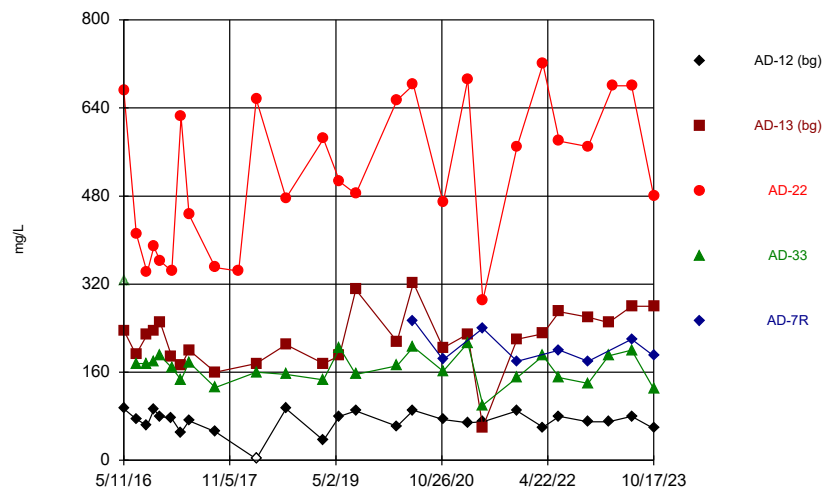
Constituent: Sulfate, total Analysis Run 1/3/2024 3:53 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Thallium, total Analysis Run 1/3/2024 3:53 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

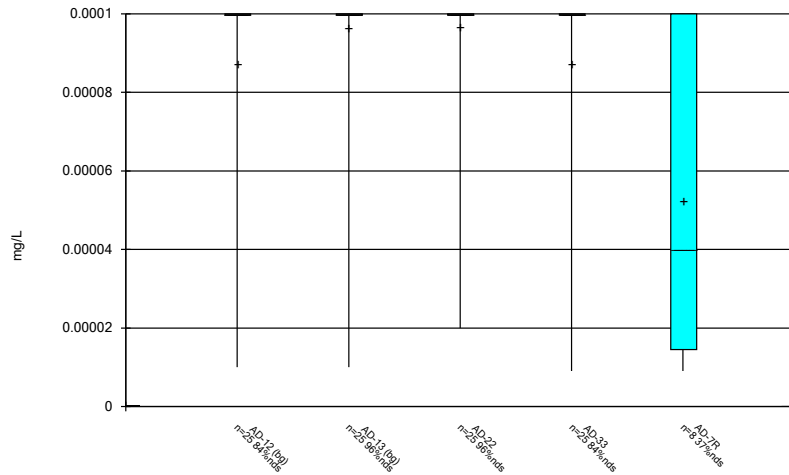
Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 1/3/2024 3:53 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

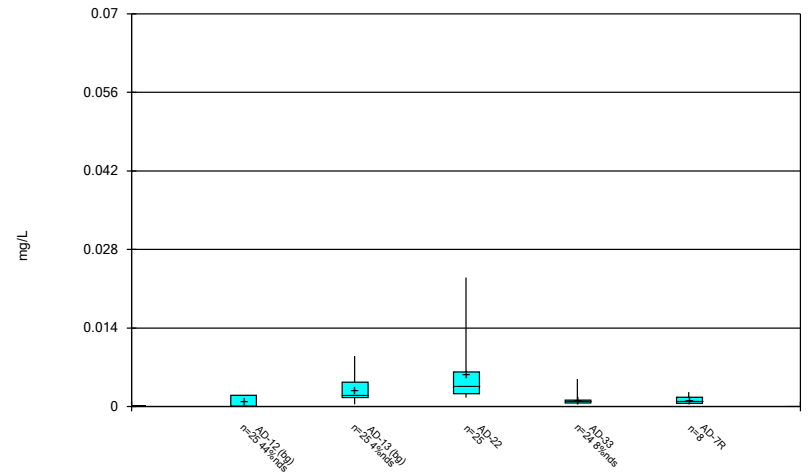
FIGURE B
Box Plots

Box & Whiskers Plot



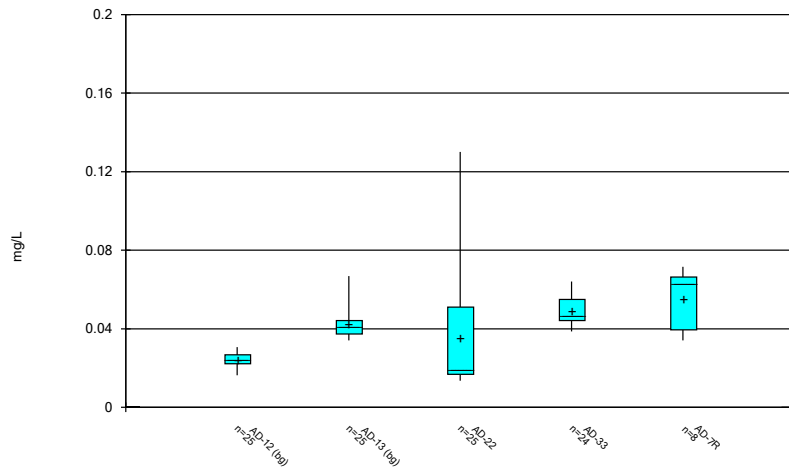
Constituent: Antimony, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



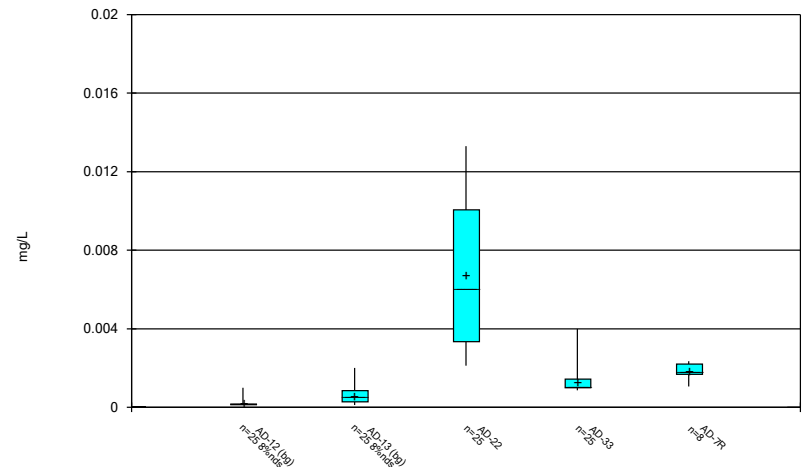
Constituent: Arsenic, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



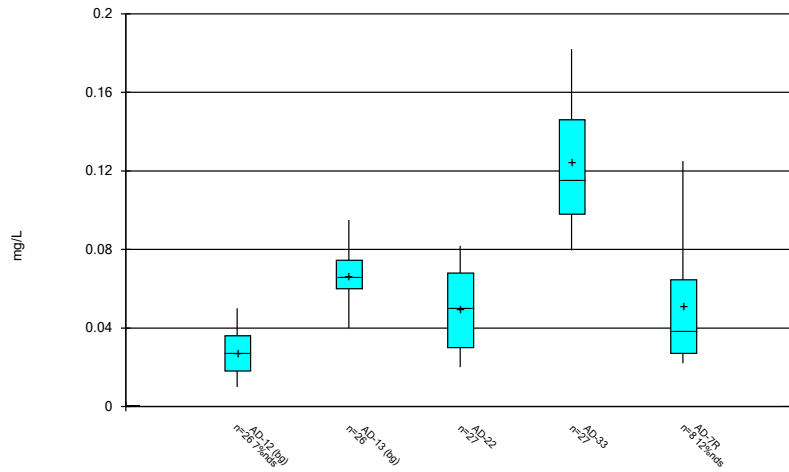
Constituent: Barium, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



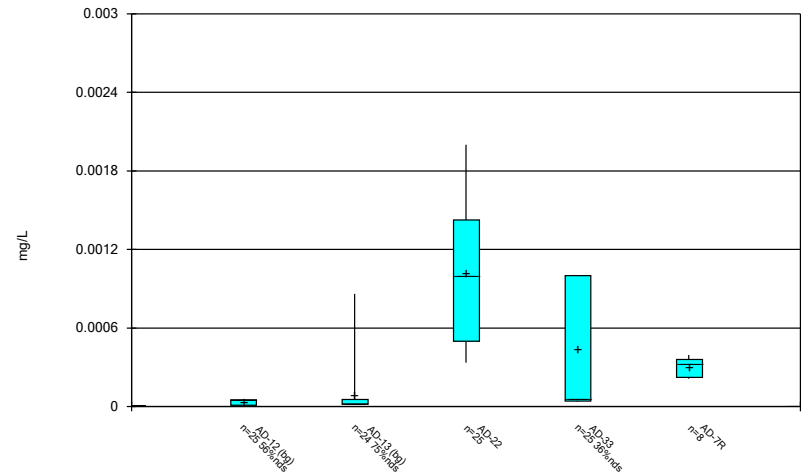
Constituent: Beryllium, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



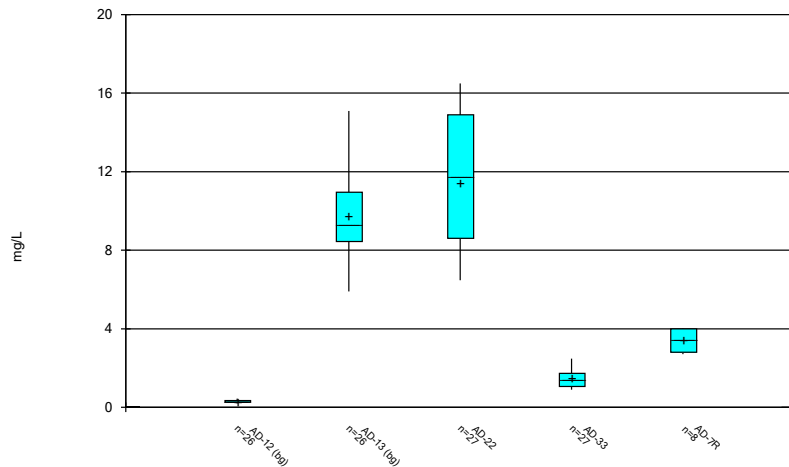
Constituent: Boron, total Analysis Run 1/3/2024 3:54 PM
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Box & Whiskers Plot



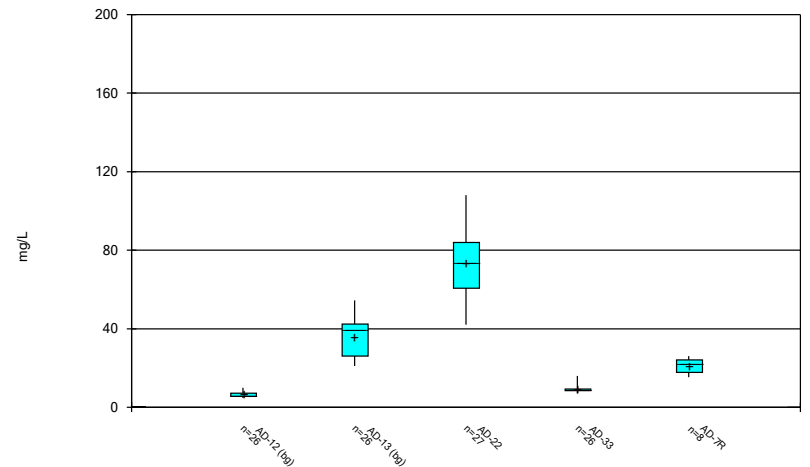
Constituent: Cadmium, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



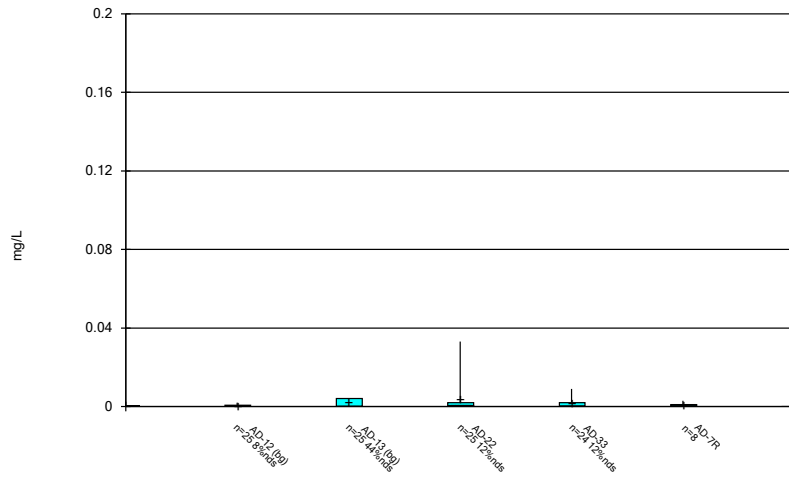
Constituent: Calcium, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



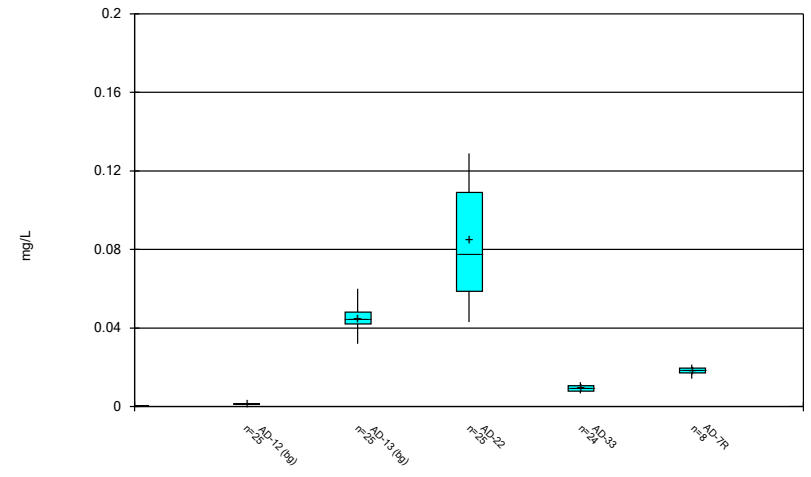
Constituent: Chloride, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



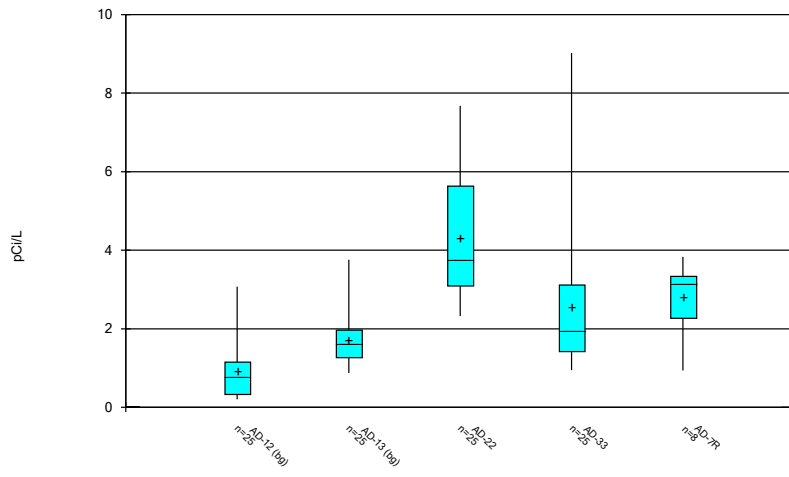
Constituent: Chromium, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



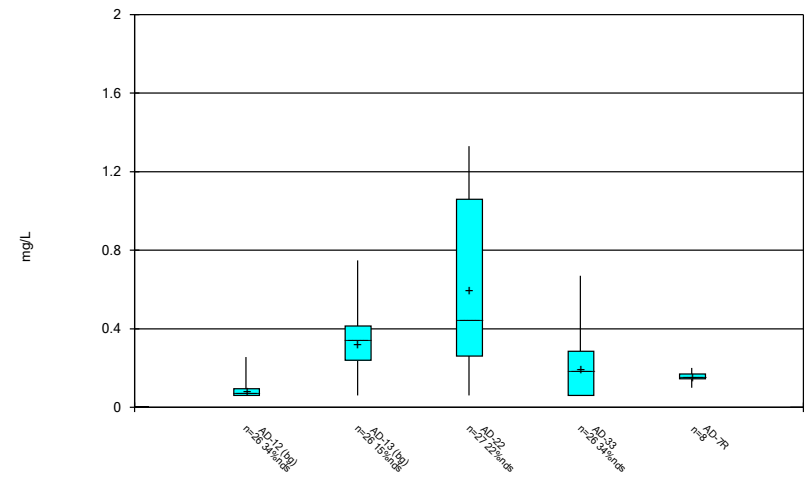
Constituent: Cobalt, total Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



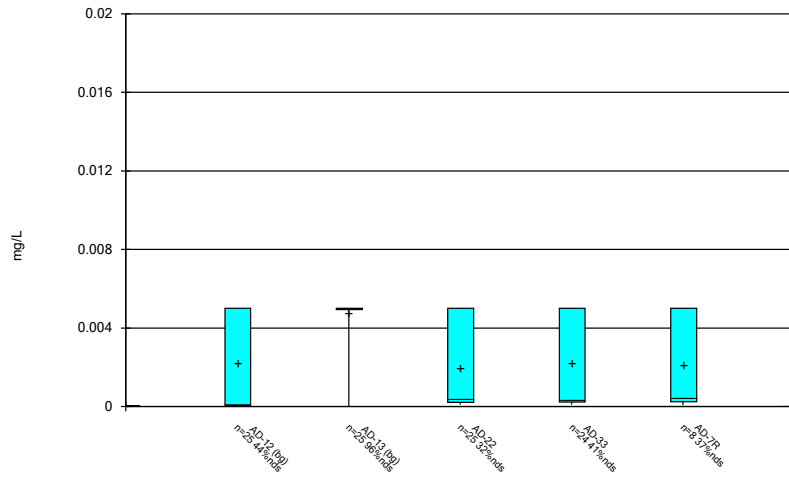
Constituent: Combined Radium 226 + 228 Analysis Run 1/3/2024 3:54 PM
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



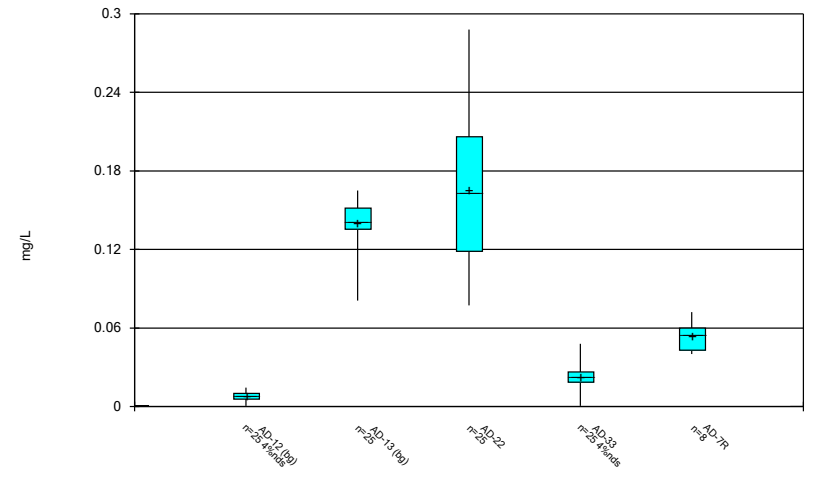
Constituent: Fluoride, total Analysis Run 1/3/2024 3:54 PM
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Box & Whiskers Plot



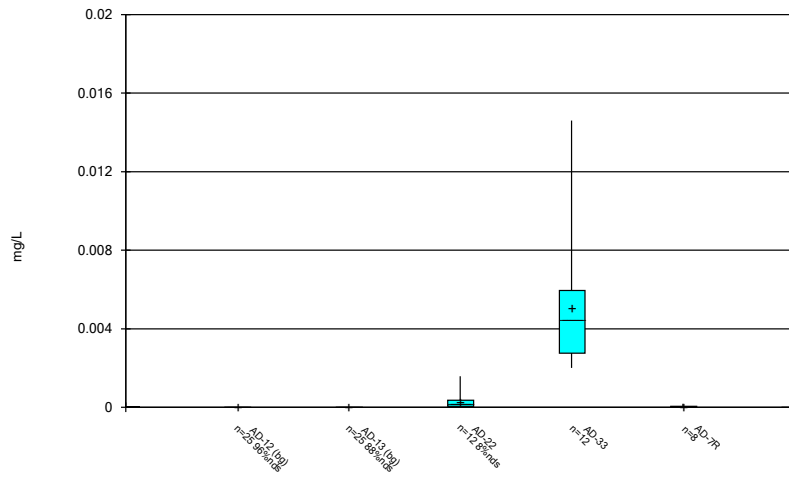
Constituent: Lead, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



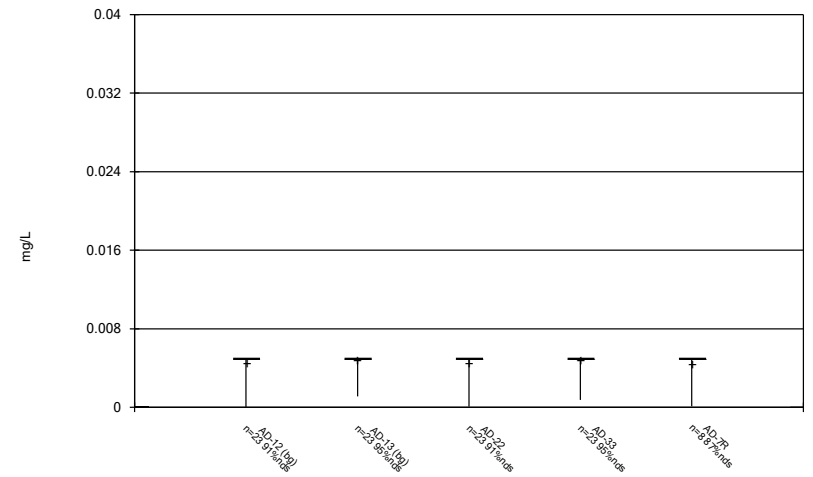
Constituent: Lithium, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



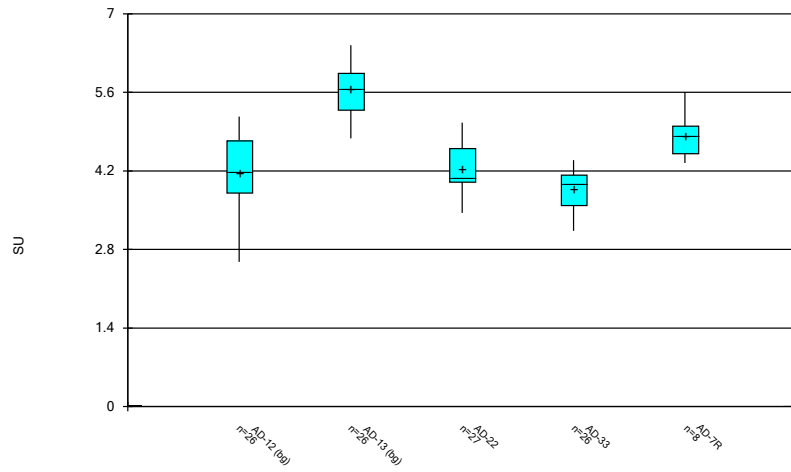
Constituent: Mercury, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



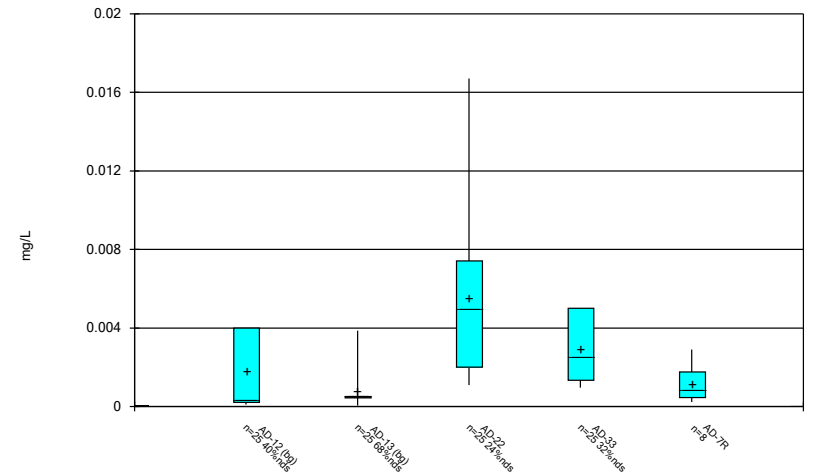
Constituent: Molybdenum, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



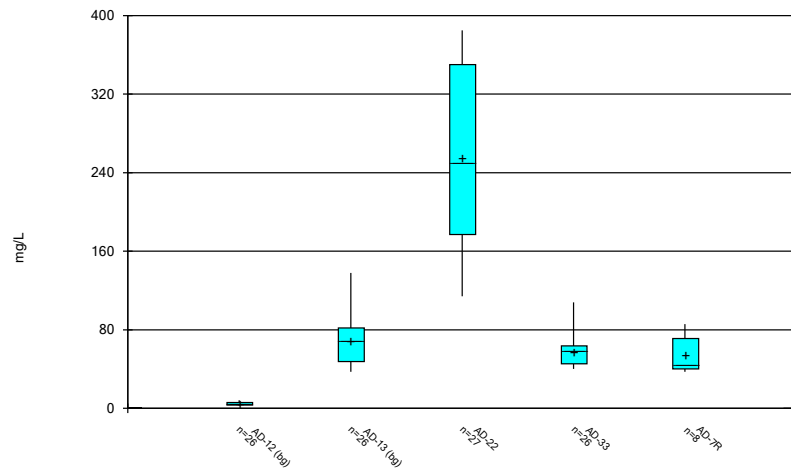
Constituent: pH, field Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



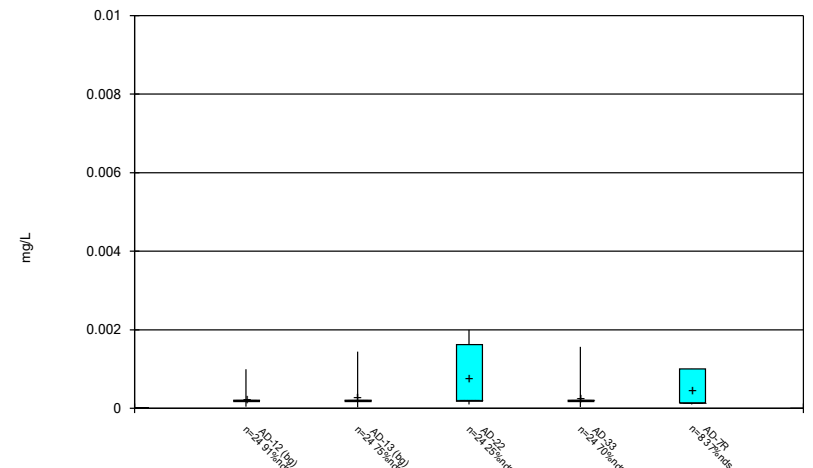
Constituent: Selenium, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



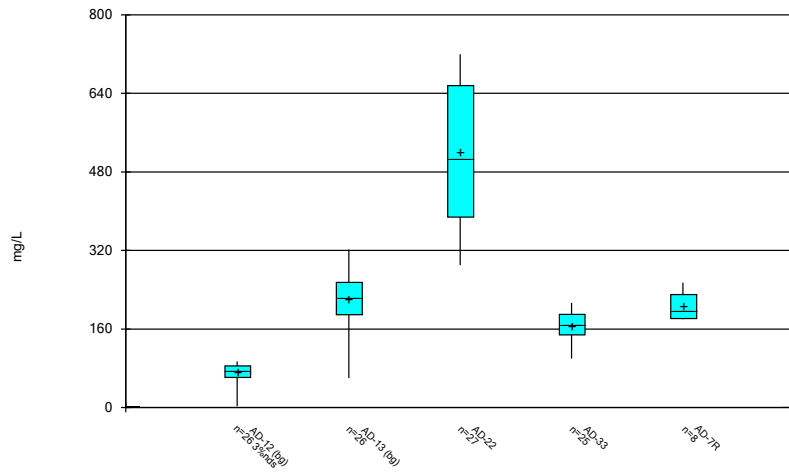
Constituent: Sulfate, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 1/3/2024 3:54 PM
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Box & Whiskers Plot



Constituent: Total Dissolved Solids [TDS] Analysis Run 1/3/2024 3:54 PM

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE C

Outlier Summary and Tukey's Outlier Test

Outlier Summary

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 4:12 PM

	AD-33 Arsenic, total (mg/L)	AD-33 Barium, total (mg/L)	AD-13 Cadmium, total (mg/L)	AD-33 Chromium, total (mg/L)	AD-33 Cobalt, total (mg/L)	AD-33 Lead, total (mg/L)	AD-12 Molybdenum, total (mg/L)	AD-13 Molybdenum, total (mg/L)	AD-22 Molybdenum, total (mg/L)	AD-33 Molybdenum, total (mg/L)
5/11/2016										
9/7/2016	0.067 (o)	0.163 (o)		0.125 (o)	0.033 (o)	0.014 (o)				
4/11/2017			0.002 (o)							
2/27/2019							<0.04 (o)	<0.04 (o)	<0.04 (o)	<0.04 (o)
5/21/2019							<0.04 (o)	<0.04 (o)		
5/22/2019									<0.04 (o)	<0.04 (o)

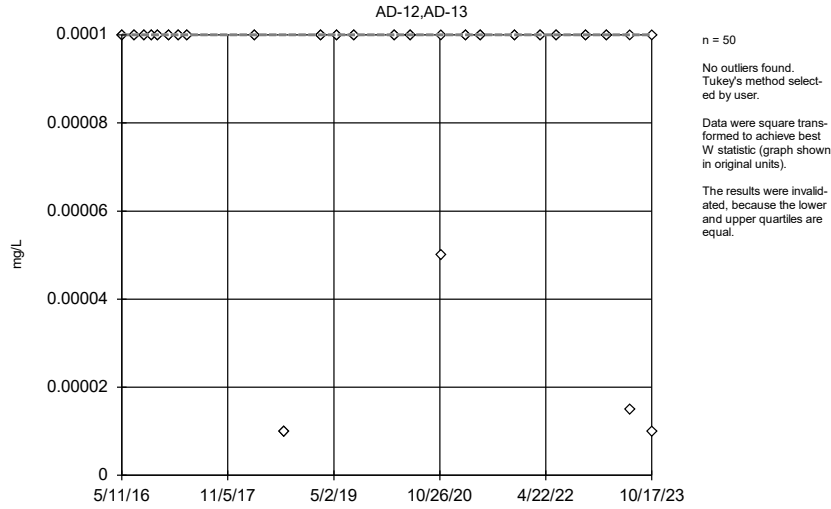
	AD-12 Thallium, total (mg/L)	AD-13 Thallium, total (mg/L)	AD-22 Thallium, total (mg/L)	AD-33 Thallium, total (mg/L)	AD-33 Total Dissolved Solids [TDS] (mg/L)
5/11/2016					326 (o)
9/7/2016					
4/11/2017					
2/27/2019	<0.01 (o)	<0.01 (o)	<0.01 (o)	<0.01 (o)	
5/21/2019					
5/22/2019					

Tukey's Outlier Test - Upgradient Wells - All Results (No Significant)

Pirkey Stackout Data: Pirkey Stackout Printed 1/5/2024, 6:22 PM

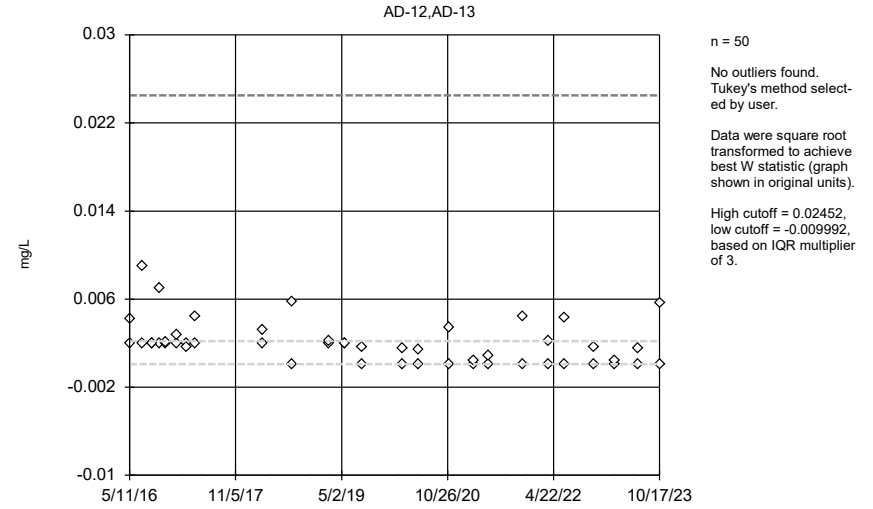
Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	50	0.0000919	0.00002505	unknown	ShapiroFrancia
Arsenic, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.001979	0.001955	sqrt(x)	ShapiroFrancia
Barium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.03305	0.0107	ln(x)	ShapiroFrancia
Beryllium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.0004139	0.0003984	ln(x)	ShapiroFrancia
Boron, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	52	0.04699	0.02291	normal	ShapiroFrancia
Cadmium, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	50	0.00009232	0.0003057	unknown	ShapiroFrancia
Chloride, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	52	21.2	16.47	x^(1/3)	ShapiroFrancia
Chromium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.001295	0.001629	ln(x)	ShapiroFrancia
Cobalt, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.02341	0.02274	x^3	ShapiroFrancia
Combined Radium 226 + 228 (pCi/L)	AD-12,AD-13	No	n/a	NP	NaN	50	1.308	0.8113	sqrt(x)	ShapiroFrancia
Fluoride, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	52	0.2037	0.1704	ln(x)	ShapiroFrancia
Lead, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.003524	0.002278	ln(x)	ShapiroFrancia
Lithium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.07421	0.06793	x^4	ShapiroFrancia
Mercury, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	50	0.00005599	0.000002424	unknown	ShapiroFrancia
Molybdenum, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	50	0.004737	0.001058	unknown	ShapiroFrancia
Selenium, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	50	0.0005819	0.0007643	ln(x)	ShapiroFrancia
Sulfate, total (mg/L)	AD-12,AD-13	No	n/a	NP	NaN	52	36.54	36.57	sqrt(x)	ShapiroFrancia
Thallium, total (mg/L)	AD-12,AD-13	n/a	n/a	NP	NaN	50	0.00026	0.0002664	unknown	ShapiroFrancia

Tukey's Outlier Screening, Pooled Background



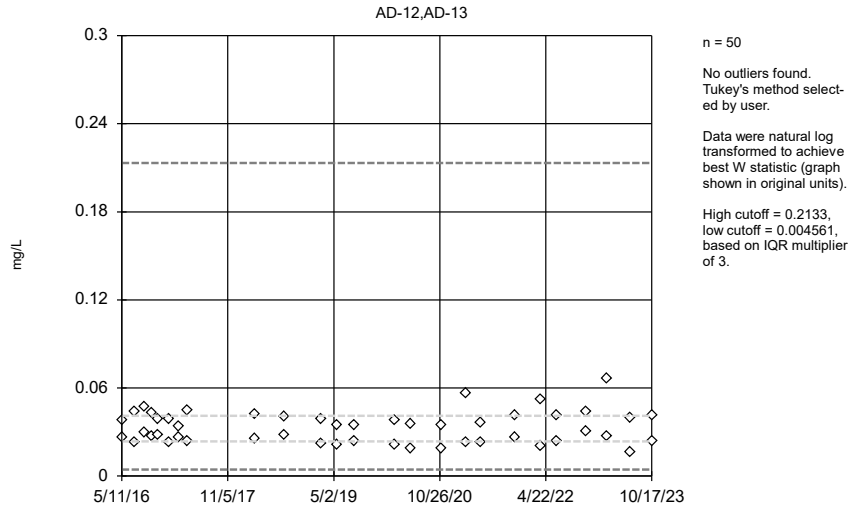
Constituent: Antimony, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background



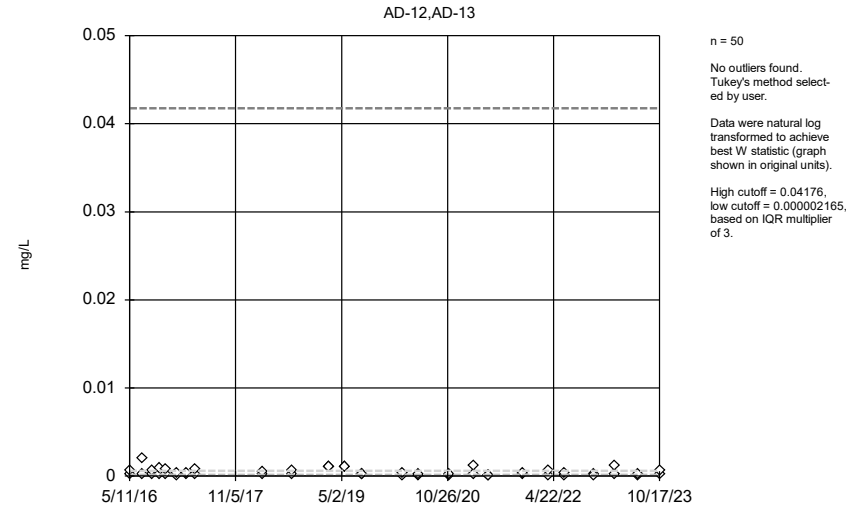
Constituent: Arsenic, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background



Constituent: Barium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

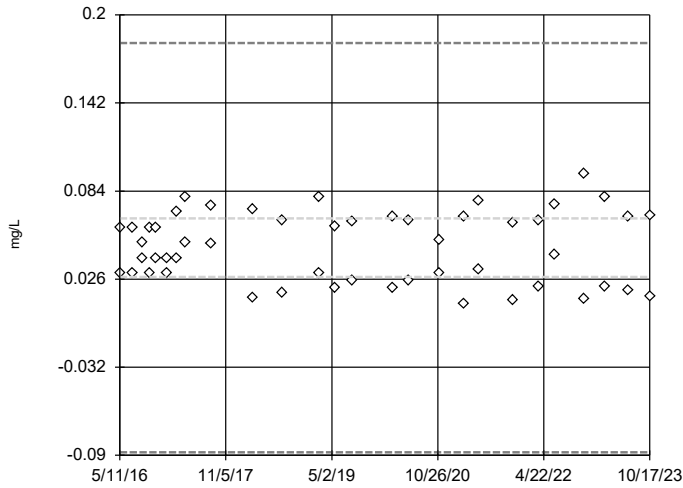
Tukey's Outlier Screening, Pooled Background



Constituent: Beryllium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

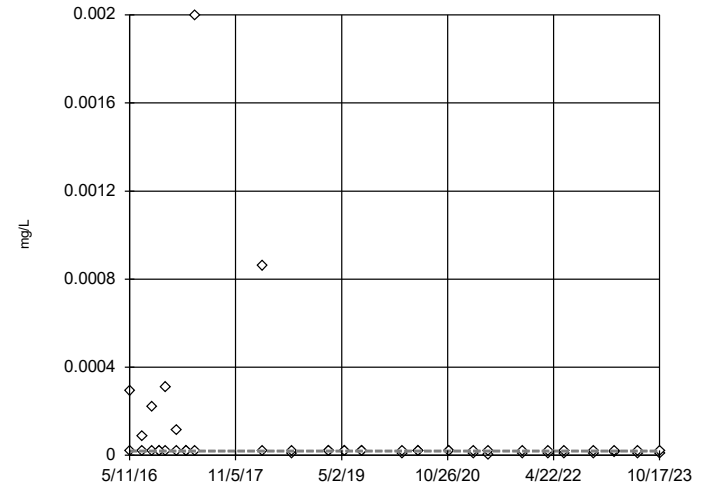


n = 52
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.1815,
 low cutoff = -0.088, based on IQR multiplier of 3.

Constituent: Boron, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

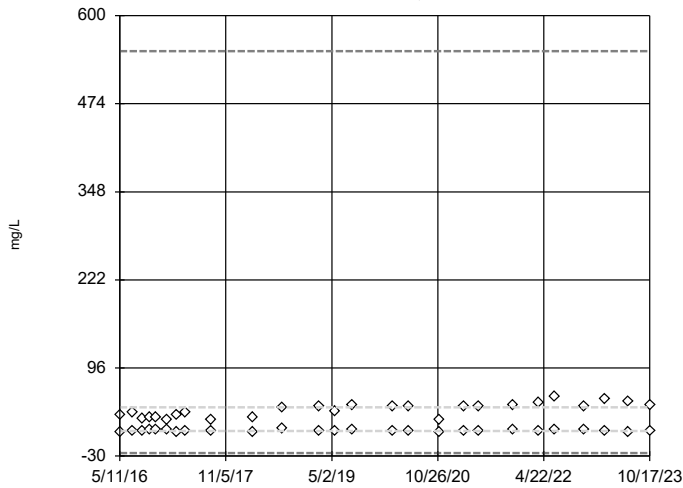


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Cadmium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

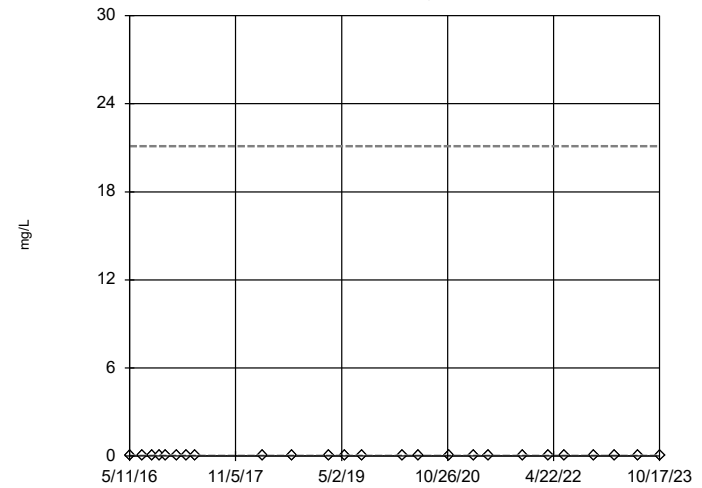


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 549.2, low cutoff = -25.57, based on IQR multiplier of 3.

Constituent: Chloride, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

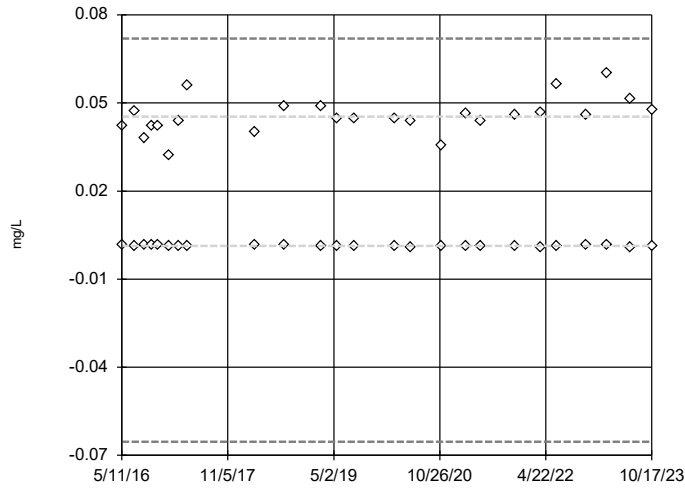


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 21.1, low cutoff = 4.4e-8, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

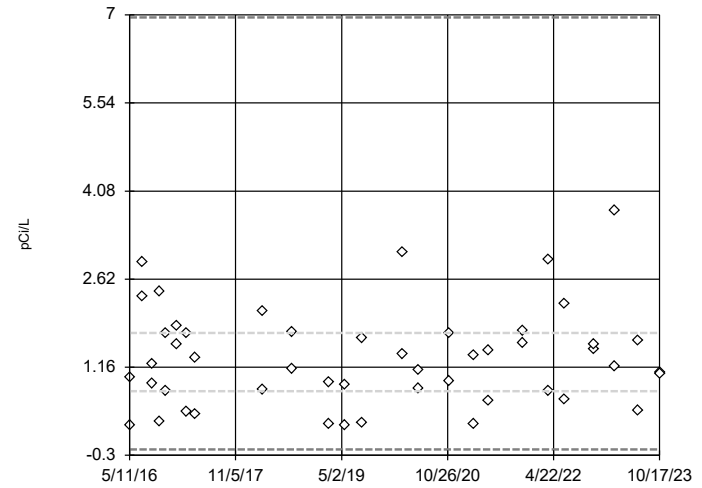


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.07192, low cutoff = -0.06534, based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

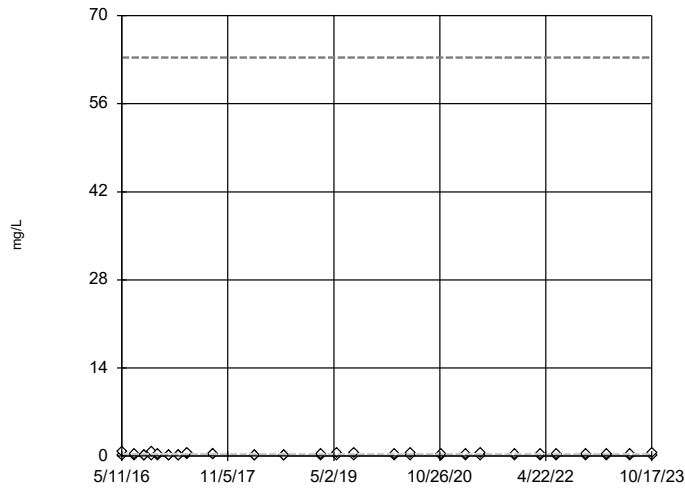


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.957, low cutoff = -0.2016, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

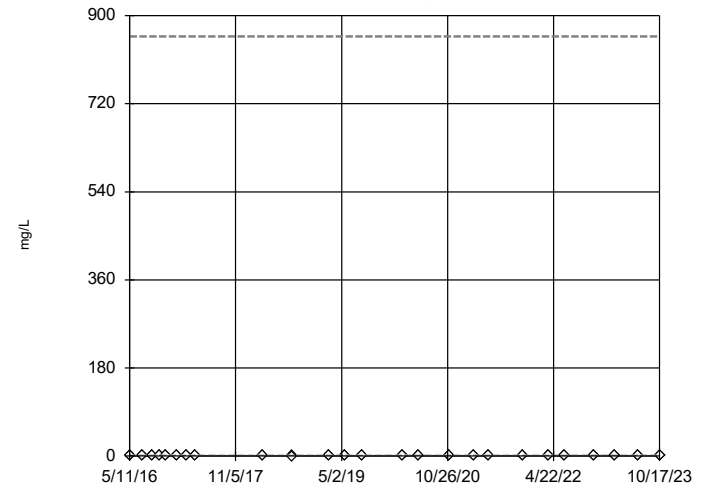


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 63.33, low cutoff = 0.000324, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

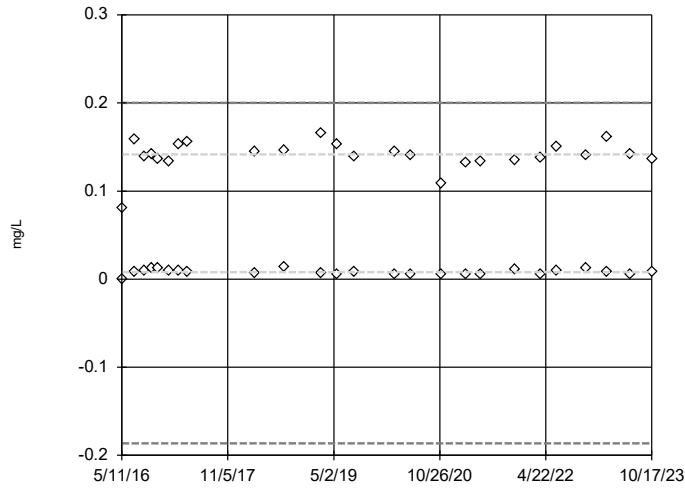


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 857.3, low cutoff = 5.2e-10, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

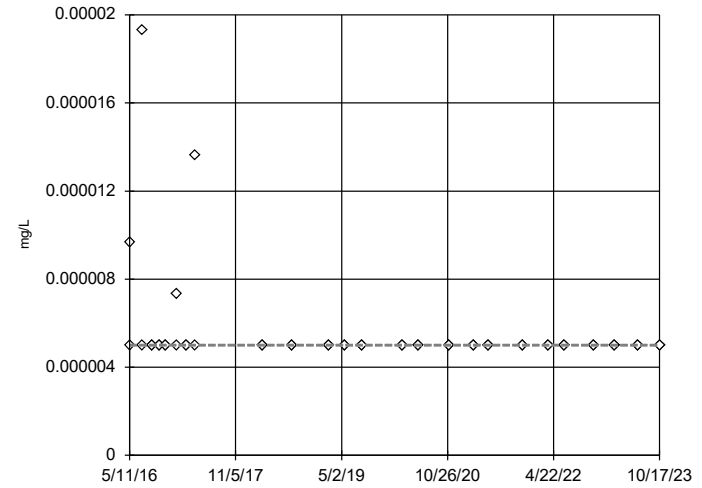


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were x*4 transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.2001,
 low cutoff = -0.1862,
 based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

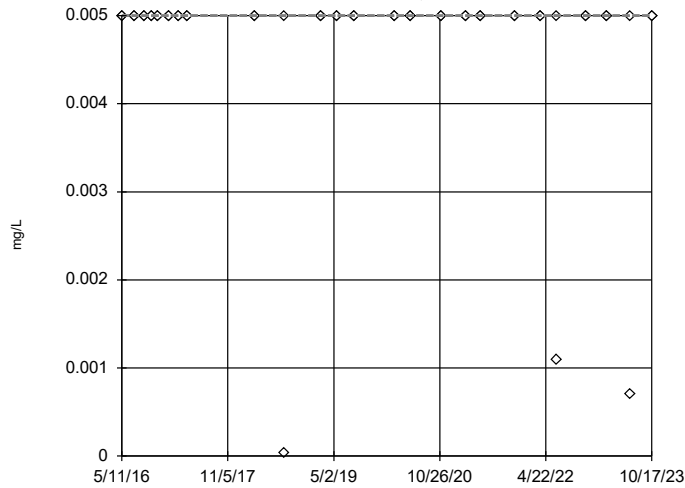


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

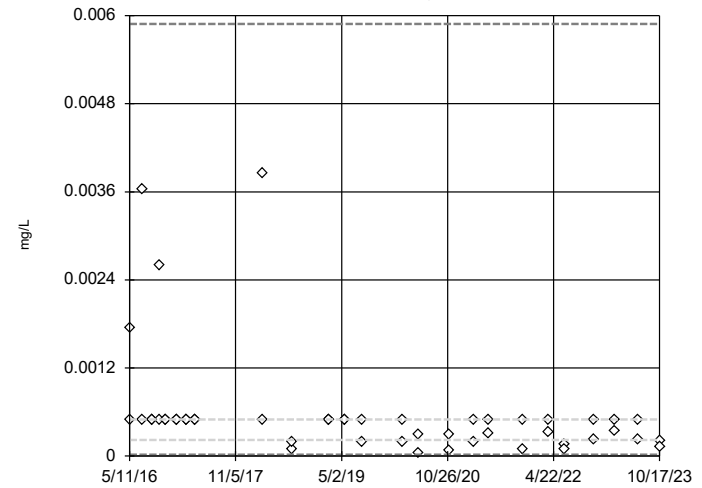


n = 50
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Molybdenum, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

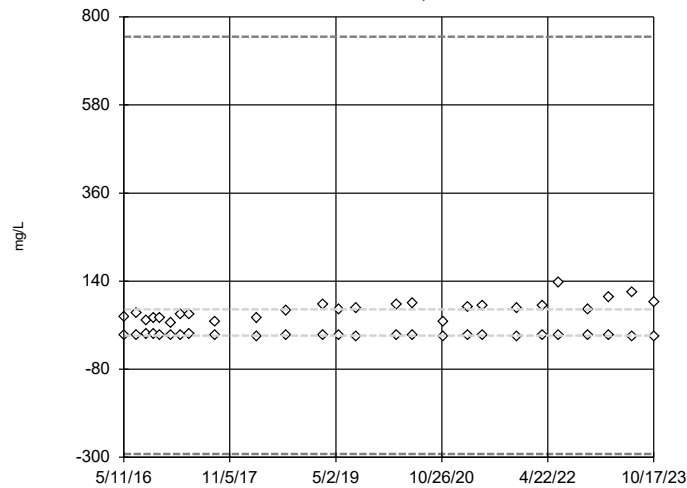


n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.005888,
 low cutoff = 0.00001866,
 based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13

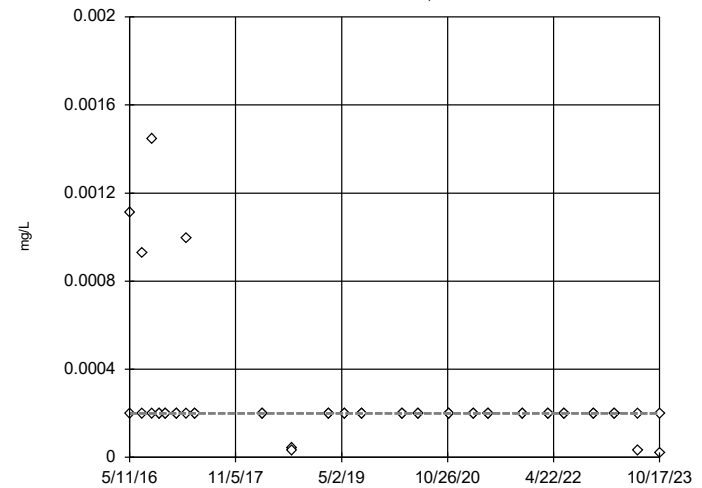


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 750.6, low cutoff = -291.4, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

Tukey's Outlier Screening, Pooled Background

AD-12,AD-13



n = 50
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Thallium, total Analysis Run 1/5/2024 6:21 PM View: Outliers Upgradient
 Pirkey Stackout Data: Pirkey Stackout

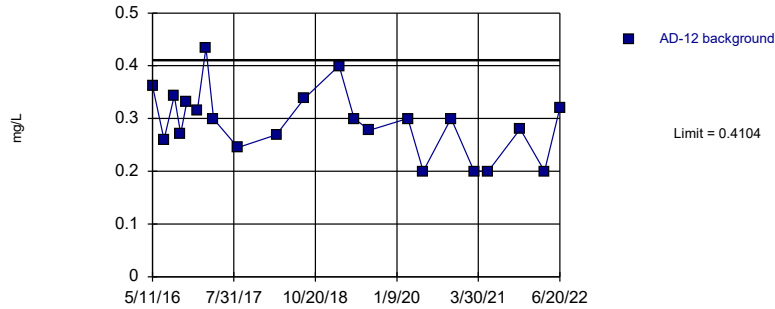
FIGURE D
Intrawell PLs

Appendix III Intrawell Prediction Limits - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 6:33 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium, total (mg/L)	AD-12	0.4104	n/a	n/a	1 future	n/a	22	0.293	0.06283	0	None	No	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-13	13.49	n/a	n/a	1 future	n/a	22	9.522	2.124	0	None	No	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-33	2.221	n/a	n/a	1 future	n/a	23	1.459	0.4105	0	None	No	0.002505	Param Intra 1 of 2
pH, field (SU)	AD-12	5.345	2.945	n/a	1 future	n/a	22	4.145	0.6423	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-13	6.507	4.905	n/a	1 future	n/a	22	5.706	0.4284	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-33	4.598	3.112	n/a	1 future	n/a	22	3.855	0.3975	0	None	No	0.001253	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-12	100.3	n/a	n/a	1 future	n/a	22	5424	2481	4.545	None	x^2	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-13	312.6	n/a	n/a	1 future	n/a	22	212.5	53.58	0	None	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-33	217	n/a	n/a	1 future	n/a	21	167.2	26.49	0	None	No	0.002505	Param Intra 1 of 2

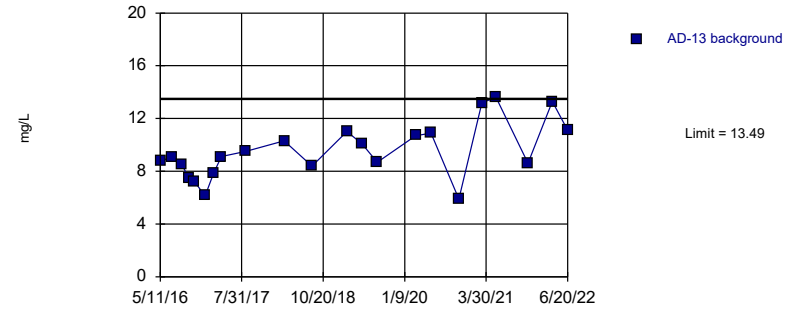
Prediction Limit
Intrawell Parametric, AD-12 (bg)



Background Data Summary: Mean=0.293, Std. Dev.=0.06283, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9534, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 1/3/2024 6:31 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

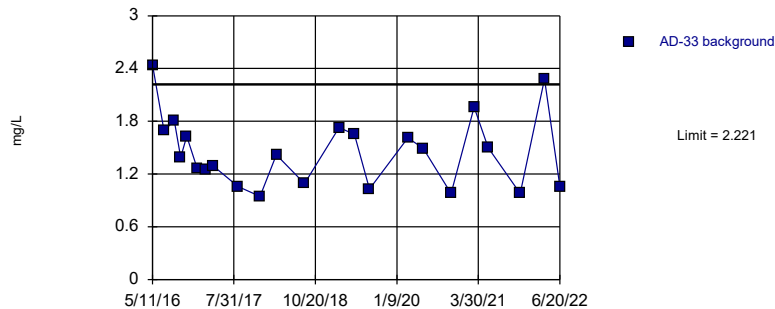
Prediction Limit
Intrawell Parametric, AD-13 (bg)



Background Data Summary: Mean=9.522, Std. Dev.=2.124, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9578, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 1/3/2024 6:31 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

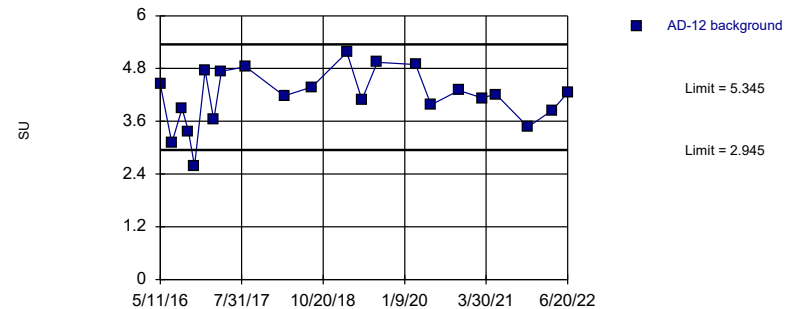
Prediction Limit
Intrawell Parametric, AD-33



Background Data Summary: Mean=1.459, Std. Dev.=0.4105, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9284, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 1/3/2024 6:31 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

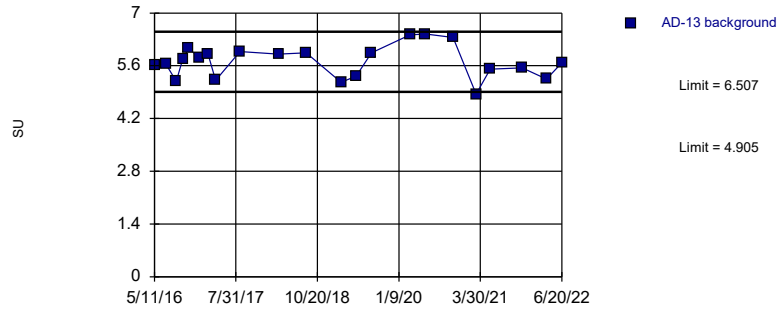
Prediction Limit
Intrawell Parametric, AD-12 (bg)



Background Data Summary: Mean=4.145, Std. Dev.=0.6423, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9666, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 1/3/2024 6:31 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

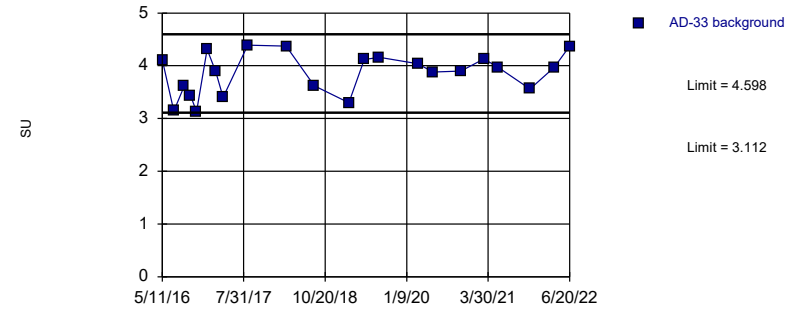
Prediction Limit
Intrawell Parametric, AD-13 (bg)



Background Data Summary: Mean=5.706, Std. Dev.=0.4284, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9693, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 1/3/2024 6:31 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

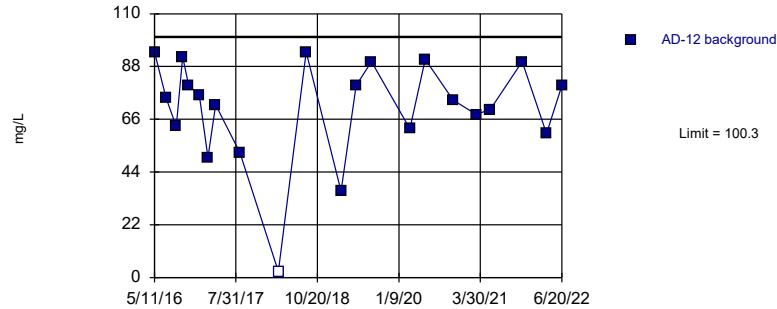
Prediction Limit
Intrawell Parametric, AD-33



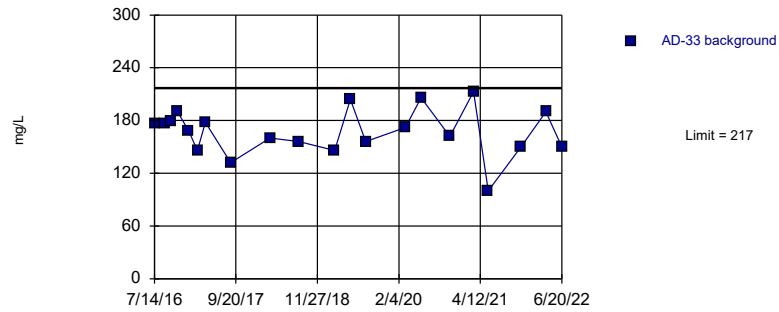
Background Data Summary: Mean=3.855, Std. Dev.=0.3975, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9336, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 1/3/2024 6:31 PM View: Intrawell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit
Intrawell Parametric, AD-12 (bg)



Prediction Limit Intrawell Parametric, AD-33

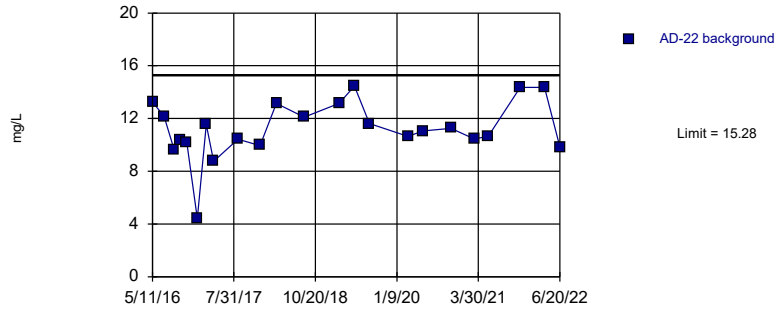


Appendix III Intrawell Prediction Limits - Deseasonalized Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 6:34 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Calcium, total (mg/L)	AD-22	15.28	n/a	n/a	1 future	n/a	23	11.21	2.192	0	None	No	0.002505	Param Intra 1 of 2 Deseas
pH, field (SU)	AD-22	5.002	3.507	n/a	1 future	n/a	22	4.255	0.3999	0	None	No	0.001253	Param Intra 1 of 2 Deseas
Total Dissolved Solids [TDS] (mg/L)	AD-22	715.9	n/a	n/a	1 future	n/a	23	506.3	112.9	0	None	No	0.002505	Param Intra 1 of 2 Deseas

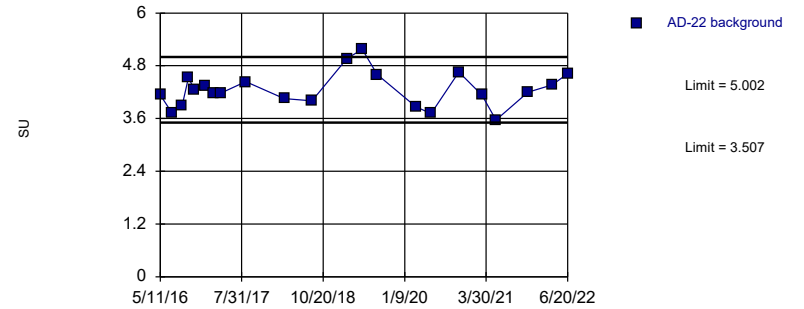
Prediction Limit Intrawell Parametric, AD-22



Background Data Summary: Mean=11.21, Std. Dev.=2.192, n=23. Data were deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.903, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 1/3/2024 6:34 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

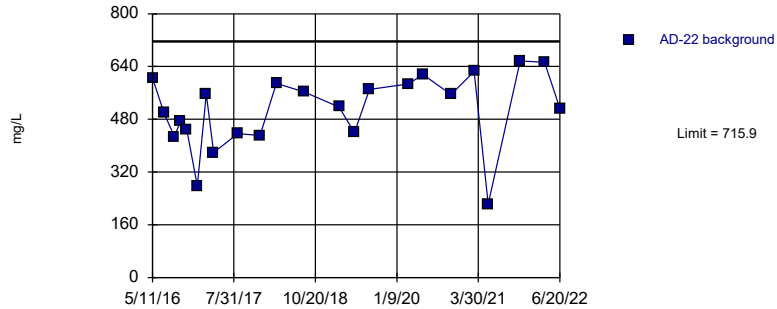
Prediction Limit Intrawell Parametric, AD-22



Background Data Summary: Mean=4.255, Std. Dev.=0.3999, n=22. Data were deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9767, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 1/3/2024 6:34 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit Intrawell Parametric, AD-22



Background Data Summary: Mean=506.3, Std. Dev.=112.9, n=23. Data were deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9294, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 1/3/2024 6:34 PM View: Intrawell
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE E
Upgradient Trend Tests

Trend Tests - Upgradient Wells - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 6:37 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Alpha</u>	<u>Method</u>
Chloride, total (mg/L)	AD-13 (bg)	3.272	201	118	Yes	26	0	n/a	0.01	NP
Sulfate, total (mg/L)	AD-12 (bg)	-0.2267	-142	-118	Yes	26	0	n/a	0.01	NP
Sulfate, total (mg/L)	AD-13 (bg)	6.675	186	118	Yes	26	0	n/a	0.01	NP

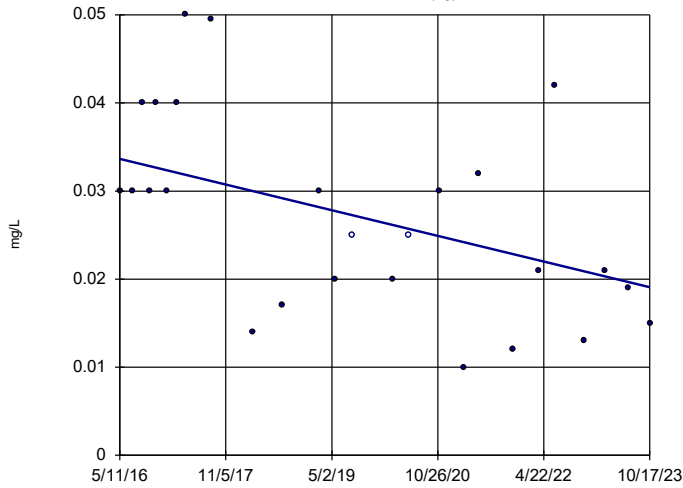
Trend Tests - Upgradient Wells - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 6:37 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Alpha</u>	<u>Method</u>
Boron, total (mg/L)	AD-12 (bg)	-0.001957	-104	-118	No	26	7.692	n/a	0.01	NP
Boron, total (mg/L)	AD-13 (bg)	0.00145	112	118	No	26	0	n/a	0.01	NP
Chloride, total (mg/L)	AD-12 (bg)	0.0425	45	118	No	26	0	n/a	0.01	NP
Chloride, total (mg/L)	AD-13 (bg)	3.272	201	118	Yes	26	0	n/a	0.01	NP
Fluoride, total (mg/L)	AD-12 (bg)	0.001344	67	118	No	26	34.62	n/a	0.01	NP
Fluoride, total (mg/L)	AD-13 (bg)	0	8	118	No	26	15.38	n/a	0.01	NP
Sulfate, total (mg/L)	AD-12 (bg)	-0.2267	-142	-118	Yes	26	0	n/a	0.01	NP
Sulfate, total (mg/L)	AD-13 (bg)	6.675	186	118	Yes	26	0	n/a	0.01	NP

Sen's Slope Estimator

AD-12 (bg)

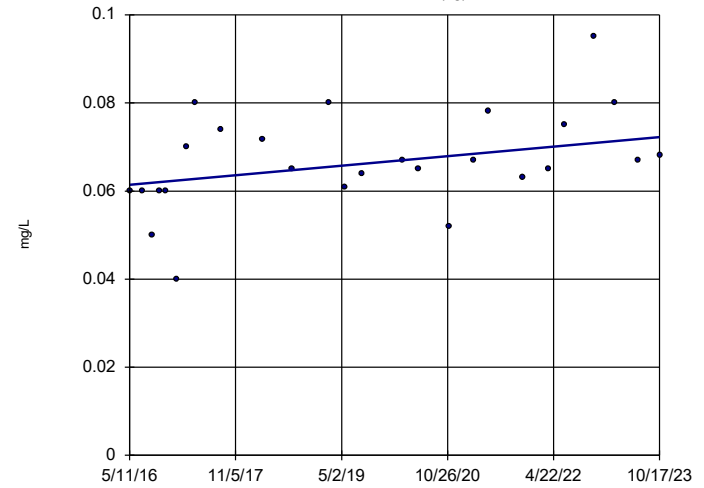


n = 26
Slope = -0.001957
units per year.
Mann-Kendall
statistic = -104
critical = -118
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Boron, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)

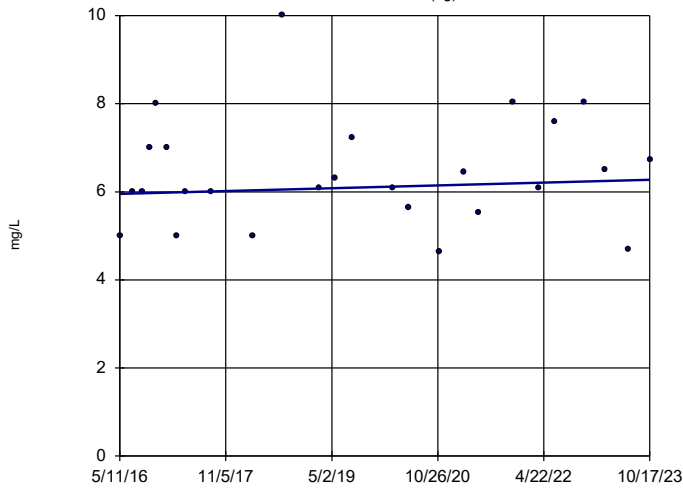


n = 26
Slope = 0.00145
units per year.
Mann-Kendall
statistic = 112
critical = 118
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Boron, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-12 (bg)

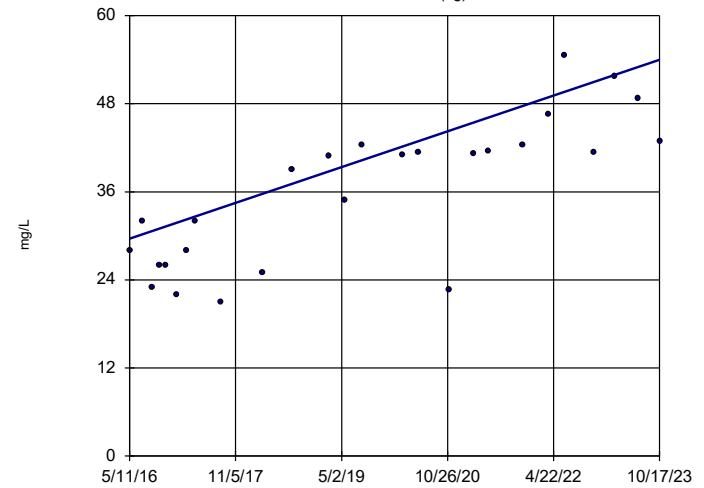


n = 26
Slope = 0.0425
units per year.
Mann-Kendall
statistic = 45
critical = 118
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Chloride, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)

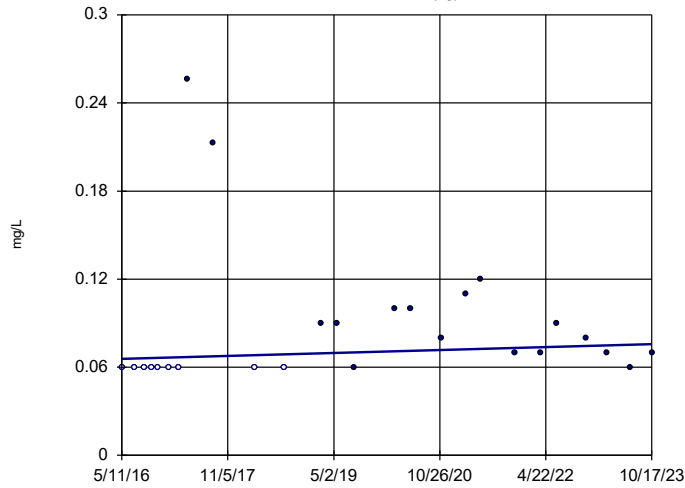


n = 26
Slope = 3.272
units per year.
Mann-Kendall
statistic = 201
critical = 118
Increasing trend
significant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Chloride, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

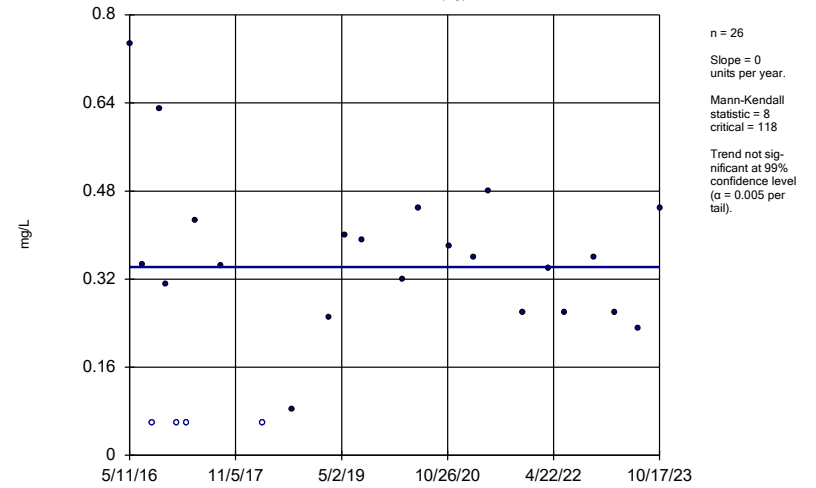
AD-12 (bg)



Constituent: Fluoride, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

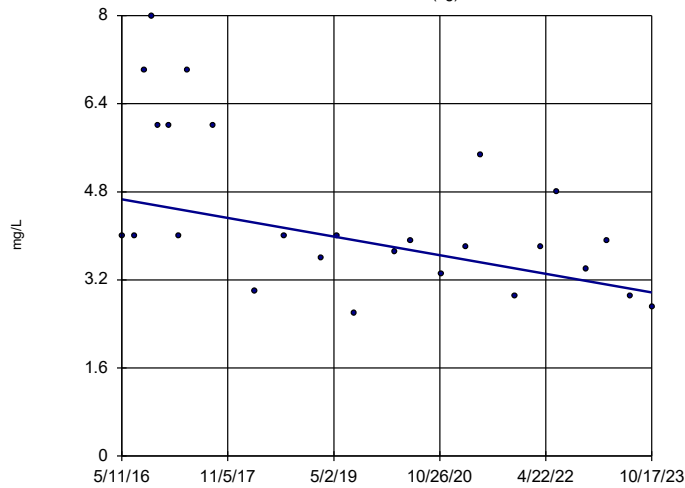
AD-13 (bg)



Constituent: Fluoride, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

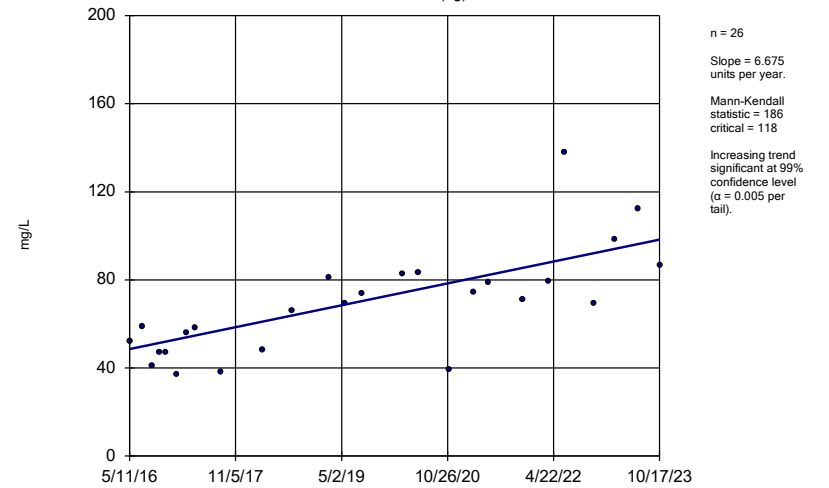
AD-12 (bg)



Constituent: Sulfate, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)



Constituent: Sulfate, total Analysis Run 1/3/2024 6:36 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

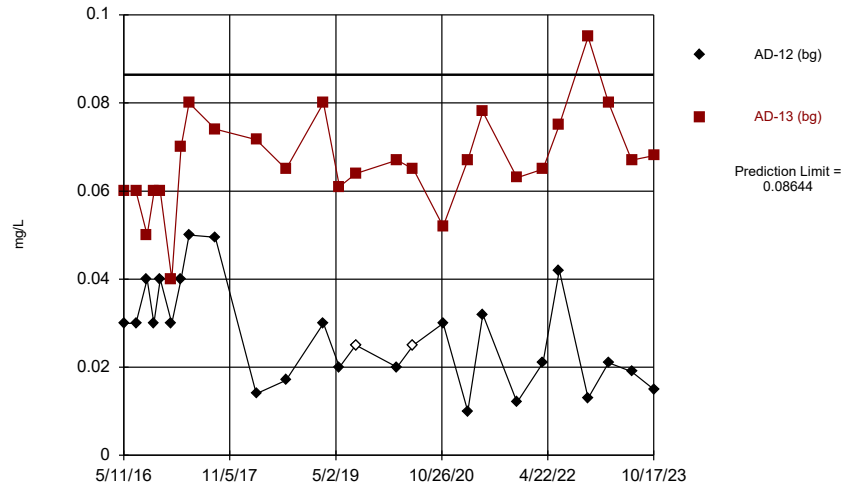
FIGURE F
Interwell PLs

Appendix III Interwell Prediction Limits - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 6:41 PM

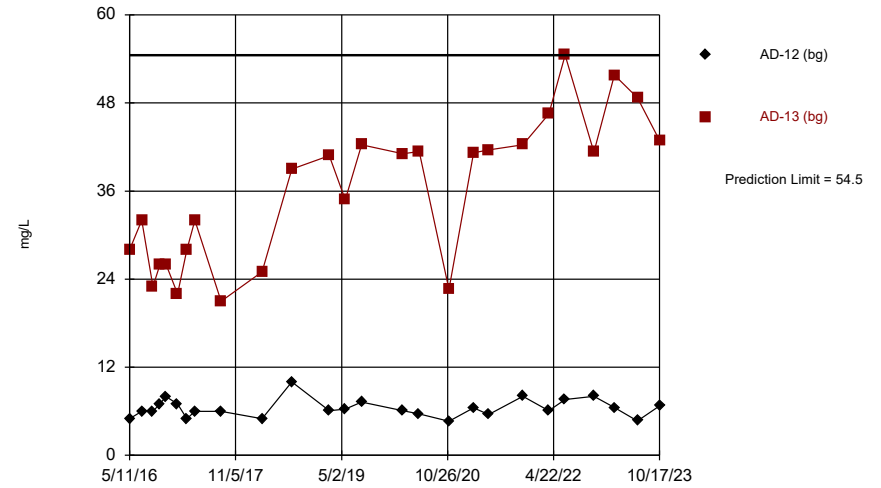
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron, total (mg/L)	n/a	0.08644	n/a	n/a	3 future	n/a	52	0.04699	0.02291	3.846	None	No	0.002505	Param Inter 1 of 2
Chloride, total (mg/L)	n/a	54.5	n/a	n/a	3 future	n/a	52	n/a	n/a	0	n/a	n/a	0.0007028	NP Inter (normality) 1 of 2
Fluoride, total (mg/L)	n/a	0.748	n/a	n/a	3 future	n/a	52	n/a	n/a	25	n/a	n/a	0.0007028	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	n/a	138	n/a	n/a	3 future	n/a	52	n/a	n/a	0	n/a	n/a	0.0007028	NP Inter (normality) 1 of 2

Time Series



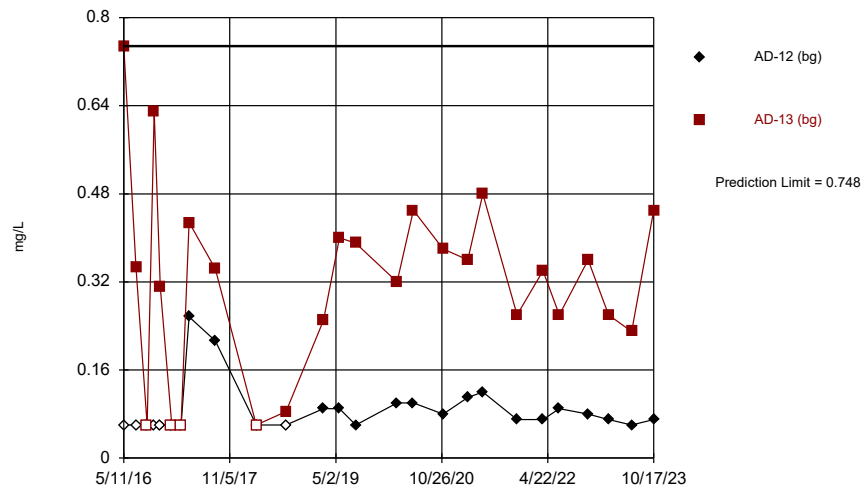
Constituent: Boron, total Analysis Run 1/3/2024 6:39 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



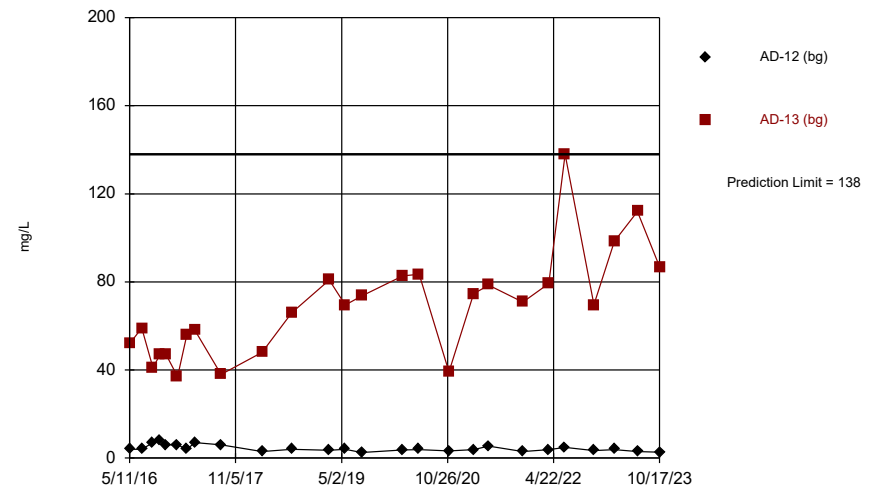
Constituent: Chloride, total Analysis Run 1/3/2024 6:39 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Fluoride, total Analysis Run 1/3/2024 6:39 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Time Series



Constituent: Sulfate, total Analysis Run 1/3/2024 6:39 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

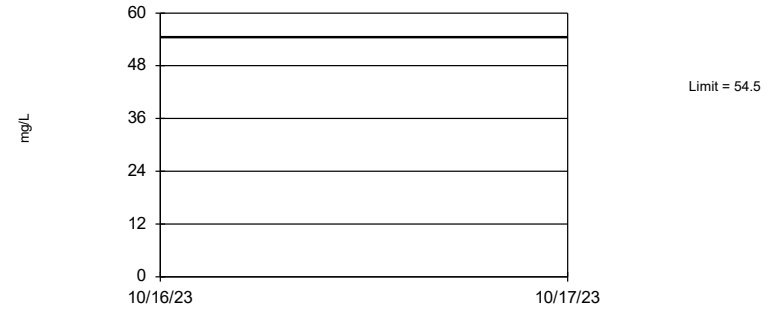
Prediction Limit Interwell Parametric



Background Data Summary: Mean=0.04699, Std. Dev.=0.02291, n=52, 3.846% NDs. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9551, critical = 0.937. Kappa = 1.722 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.002505. Assumes 3 future values.

Constituent: Boron, total Analysis Run 1/3/2024 6:38 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 52 background values. Annual per-constituent alpha = 0.004209. Individual comparison alpha = 0.0007028 (1 of 2). Assumes 3 future values.

Constituent: Chloride, total Analysis Run 1/3/2024 6:38 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

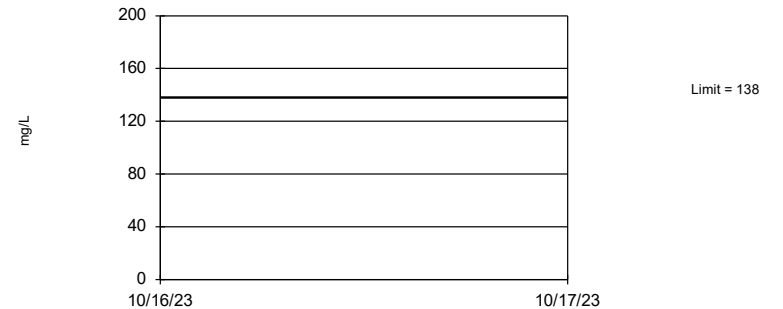
Prediction Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 52 background values. 25% NDs. Annual per-constituent alpha = 0.004209. Individual comparison alpha = 0.0007028 (1 of 2). Assumes 3 future values.

Constituent: Fluoride, total Analysis Run 1/3/2024 6:38 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Prediction Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 52 background values. Annual per-constituent alpha = 0.004209. Individual comparison alpha = 0.0007028 (1 of 2). Assumes 3 future values.

Constituent: Sulfate, total Analysis Run 1/3/2024 6:38 PM View: Interwell
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE G
Seasonality

Seasonality Summary Table - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/4/2024, 1:28 PM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>K.-W.</u>	<u>Chi-Sq.</u>	<u>df</u>	<u>N</u>	<u>Alpha</u>
Beryllium, total (mg/L)	AD-22	Yes	11.66	3.841	1	25	0.05
Cadmium, total (mg/L)	AD-22	Yes	12.22	3.841	1	25	0.05
Cobalt, total (mg/L)	AD-22	Yes	12.62	3.841	1	25	0.05
Combined Radium 226 + 228 (pCi/L)	AD-22	Yes	13	3.841	1	25	0.05
Fluoride, total (mg/L)	AD-22	Yes	5.433	3.841	1	27	0.05
Lithium, total (mg/L)	AD-22	Yes	9.649	3.841	1	25	0.05
Selenium, total (mg/L)	AD-22	Yes	4.042	3.841	1	25	0.05

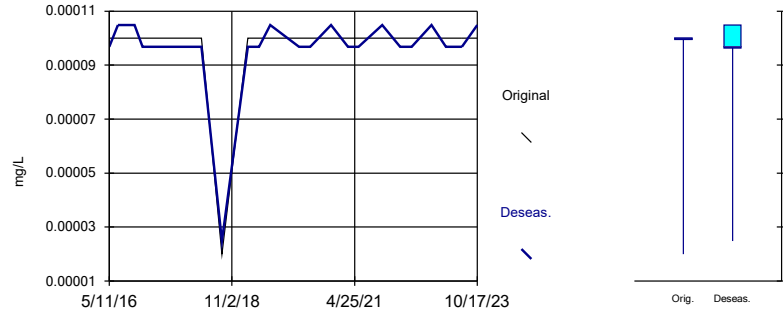
Seasonality Summary Table - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/4/2024, 1:28 PM

<u>Constituent</u>	<u>Well</u>	<u>Sig.</u>	<u>K.-W.</u>	<u>Chi-Sq.</u>	<u>df</u>	<u>N</u>	<u>Alpha</u>
Antimony, total (mg/L)	AD-22	No	1.5	3.841	1	25	0.05
Arsenic, total (mg/L)	AD-22	No	0.2224	3.841	1	25	0.05
Barium, total (mg/L)	AD-22	No	1.357	3.841	1	25	0.05
Beryllium, total (mg/L)	AD-22	Yes	11.66	3.841	1	25	0.05
Cadmium, total (mg/L)	AD-22	Yes	12.22	3.841	1	25	0.05
Chromium, total (mg/L)	AD-22	No	0.2228	3.841	1	25	0.05
Cobalt, total (mg/L)	AD-22	Yes	12.62	3.841	1	25	0.05
Combined Radium 226 + 228 (pCi/L)	AD-22	Yes	13	3.841	1	25	0.05
Fluoride, total (mg/L)	AD-22	Yes	5.433	3.841	1	27	0.05
Lead, total (mg/L)	AD-22	No	0.6235	3.841	1	25	0.05
Lithium, total (mg/L)	AD-22	Yes	9.649	3.841	1	25	0.05
Mercury, total (mg/L)	AD-22	No	1.038	3.841	1	12	0.05
Molybdenum, total (mg/L)	AD-22	No	0.06434	3.841	1	23	0.05
Selenium, total (mg/L)	AD-22	Yes	4.042	3.841	1	25	0.05
Thallium, total (mg/L)	AD-22	No	1.625	3.841	1	24	0.05

Seasonality: AD-22

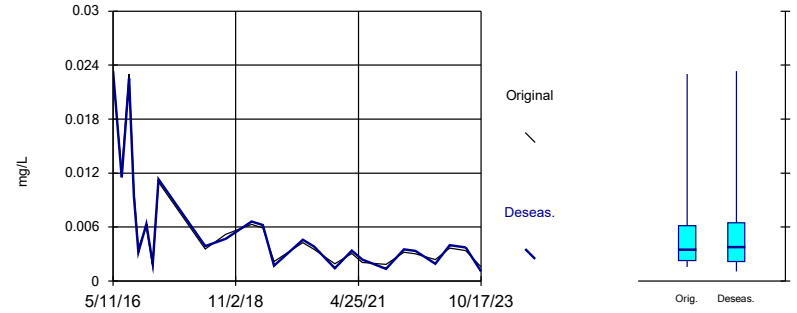
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.5
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.1731
 Adjusted Kruskal-Wallis statistic (H') = 1.5



Constituent: Antimony, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

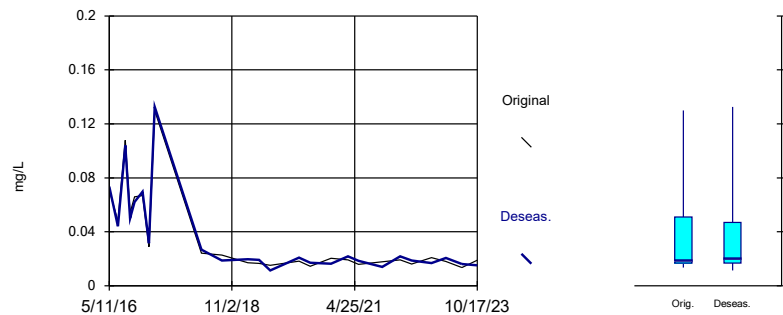
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.2224
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.2223
 Adjusted Kruskal-Wallis statistic (H') = 0.2224



Constituent: Arsenic, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

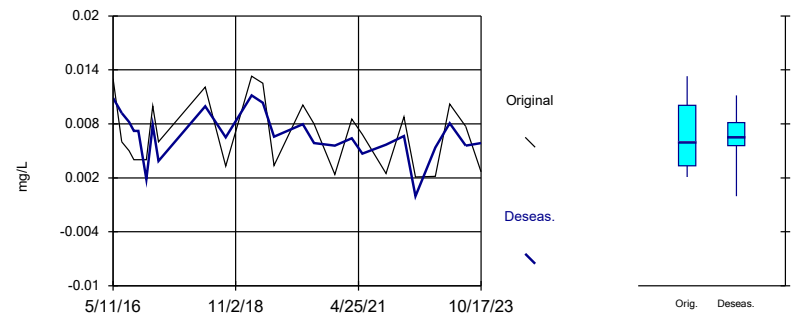
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.357
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Barium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

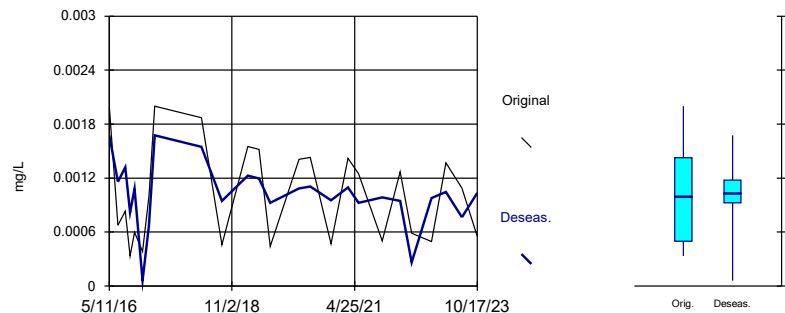
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 11.66
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 11.64
 Adjusted Kruskal-Wallis statistic (H') = 11.66



Constituent: Beryllium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

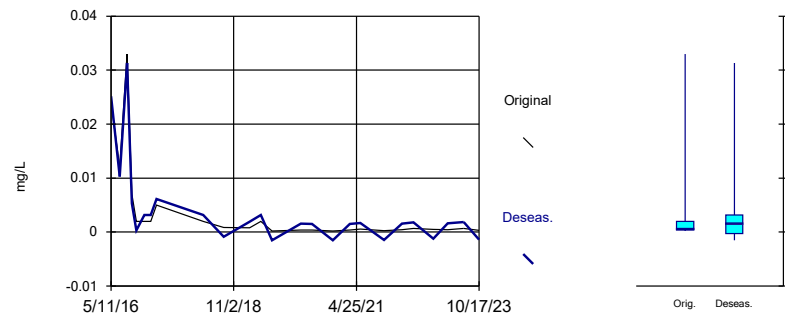
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 12.22
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 12.21
 Adjusted Kruskal-Wallis statistic (H') = 12.22



Constituent: Cadmium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

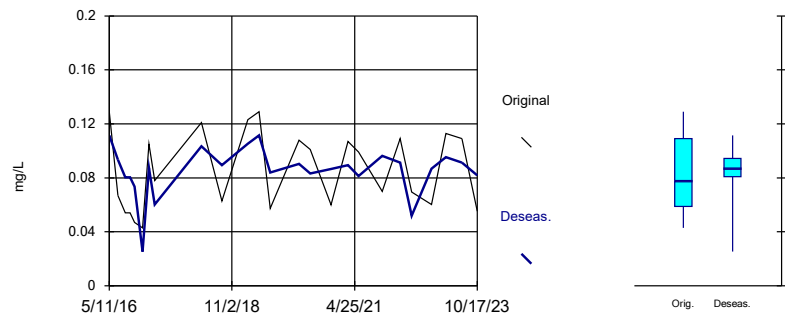
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.2228
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.2223
 Adjusted Kruskal-Wallis statistic (H') = 0.2228



Constituent: Chromium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

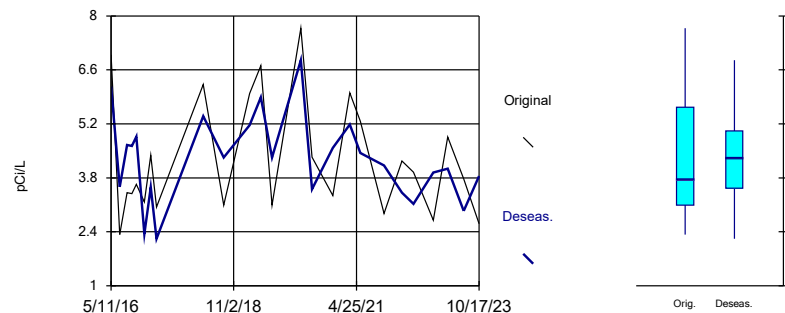
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 12.62
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 12.6
 Adjusted Kruskal-Wallis statistic (H') = 12.62



Constituent: Cobalt, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

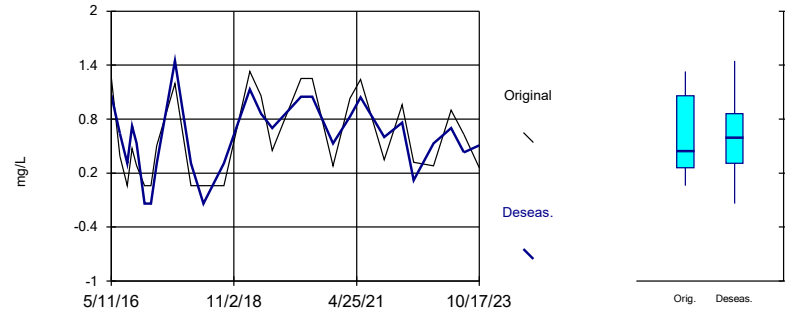
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 13
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Combined Radium 226 + 228 Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

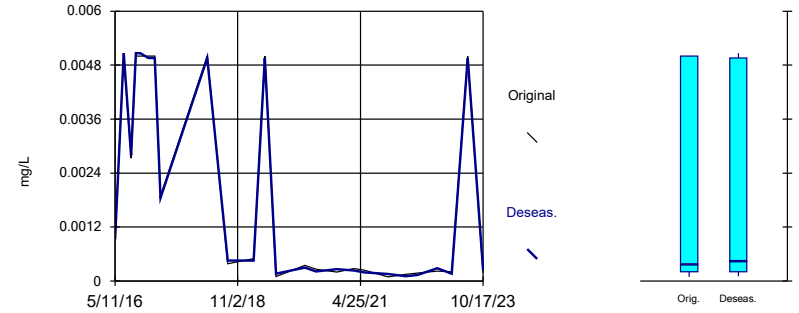
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 5.433
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H) was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 5.372
 Adjusted Kruskal-Wallis statistic (H) = 5.433



Constituent: Fluoride, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

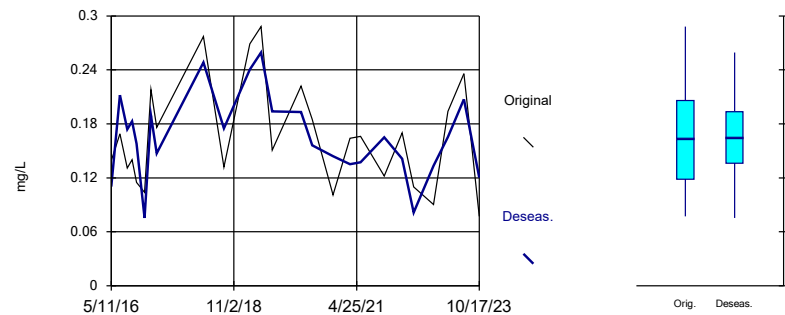
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.6235
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H) was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.6031
 Adjusted Kruskal-Wallis statistic (H) = 0.6235



Constituent: Lead, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

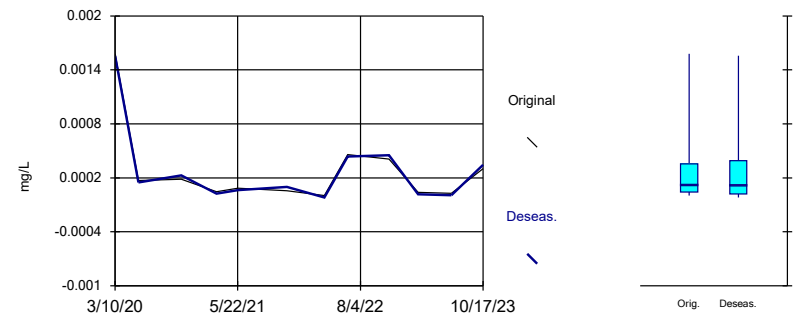
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 9.649
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Lithium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

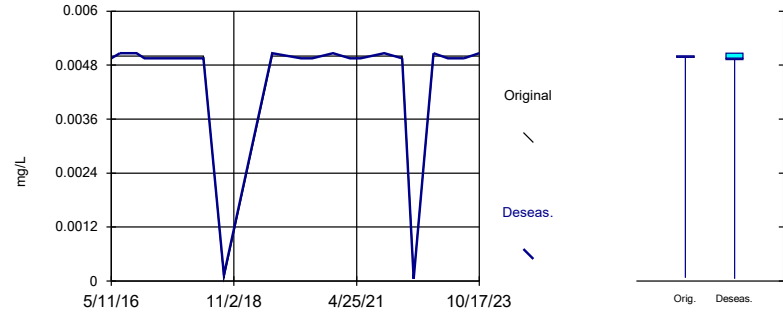
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.038
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



Constituent: Mercury, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

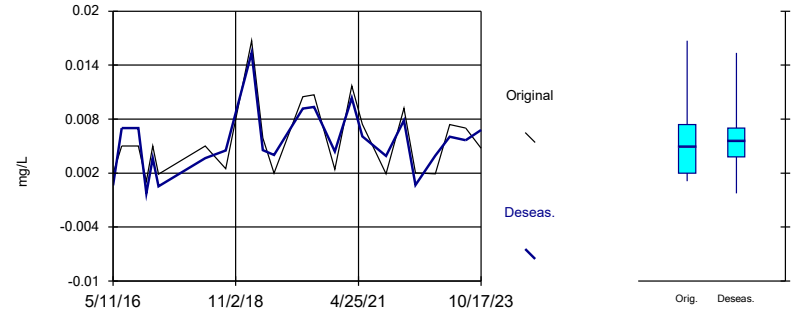
For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 0.06434
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 0.01538
 Adjusted Kruskal-Wallis statistic (H') = 0.06434



Constituent: Molybdenum, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

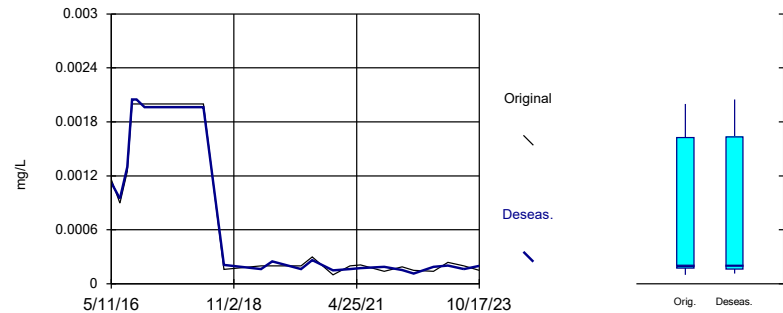
For the selected data, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 4.042
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 3.988
 Adjusted Kruskal-Wallis statistic (H') = 4.042



Constituent: Selenium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Seasonality: AD-22

For the selected data, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
 Calculated Kruskal-Wallis statistic = 1.625
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.
 There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
 Kruskal-Wallis statistic (H) = 1.585
 Adjusted Kruskal-Wallis statistic (H') = 1.625



Constituent: Thallium, total Analysis Run 1/4/2024 1:23 PM View: Seasonality
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

FIGURE H
UTLs

Upper Tolerance Limits Summary Table

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/3/2024, 6:42 PM

<u>Constituent</u>	<u>Upper Lim.</u>	<u>Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Antimony, total (mg/L)	0.0001	50	n/a	n/a	90	n/a	n/a	0.07694	NP Inter(NDs)
Arsenic, total (mg/L)	0.009	50	n/a	n/a	24	n/a	n/a	0.07694	NP Inter(normality)
Barium, total (mg/L)	0.05515	50	0.03305	0.0107	0	None	No	0.05	Inter
Beryllium, total (mg/L)	0.002	50	n/a	n/a	8	n/a	n/a	0.07694	NP Inter(normality)
Cadmium, total (mg/L)	0.00086	49	n/a	n/a	65.31	n/a	n/a	0.08099	NP Inter(NDs)
Chromium, total (mg/L)	0.004	50	n/a	n/a	26	n/a	n/a	0.07694	NP Inter(normality)
Cobalt, total (mg/L)	0.06	50	n/a	n/a	0	n/a	n/a	0.07694	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	2.983	50	1.308	0.8113	0	None	No	0.05	Inter
Fluoride, total (mg/L)	0.748	52	n/a	n/a	25	n/a	n/a	0.06944	NP Inter(normality)
Lead, total (mg/L)	0.005	50	n/a	n/a	70	n/a	n/a	0.07694	NP Inter(NDs)
Lithium, total (mg/L)	0.165	50	n/a	n/a	2	n/a	n/a	0.07694	NP Inter(normality)
Mercury, total (mg/L)	0.00001928	50	n/a	n/a	92	n/a	n/a	0.07694	NP Inter(NDs)
Molybdenum, total (mg/L)	0.005	46	n/a	n/a	93.48	n/a	n/a	0.09447	NP Inter(NDs)
Selenium, total (mg/L)	0.00386	50	n/a	n/a	54	n/a	n/a	0.07694	NP Inter(NDs)
Thallium, total (mg/L)	0.001443	48	n/a	n/a	83.33	n/a	n/a	0.08526	NP Inter(NDs)

FIGURE I
GWPS

PIRKEY STACKOUT GWPS			
Constituent Name	MCL	Background Limit	GWPS
Antimony, Total (mg/L)	0.006	0.0001	0.006
Arsenic, Total (mg/L)	0.01	0.009	0.01
Barium, Total (mg/L)	2	0.055	2
Beryllium, Total (mg/L)	0.004	0.002	0.004
Cadmium, Total (mg/L)	0.005	0.00086	0.005
Chromium, Total (mg/L)	0.1	0.004	0.1
Cobalt, Total (mg/L)	n/a	0.06	0.06
Combined Radium, Total (pCi/L)	5	2.98	5
Fluoride, Total (mg/L)	4	0.75	4
Lead, Total (mg/L)	n/a	0.005	0.005
Lithium, Total (mg/L)	n/a	0.17	0.17
Mercury, Total (mg/L)	0.002	0.000019	0.002
Molybdenum, Total (mg/L)	n/a	0.005	0.005
Selenium, Total (mg/L)	0.05	0.0039	0.05
Thallium, Total (mg/L)	0.002	0.0014	0.002

*MCL = Maximum Contaminant Level

*GWPS = Groundwater Protection Standard

FIGURE J
Confidence Intervals

Confidence Intervals - Significant Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/4/2024, 3:45 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig. N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Beryllium, total (mg/L)	AD-22	0.0086	0.004883	0.004	Yes 25	0.006741	0.003729	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-22	0.09956	0.07097	0.06	Yes 25	0.08526	0.02868	0	None	No	0.01	Param.
Mercury, total (mg/L)	AD-33	0.006917	0.002749	0.002	Yes 12	0.005019	0.003376	0	None	x^(1/3)	0.01	Param.

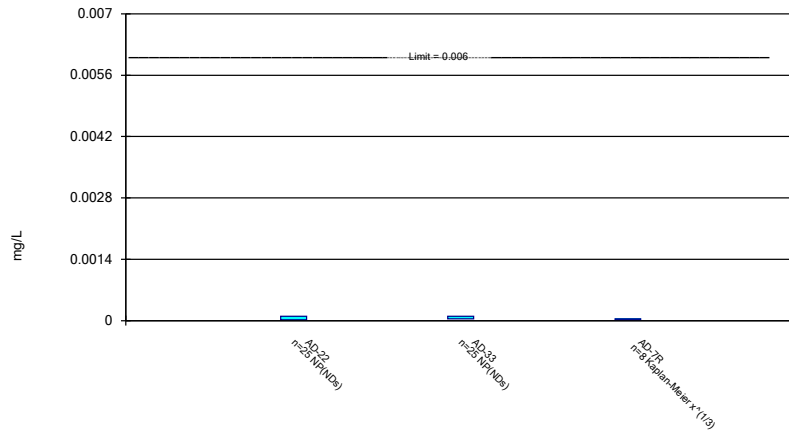
Confidence Intervals - All Results

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 1/4/2024, 3:45 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig. N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	AD-22	0.0001	0.00002	0.006	No 25	0.0000968	0.000016	96	None	No	0.01	NP (NDs)
Antimony, total (mg/L)	AD-33	0.0001	0.00004	0.006	No 25	0.0000872	0.00003036	84	None	No	0.01	NP (NDs)
Antimony, total (mg/L)	AD-7R	0.00003882	0.000009002	0.006	No 8	0.00005225	0.00004161	37.5	Kaplan-Meier	x^(1/3)	0.01	Param.
Arsenic, total (mg/L)	AD-22	0.006232	0.002923	0.01	No 25	0.005894	0.005878	0	None	ln(x)	0.01	Param.
Arsenic, total (mg/L)	AD-33	0.001367	0.0006688	0.01	No 24	0.001143	0.0009758	8.333	None	x^(1/3)	0.01	Param.
Arsenic, total (mg/L)	AD-7R	0.002	0.0003529	0.01	No 8	0.001176	0.0007768	0	None	No	0.01	Param.
Barium, total (mg/L)	AD-22	0.048	0.017	2	No 25	0.03527	0.03105	0	None	No	0.01	NP (normality)
Barium, total (mg/L)	AD-33	0.05261	0.04562	2	No 24	0.04912	0.006846	0	None	No	0.01	Param.
Barium, total (mg/L)	AD-7R	0.07019	0.03994	2	No 8	0.05534	0.01507	0	None	x^2	0.01	Param.
Beryllium, total (mg/L)	AD-22	0.0086	0.004883	0.004	Yes 25	0.006741	0.003729	0	None	No	0.01	Param.
Beryllium, total (mg/L)	AD-33	0.0014	0.000945	0.004	No 25	0.001287	0.0006476	0	None	No	0.01	NP (normality)
Beryllium, total (mg/L)	AD-7R	0.002273	0.001387	0.004	No 8	0.00183	0.0004181	0	None	No	0.01	Param.
Cadmium, total (mg/L)	AD-22	0.00129	0.0007509	0.005	No 25	0.00102	0.0005404	0	None	No	0.01	Param.
Cadmium, total (mg/L)	AD-33	0.001	0.000043	0.005	No 25	0.0004323	0.0004723	36	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	AD-7R	0.0003803	0.000226	0.005	No 8	0.0003031	0.00007279	0	None	No	0.01	Param.
Chromium, total (mg/L)	AD-22	0.002372	0.0005613	0.1	No 25	0.003923	0.007964	12	None	ln(x)	0.01	Param.
Chromium, total (mg/L)	AD-33	0.001762	0.0004137	0.1	No 24	0.001575	0.002112	12.5	None	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	AD-7R	0.001404	0.0002153	0.1	No 8	0.0008213	0.0009245	0	None	ln(x)	0.01	Param.
Cobalt, total (mg/L)	AD-22	0.09956	0.07097	0.06	Yes 25	0.08526	0.02868	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-33	0.01036	0.008596	0.06	No 24	0.00948	0.001733	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-7R	0.02055	0.01593	0.06	No 8	0.01824	0.00218	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-22	5.043	3.524	5	No 25	4.284	1.524	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-33	3.023	1.673	5	No 25	2.558	1.807	0	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-7R	3.788	1.777	5	No 8	2.783	0.9485	0	None	No	0.01	Param.
Fluoride, total (mg/L)	AD-22	1.06	0.26	4	No 27	0.5949	0.4643	22.22	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	AD-33	0.2291	0.1043	4	No 26	0.1995	0.1449	34.62	Kaplan-Meier	sqrt(x)	0.01	Param.
Fluoride, total (mg/L)	AD-7R	0.186	0.124	4	No 8	0.155	0.02928	0	None	No	0.01	Param.
Lead, total (mg/L)	AD-22	0.005	0.00021	0.005	No 25	0.001957	0.002209	32	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-33	0.005	0.00022	0.005	No 24	0.002226	0.002396	41.67	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-7R	0.0005223	0.0001108	0.005	No 8	0.002066	0.002436	37.5	Kaplan-Meier	ln(x)	0.01	Param.
Lithium, total (mg/L)	AD-22	0.1952	0.1365	0.17	No 25	0.1659	0.05887	0	None	No	0.01	Param.
Lithium, total (mg/L)	AD-33	0.0262	0.0185	0.17	No 25	0.02268	0.007796	4	None	No	0.01	NP (normality)
Lithium, total (mg/L)	AD-7R	0.06535	0.04185	0.17	No 8	0.0536	0.01109	0	None	No	0.01	Param.
Mercury, total (mg/L)	AD-22	0.0004236	0.00003506	0.002	No 12	0.0002804	0.000437	8.333	None	x^(1/3)	0.01	Param.
Mercury, total (mg/L)	AD-33	0.006917	0.002749	0.002	Yes 12	0.005019	0.003376	0	None	x^(1/3)	0.01	Param.
Mercury, total (mg/L)	AD-7R	0.00009057	0.000003258	0.002	No 8	0.00004363	0.00005798	0	None	sqrt(x)	0.01	Param.
Molybdenum, total (mg/L)	AD-22	0.005	0.0001	0.005	No 23	0.004573	0.001416	91.3	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-33	0.005	0.0007365	0.005	No 23	0.004815	0.000889	95.65	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-7R	0.005	0.0001	0.005	No 8	0.004387	0.001732	87.5	None	No	0.004	NP (NDs)
Selenium, total (mg/L)	AD-22	0.006085	0.002643	0.05	No 25	0.00556	0.003845	24	Kaplan-Meier	sqrt(x)	0.01	Param.
Selenium, total (mg/L)	AD-33	0.005	0.00139	0.05	No 25	0.002921	0.001649	32	None	No	0.01	NP (normality)
Selenium, total (mg/L)	AD-7R	0.002149	0.0001537	0.05	No 8	0.001151	0.0009411	0	None	No	0.01	Param.
Thallium, total (mg/L)	AD-22	0.00125	0.000162	0.002	No 24	0.0007537	0.0007975	25	None	No	0.01	NP (normality)
Thallium, total (mg/L)	AD-33	0.001192	0.00005	0.002	No 24	0.0002654	0.0003536	70.83	None	No	0.01	NP (NDs)
Thallium, total (mg/L)	AD-7R	0.001	0.0001	0.002	No 8	0.0004563	0.0004505	37.5	None	No	0.004	NP (normality)

Parametric and Non-Parametric (NP) Confidence Interval

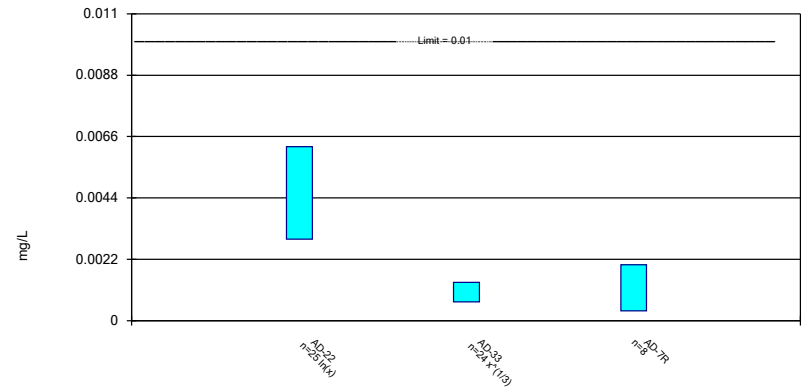
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony, total Analysis Run 1/4/2024 3:43 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

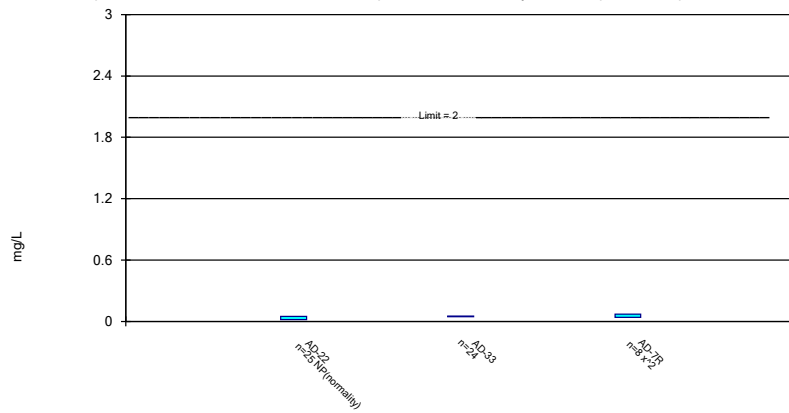
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 1/4/2024 3:43 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

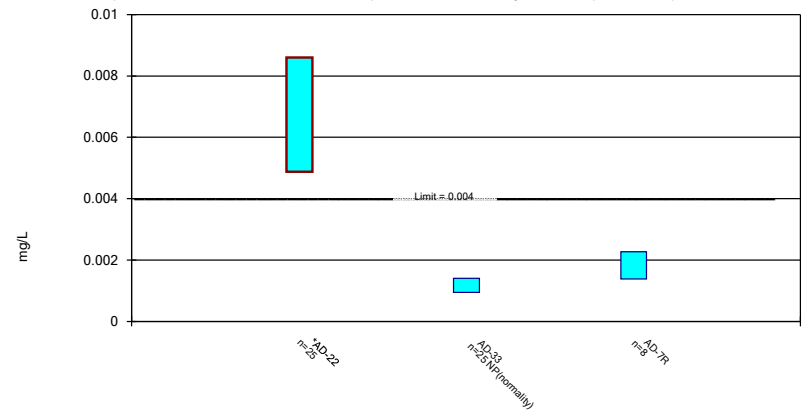
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Constituent: Barium, total Analysis Run 1/4/2024 3:43 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

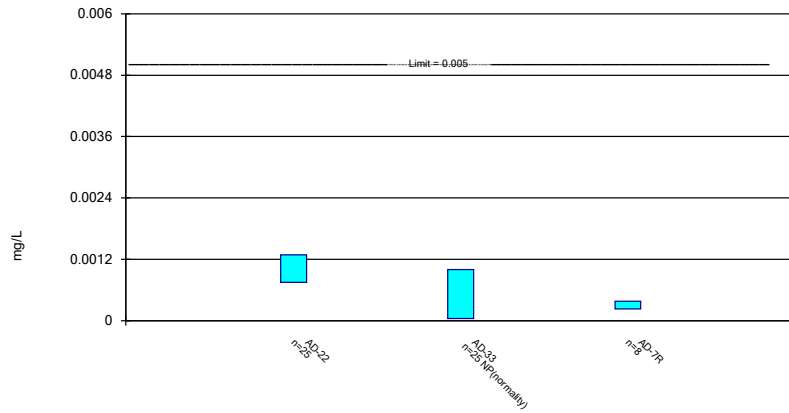
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 1/4/2024 3:43 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

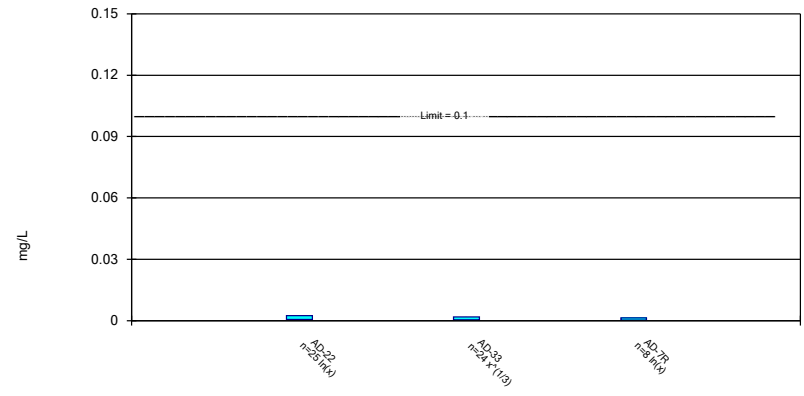
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 1/4/2024 3:43 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

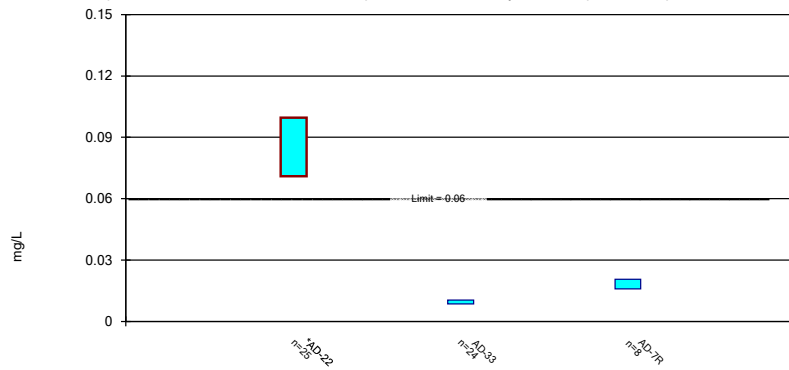
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

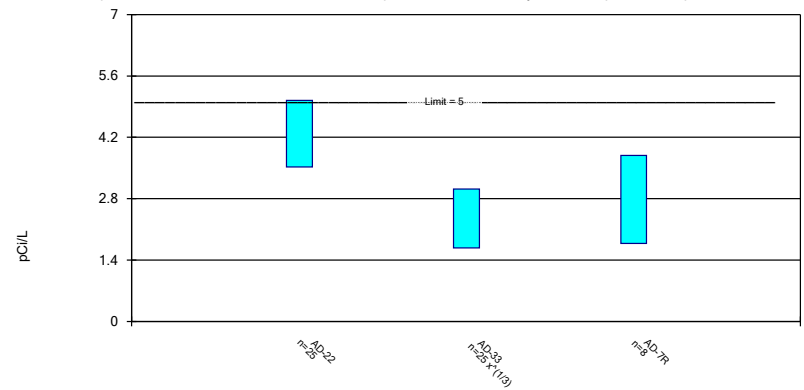
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

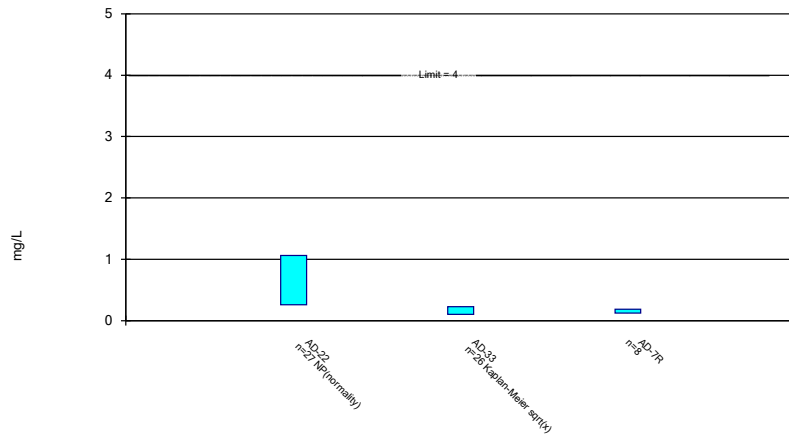
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Constituent: Combined Radium 226 + 228 Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

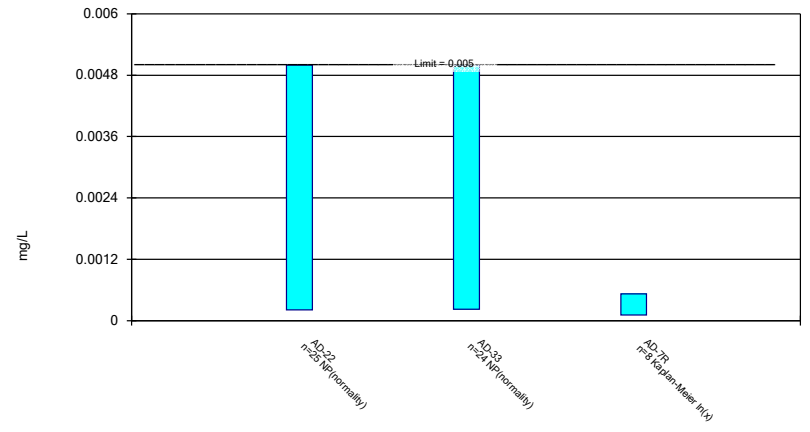
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

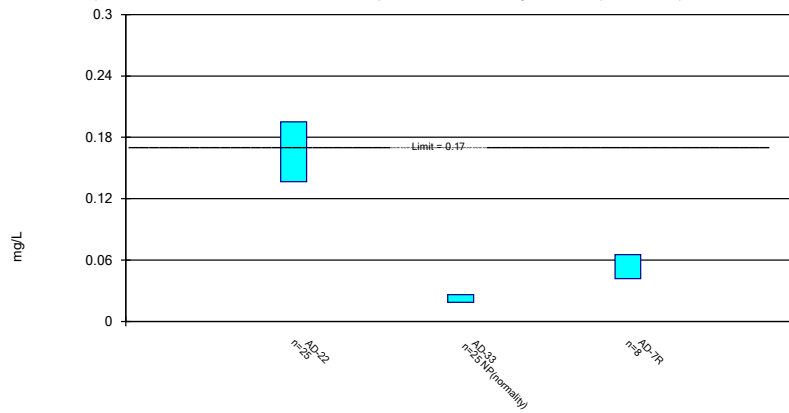
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

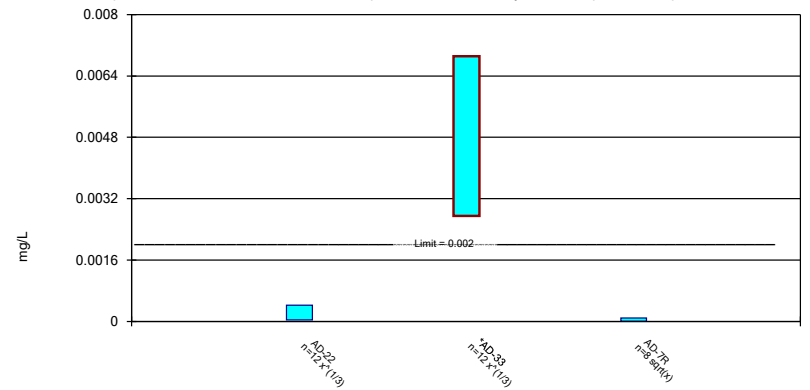
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric Confidence Interval

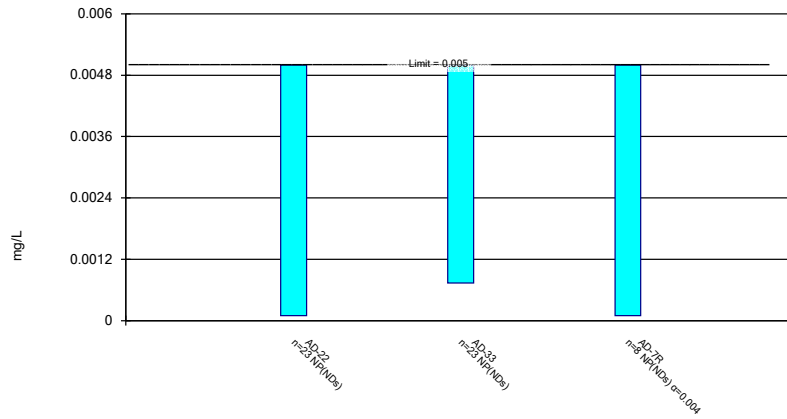
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Mercury, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

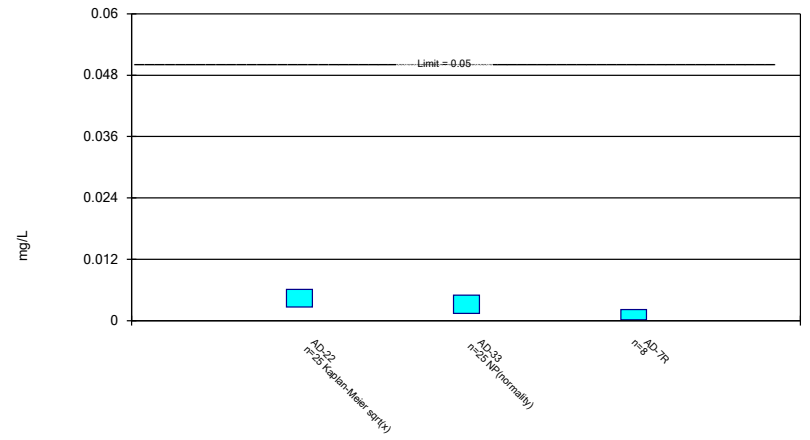
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted.



Constituent: Molybdenum, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Parametric and Non-Parametric (NP) Confidence Interval

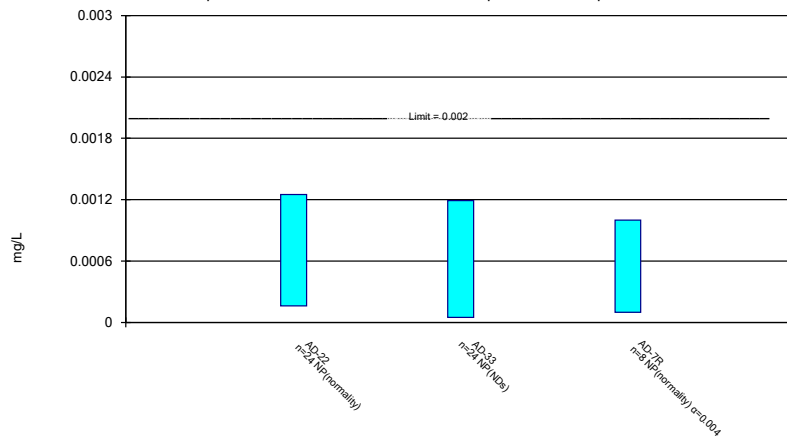
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted.



Constituent: Thallium, total Analysis Run 1/4/2024 3:44 PM View: Confidence Intervals
 Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

Deseasonalized Confidence Intervals - Well AD-22 - Significant Results

Pirkey Stackout Data: Pirkey Stackout Printed 1/5/2024, 6:11 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig. N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Beryllium, total (ug/L)	AD-22	8.164	5.569	4	Yes 25	6.867	2.604	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-22	0.09453	0.07906	0.06	Yes 25	0.08527	0.01834	0	None	x^2	0.01	Param.

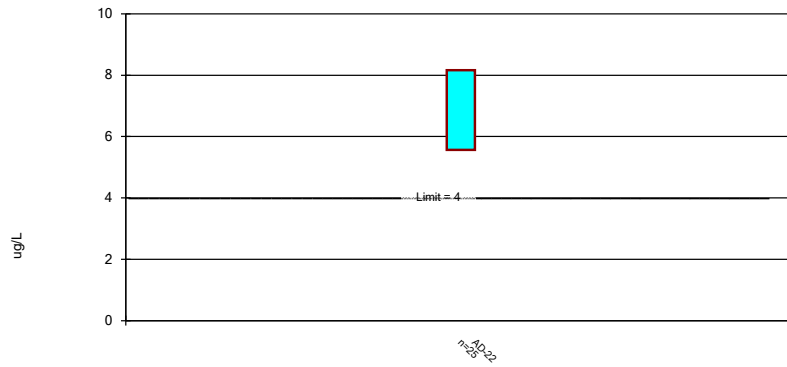
Deseasonalized Confidence Intervals - Well AD-22 - All Results

Pirkey Stackout Data: Pirkey Stackout Printed 1/5/2024, 6:11 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig. N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Beryllium, total (ug/L)	AD-22	8.164	5.569	4	Yes 25	6.867	2.604	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-22	0.09453	0.07906	0.06	Yes 25	0.08527	0.01834	0	None	x^2	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-22	4.843	3.724	5	No 25	4.283	1.122	0	None	No	0.01	Param.
Lithium, total (mg/L)	AD-22	0.1891	0.1426	0.17	No 25	0.1659	0.0467	0	None	No	0.01	Param.

Parametric Confidence Interval

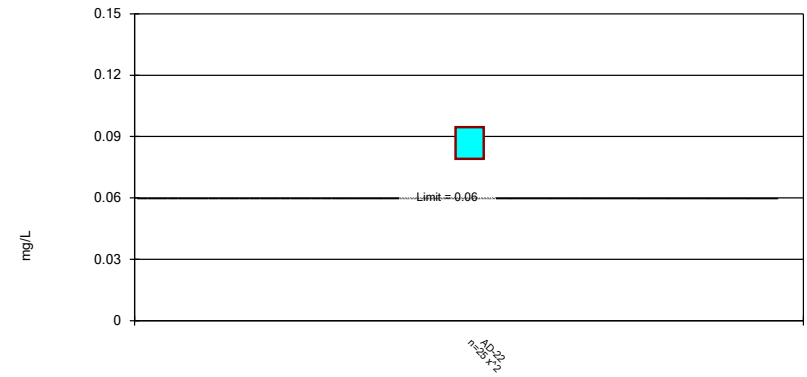
Compliance limit is exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total, Alt. Values Analysis Run 1/5/2024 6:09 PM View: Deseasonalized Confidence
Pirkey Stackout Data: Pirkey Stackout

Parametric Confidence Interval

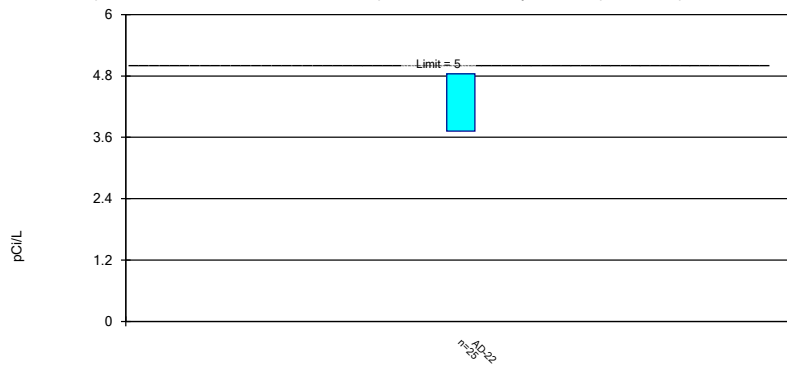
Compliance limit is exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total, Alt. Values Analysis Run 1/5/2024 6:09 PM View: Deseasonalized Confidence
Pirkey Stackout Data: Pirkey Stackout

Parametric Confidence Interval

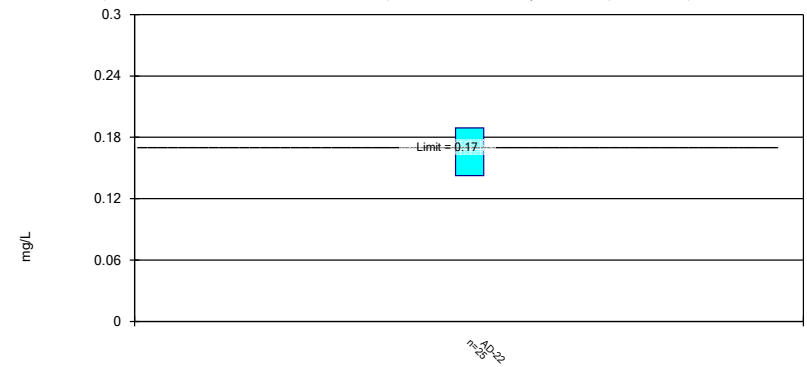
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228, Alt. Values Analysis Run 1/5/2024 6:10 PM View: Deseasonali
Pirkey Stackout Data: Pirkey Stackout

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total, Alt. Values Analysis Run 1/5/2024 6:10 PM View: Deseasonalized Confidence
Pirkey Stackout Data: Pirkey Stackout

FIGURE K
Appendix IV Trend Tests

Trend Tests - Confidence Interval Exceedances - Significant Results

Pirkey Stackout Data: Pirkey Stackout Printed 1/5/2024, 6:43 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Alpha</u>	<u>Method</u>
Beryllium, total (mg/L)	AD-12 (bg)	-0.000004617	-105	-85	Yes	25	8	n/a	0.05	NP
Cobalt, total (mg/L)	AD-13 (bg)	0.000887	111	85	Yes	25	0	n/a	0.05	NP
Mercury, total (mg/L)	AD-33	0.0009923	34	30	Yes	12	0	n/a	0.05	NP

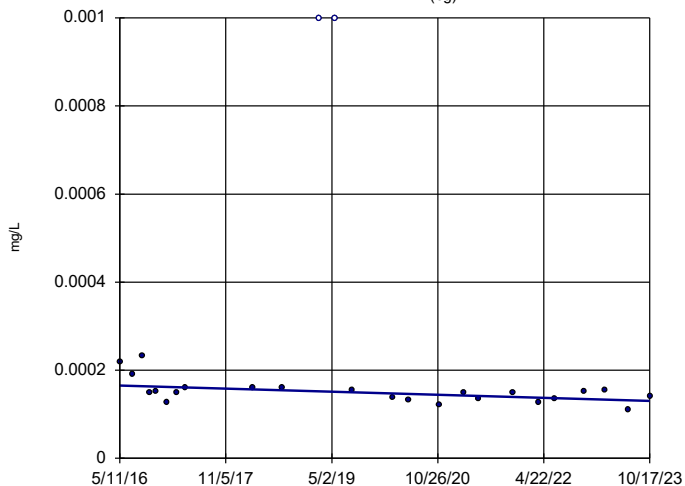
Trend Tests - Confidence Interval Exceedances - All Results

Pirkey Stackout Data: Pirkey Stackout Printed 1/5/2024, 6:43 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Alpha	Method
Beryllium, total (mg/L)	AD-12 (bg)	-0.000004617	-105	-85	Yes	25	8	n/a	0.05	NP
Beryllium, total (mg/L)	AD-13 (bg)	-0.00003994	-65	-85	No	25	8	n/a	0.05	NP
Beryllium, total (mg/L)	AD-22	-0.0003348	-52	-85	No	25	0	n/a	0.05	NP
Cobalt, total (mg/L)	AD-12 (bg)	-0.00003841	-79	-85	No	25	0	n/a	0.05	NP
Cobalt, total (mg/L)	AD-13 (bg)	0.000887	111	85	Yes	25	0	n/a	0.05	NP
Cobalt, total (mg/L)	AD-22	0.00093	27	85	No	25	0	n/a	0.05	NP
Mercury, total (mg/L)	AD-12 (bg)	0	-10	-85	No	25	96	n/a	0.05	NP
Mercury, total (mg/L)	AD-13 (bg)	0	-61	-85	No	25	88	n/a	0.05	NP
Mercury, total (mg/L)	AD-33	0.0009923	34	30	Yes	12	0	n/a	0.05	NP

Sen's Slope Estimator

AD-12 (bg)

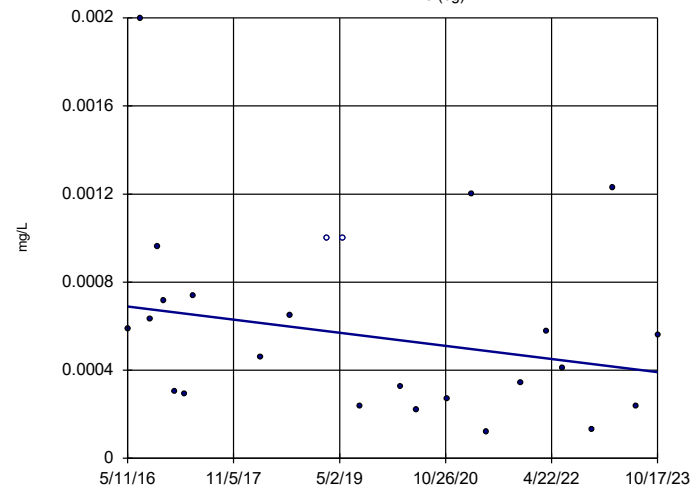


n = 25
Slope = -0.00004617
units per year.
Mann-Kendall
statistic = -105
critical = -85
Decreasing trend
significant at 95%
confidence level
($\alpha = 0.025$ per
tail).

Constituent: Beryllium, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)

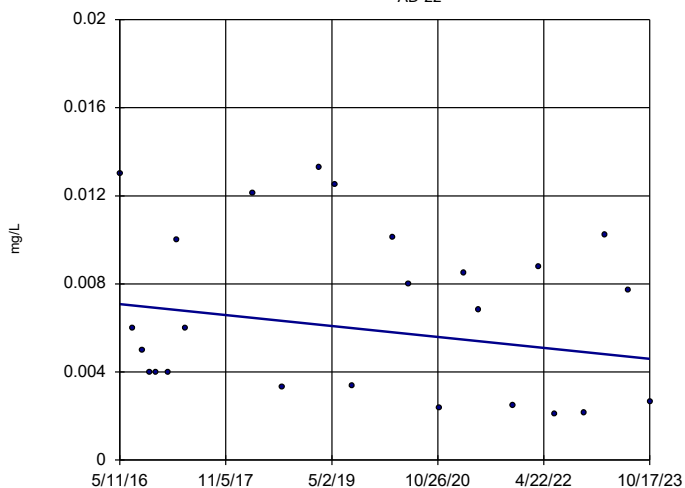


n = 25
Slope = -0.00003994
units per year.
Mann-Kendall
statistic = -65
critical = -85
Trend not sig-
nificant at 95%
confidence level
($\alpha = 0.025$ per
tail).

Constituent: Beryllium, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-22

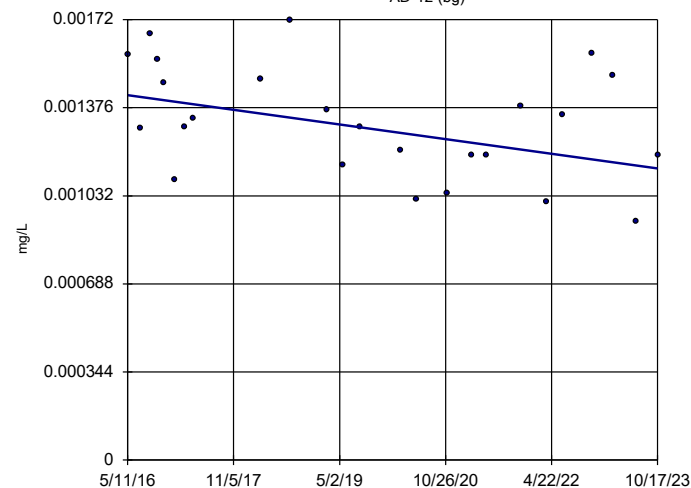


n = 25
Slope = -0.0003348
units per year.
Mann-Kendall
statistic = -52
critical = -85
Trend not sig-
nificant at 95%
confidence level
($\alpha = 0.025$ per
tail).

Constituent: Beryllium, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-12 (bg)

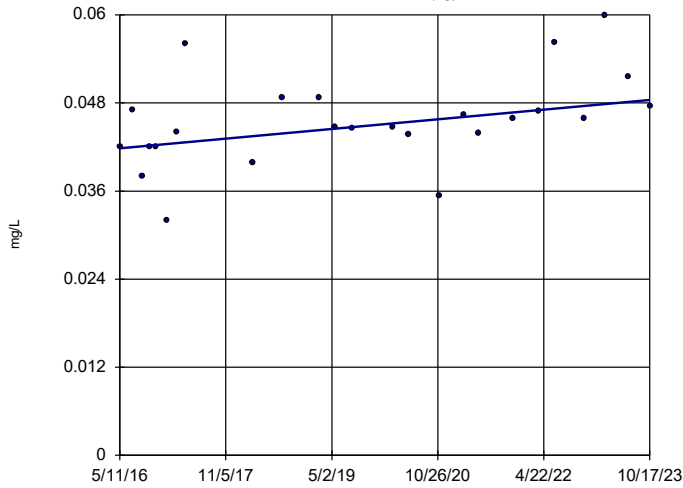


n = 25
Slope = -0.00003841
units per year.
Mann-Kendall
statistic = -79
critical = -85
Trend not sig-
nificant at 95%
confidence level
($\alpha = 0.025$ per
tail).

Constituent: Cobalt, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)

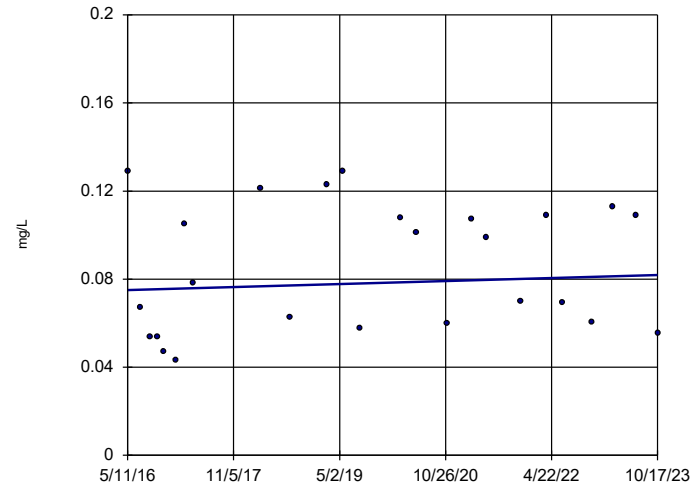


n = 25
 Slope = 0.000887
 units per year.
 Mann-Kendall
 statistic = 111
 critical = 85
 Increasing trend
 significant at 95%
 confidence level
 ($\alpha = 0.025$ per
 tail).

Constituent: Cobalt, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
 Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-22

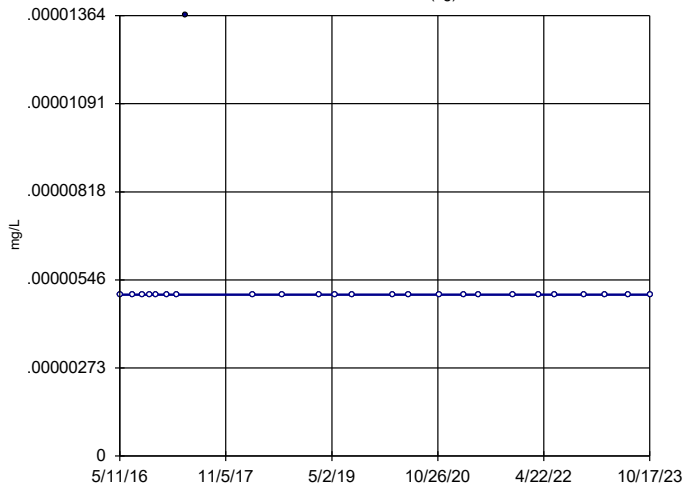


n = 25
 Slope = 0.00093
 units per year.
 Mann-Kendall
 statistic = 27
 critical = 85
 Trend not sig-
 nificant at 95%
 confidence level
 ($\alpha = 0.025$ per
 tail).

Constituent: Cobalt, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
 Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-12 (bg)

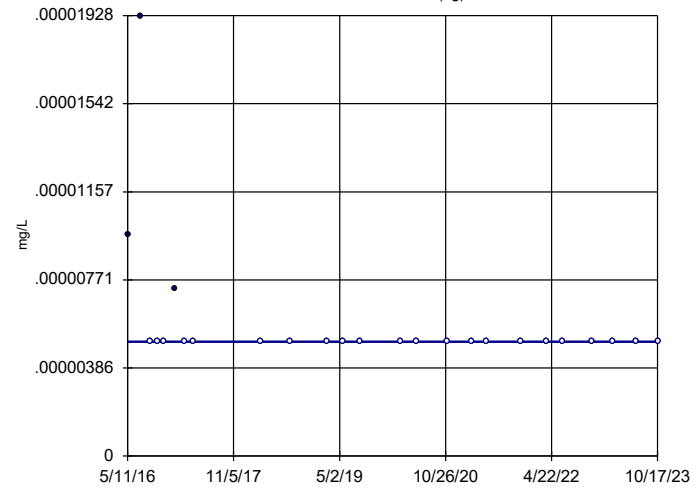


n = 25
 Slope = 0
 units per year.
 Mann-Kendall
 statistic = -10
 critical = -85
 Trend not sig-
 nificant at 95%
 confidence level
 ($\alpha = 0.025$ per
 tail).

Constituent: Mercury, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
 Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-13 (bg)

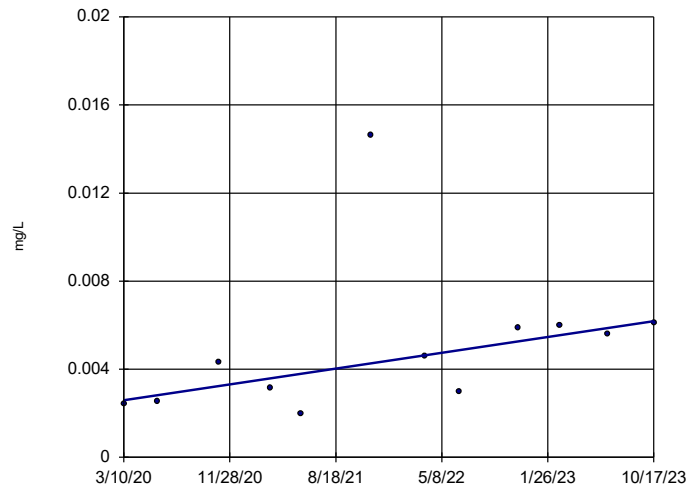


n = 25
 Slope = 0
 units per year.
 Mann-Kendall
 statistic = -61
 critical = -85
 Trend not sig-
 nificant at 95%
 confidence level
 ($\alpha = 0.025$ per
 tail).

Constituent: Mercury, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
 Pirkey Stackout Data: Pirkey Stackout

Sen's Slope Estimator

AD-33



n = 12
Slope = 0.0009923
units per year.
Mann-Kendall
statistic = 34
critical = 30
Increasing trend
significant at 95%
confidence level
($\alpha = 0.025$ per
tail).

Constituent: Mercury, total Analysis Run 1/5/2024 6:42 PM View: Appendix IV Trend Tests
Pirkey Stackout Data: Pirkey Stackout

APPENDIX 3- Alternate Source Demonstrations

Alternate source demonstrations are included in this appendix. Alternate sources are sources or reasons that explain that statistically significant increases over background or statistically significant levels above the groundwater protection standard are not attributable to the CCR unit.



ALTERNATIVE SOURCE DEMONSTRATION REPORT

TEXAS STATE CCR RULE

H.W. Pirkey Power Plant

Flue Gas Desulfurization Stackout Area

Hallsville, Texas

Prepared for

American Electric Power

1 Riverside Plaza

Columbus, Ohio 43215-2372

Prepared by

Geosyntec Consultants, Inc.

500 West Wilson Bridge Road, Suite 250

Worthington, Ohio 43085

Project CHA8495

June 2023

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Attachment F: AD-33 Boring Log and Well Installation Diagram

Attachment G: Certification by a Qualified Professional Engineer

LIST OF ACRONYMS

Å	angstrom
amsl	above mean sea level
ASD	alternative source demonstration
bgs	below ground surface
CCR	coal combustion residuals
EPRI	Electric Power Research Institute
FGD	Flue Gas Desulfurization
GWPS	groundwater protection standard
LCL	lower confidence limit
MCL	maximum contaminant level
mg/L	milligrams per liter
SPLP	Synthetic Precipitation Leaching Procedure
SSL	statistically significant level
SU	standard unit
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
XRD	X-ray diffraction

1. INTRODUCTION AND SUMMARY

This alternative source demonstration (ASD) report has been prepared to address statistically significant levels (SSLs) for beryllium, cobalt, and mercury in the groundwater monitoring network at the H.W. Pirkey Plant Flue Gas Desulfurization (FGD) Stackout Area in Hallsville, Texas, following the second semiannual assessment monitoring event of 2022. The H.W. Pirkey Plant has four coal combustion residuals (CCR) storage units regulated by the Texas Commission on Environmental Quality (TCEQ) under Registration No. CCR104, including the FGD Stackout Area (**Figure 1**).

In November 2022, a semiannual assessment monitoring event was conducted at the FGD Stackout Area in accordance with Title 30, §352.951(a) of the Texas Administrative Code (TAC). The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. Groundwater protection standards (GWPSs) were established for each Appendix IV parameter in accordance with the statistical analysis plan developed for the unit (Geosyntec 2020a) and the United States Environmental Protection Agency (USEPA) document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance* (USEPA 2009). The GWPS for each parameter was established as the greater of either the background concentration or the maximum contaminant level (MCL). To determine background concentrations, an upper tolerance limit was calculated using pooled data from the background wells collected during the background monitoring and assessment monitoring events.

Confidence intervals were recalculated for Appendix IV parameters at the compliance wells to assess whether these parameters were present at SSLs above the GWPSs. Seasonal patterns were observed for cadmium, cobalt, and lithium, at AD-22 (Geosyntec 2023a). To correctly account for seasonality, confidence intervals for these wells and constituents were constructed using deseasonalized values. An SSL was attributed to a parameter if its lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). The following SSLs were identified at the Pirkey FGD Stackout Area (Geosyntec 2023a):

- The LCL for beryllium exceeded the GWPS of 0.00400 milligrams per liter (mg/L) at AD-22 (0.00468 mg/L).
- The deseasonalized LCL for cobalt exceeded the GWPS of 0.0560 mg/L at AD-22 (0.0713 mg/L).
- The LCL for mercury exceeded the GWPS of 0.00200 mg/L at AD-33 (0.00216 mg/L).

No other SSLs were identified.

1.1 CCR Rule Requirements

TCEQ regulations regarding assessment monitoring programs for CCR landfills and surface impoundments provide owners and operators with the option to make an ASD when an SSL is identified:

In making a demonstration under this subsection, the owner or operator must, within 90 days of detecting a statistically significant level above the groundwater protection standard of any constituent listed in Appendix IV adopted by reference in §352.1431 of this title,

submit a report prepared and certified in accordance with §352.4 of this title (relating to Engineering and Geoscientific Information) to the executive director, and any local pollution agency with jurisdiction that has requested to be notified, demonstrating that a source other than a CCR unit caused the exceedance or that the exceedance resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. (30 TAC §352.951(e))

Pursuant to 30 TAC §352.951(e), Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report to document that the SSLs identified for beryllium and cobalt at AD-22 and for mercury at AD-33 are from a source other than the FGD Stackout Area.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which each identified SSL could be attributed. Alternative sources were categorized into the following five types, based on methodology provided by the Electric Power Research Institute (EPRI 2017):

- ASD Type I: Sampling Causes
- ASD Type II: Laboratory Causes
- ASD Type III: Statistical Evaluation Causes
- ASD Type IV: Natural Variation
- ASD Type V: Alternative Sources

A demonstration was conducted to show that the SSLs identified for beryllium, cobalt, and mercury were based on a Type IV cause and not by a release from the Pirkey FGD Stackout Area.

2. SUMMARY OF SITE CONDITIONS

The Stackout Area design and construction, regional geology and site hydrogeology, and groundwater monitoring system and flow conditions are described below.

2.1 FGD Stackout Area Design and Construction

The Pirkey FGD Stackout Area is an approximately 7-acre storage area located due west of the Pirkey Plant (**Figure 1**). It was designed for temporary stockpiling of stabilized FGD material placed on the native clay soil in the unit until it can be hauled to the on-site landfill for disposal (Arcadis 2016). The ground surface elevation in the Stackout Area ranges from approximately 360 to 365 feet above mean sea level. Based on lithological borings advanced in the vicinity, the Stackout Pad is underlain by approximately 20 feet of clay (Arcadis 2016).

The maximum height of the stockpiles in the Stackout Area is approximately 41 feet above ground surface. Containment of contact water from the stockpiles is provided by a stone berm with a geomembrane cover constructed around the Stackout Area perimeter. Also, stockpiles are located no closer than approximately 50 feet from the Stackout Area perimeter (Arcadis 2016).

2.2 Regional Geology / Site Hydrogeology

The Stackout Area is positioned on an outcrop of the Eocene Recklaw Formation, which consists predominantly of clay and fine-grained sand (Arcadis 2016). The Recklaw Formation is underlain by the Carrizo Sand, which crops out in the topographically lower southern portion of the plant. The Carrizo Sand consists of fine- to medium-grained sand interbedded with silt and clay.

The very-fine- to fine-grained clayey and silty sand located about 10 to 20 feet below the Stackout Area, with an average thickness of approximately 20 feet, is considered to be the uppermost aquifer below this CCR unit (Arcadis, 2016).

2.3 Groundwater Monitoring System and Flow Conditions

The Stackout Area monitoring well network monitors groundwater within the uppermost aquifer, Geologic cross sections B-B' and E-E' from Arcadis (2016) show the subsurface structure of the uppermost aquifer (indicated on the figures as clayey silty sand, brown to gray in color) underlying the Stackout Area. These figures and a cross section location map are provided in **Attachment A**. The geologic cross sections demonstrate lateral continuity of the uppermost aquifer at and around the Stackout Area.

Groundwater flow direction at and near the Stackout Area is west-northwesterly (**Figure 1**). Groundwater flow velocities in the uppermost aquifer in the vicinity of the Stackout Area have been reported as approximately 5 to 35 feet per year. The Stackout Area monitoring well network consists of upgradient monitoring wells AD-12 and AD-13, and downgradient compliance wells AD-7, AD-22, and AD-33, all of which are screened within the uppermost aquifer.

3. ALTERNATIVE SOURCE DEMONSTRATION

The ASD evaluation method and proposed alternative source of beryllium, cobalt, and mercury, and future groundwater sampling requirements are described below.

3.1 Proposed Alternative Source

An initial review of site geochemistry, site historical data, and laboratory quality assurance and quality control data did not identify alternative sources for beryllium, cobalt, and mercury due to Type I (sampling), Type II (laboratory), Type III (statistical evaluation), or Type V (anthropogenic) issues. Groundwater sampling, laboratory analysis, and statistical evaluations were generally completed in accordance with 30 TAC §352.931 and the draft TCEQ guidance for groundwater monitoring (TCEQ 2020). As described below, the SSLs for beryllium and cobalt have been attributed to natural variation associated with seasonal effects, which is a Type IV (natural variation) issue. The SSL for mercury has also been attributed to natural variation associated with the lithology of the uppermost aquifer.

3.1.1 Beryllium

An SSL was identified for beryllium at AD-22 (Geosyntec 2023a). Previous ASDs for the FGD Stackout Area showed that beryllium concentrations at AD-22 appear to correlate with groundwater elevations (Geosyntec 2019, Geosyntec 2020b, Geosyntec 2020c, Geosyntec 2021a, Geosyntec 2021b, Geosyntec 2022, Geosyntec 2023b). This relationship generally still holds true (**Figure 2**). Beryllium concentrations at AD-22 are generally correlated with seasonal changes in other relatively mobile cationic constituents, including calcium and lithium (**Figure 3**). The correlation between beryllium and both monovalent (lithium) and divalent (calcium) cations suggests that the variability in observed beryllium concentrations is related to cation exchange behavior with clay minerals present in the native soil.

In March of 2020, the geology near AD-22 was relogged at soil boring SP-B4. Clay materials were present in the seasonally saturated zones above the permanent water table (**Figure 4**). The boring log for SP-B4 is provided in **Attachment B**, and the original boring log and well construction diagram for AD-22 is provided in **Attachment C**. At AD-22, the depth to water fluctuated between approximately 3 and 12 feet below ground surface (bgs). Clay was identified from approximately 0.7 feet bgs to 13.3 feet bgs, where it transitioned to a clayey silt (**Attachment B**). Analysis by X-ray diffraction (XRD) confirmed the presence of clay minerals within the seasonal water table and sand within the screened intervals for AD-22, as summarized in **Table 1**. The clay fraction of the uppermost samples collected from within the seasonal water table was further analyzed to identify the type of clays present. Smectite-type clays, which are 2:1-layer high-activity clays with characteristically high cation exchange capacity (compared to low-activity 1:1 clay minerals), make up the majority of the clay minerals present at those intervals.

Sorption and desorption of beryllium from smectite-type clays is well documented (You et al. 1989, Boschi and Willenbring 2016a). Desorption was found to be affected by pH, with 75% of beryllium desorbing from a smectite-type clay as pH decreased from 6.0 standard units (SU) to 3.0 SU (Boschi and Willenbring 2016b). The pH values recorded at AD-22 for samples collected under the Texas CCR Rule ranged from 3.9 to 5.1 SU, suggesting that conditions are favorable for beryllium desorption from smectite-type clays. The presence of these exchangeable clays provides further evidence that the exceedance of beryllium at AD-22 can be attributed to the effects on

groundwater quality of seasonal groundwater elevation changes and the resulting cation exchange between groundwater and the exchangeable clay within the seasonal water table.

3.1.2 Cobalt

An SSL was identified for cobalt at AD-22 using deseasonalized statistics (Geosyntec 2023a). According to the *Unified Guidance*, “seasonal correction should be done both to minimize the chance of mistaking a seasonal effect for evidence of contaminated groundwater, and also to build more powerful background to compliance point tests. Problems can arise, for instance, from measurement variations associated with changing recharge rates during different seasons” (USEPA 2009a).

As shown in previous ASDs (Geosyntec 2020b, Geosyntec 2020c, Geosyntec 2021a, Geosyntec 2021b, Geosyntec 2022, Geosyntec 2023b), the cobalt groundwater concentrations at AD-22 also appear to correlate with seasonal changes in groundwater elevation (**Figure 5**). In addition, the cobalt concentrations are well correlated with changes in other cations, including calcium and lithium (**Figure 6**), which suggests that natural variability associated with groundwater-mineral interactions within the seasonally saturated zone is governing dissolved cobalt concentrations.

A sample of the solid FGD sludge material accumulated on the FGD Stackout Area was collected in July 2019 and submitted for laboratory analyses. The solid-phase sample was leached using both Synthetic Precipitation Leaching Procedure (SPLP) analysis (SW-846 Test Method 1312 [USEPA 1994]) and Seven-Day Distilled Water Leachate Test Procedure (7-day leaching procedure) analysis (Appendix 4 of 30 TAC Chapter 335, Subchapter R [TAC 2016]) to evaluate the material as a potential source of cobalt. No changes to material handling or plant operations have occurred that would alter the anticipated chemical composition since this sample was initially collected. Calcium-cobalt ratios for the leached sludge material and site groundwater are displayed on **Figure 7**. The concentration ratio between calcium and cobalt is consistently on the order of 100:1 at both upgradient and downgradient locations (**Figure 7**). Calcium concentrations in groundwater are generally consistent between AD-22 and upgradient well AD-13 (**Figure 8**); however, leached calcium concentrations from the FGD sludge material are approximately two to three orders of magnitude greater than concentrations in site groundwater. The difference between the ratio of calcium to cobalt in the leached FGD sludge material (about 45,000:1) compared to the ratio for groundwater suggests that dissolved calcium concentrations at AD-22 would be significantly higher if the groundwater at this location were affected by leachate.

Siderite and pyrite, both reduced iron-bearing minerals, were identified below the seasonal water table (within the saturated zone) at AD-22 (**Table 1**). Cobalt is known to undergo isomorphic substitution for iron in both siderite and pyrite (Gross 1965, Hitzman et al. 2017, Krupka and Serne 2002). This is due to the similarity of their ionic radii (approximately 1.56 angstrom [Å] for iron and 1.52 Å for cobalt [Clementi and Raimondi 1963]). The proposed substitution of cobalt for iron in the crystal lattice of pyrite has been documented in other ASDs prepared for the Pirkey Plant’s East Bottom Ash Pond (Geosyntec 2023c) and West Bottom Ash Pond (Geosyntec 2023d).

Goethite (an iron hydroxide) was identified within the seasonally saturated zone and the screened interval at AD-22 (**Table 1**). The weathering of siderite and pyrite to goethite under oxidizing conditions is a well-understood phenomenon, including in formations in East Texas (Senkayi et al. 1986, Dixon et al. 1982) and may have occurred within the seasonally saturated zone. A review of geochemical conditions at AD-22 shows that the conditions observed at AD-22 are favorable

for goethite formation (**Figure 9**). During weathering from reduced (pyrite and siderite) to oxidized (goethite) iron minerals, isomorphically substituted cobalt may be released from the mineral structure into groundwater. The contribution of cobalt to groundwater via dissolution of siderite or pyrite within the saturated aquifer is not likely to change seasonally. However, the mobilization of cobalt, which was released during weathering of siderite or pyrite to goethite in the seasonally saturated zone, may explain the variability in aqueous cobalt concentrations and their correlation with the groundwater elevation.

3.1.3 Mercury

An SSL was identified for mercury at AD-33 (Geosyntec 2023a). If the mercury detected at AD-33 were derived from CCR leachate from the FGD Stackout Area, we would anticipate similar effects on the concentrations of other CCR constituents, particularly those known to be more conservative. Boron, a geochemically conservative parameter, has high leachability from FGD material (USEPA 2009b). A release from the FGD Stackout Area would be anticipated to result in higher concentrations of boron and other conservative parameters, such as sulfate; however, the observed boron and sulfate concentrations at AD-33 do not display increasing trends (**Figure 10**). Two samples of FGD sludge material from the Stackout Area were collected in 2019 for characterization to assess if the FGD material was a likely source of mercury to groundwater at AD-33. As summarized in **Table 2**, both the historical average and the most recent boron groundwater concentrations at AD-33 are two orders of magnitude lower than the boron concentrations in leachate from both Synthetic Precipitation Leaching Procedure (SPLP) analysis (SW-846 Test Method 1312 [USEPA 1994]) and Seven-Day Distilled Water Leachate Test Procedure (7-day leaching procedure) analysis (Appendix 4 of 30 TAC Chapter 335, Subchapter R [TAC 2016]) of FGD sludge (**Attachment D**). The lack of increasing boron in AD-33 groundwater despite the relatively higher concentration of leached boron from the FGD sludge suggests groundwater at AD-33 is not impacted by the unit.

The FGD sludge material had detectable levels of total mercury at concentrations greater than those reported for two samples of aquifer solids collected from a soil boring advanced adjacent to AD-33 (**Table 3, Attachment E**). While the concentration of mercury in the aquifer solids is lower than the total mercury concentration in FGD sludge material, the low mobility of mercury from FGD suggests the FGD sludge is not the source of mercury in groundwater (USEPA 2009b, Hao et al. 2016). As shown in **Figure 11**¹, previous mercury groundwater concentrations at AD-33 were consistently at or above the mercury concentrations of leachate from SPLP analysis of FGD sludge material (**Table 2, Attachment D**). Mercury concentrations of leachate from 7-day leaching procedure analysis of FGD sludge material were below the laboratory detection limit of 0.005 mg/L. These results are in agreement with previous studies that have found that leached mercury concentrations are not correlated with total solid phase mercury in FGD samples (USEPA 2009b).

Detectable concentrations of mercury in aquifer solids at AD-33 present an alternative source of mercury in groundwater. Mercury is naturally occurring in soils and known to undergo isomorphic substitution for iron in crystalline iron minerals such as pyrite (Manceau et. al 2018). Analysis by

¹ Due to a change in reported concentrations of more recent data, historical mercury data at well AD-33 were truncated to represent current groundwater quality conditions (Geosyntec 2023a).

XRD of material from the AD-33 soil boring showed detectable levels of pyrite below the seasonal water table (**Table 1**).

Reported differences between the total and dissolved mercury groundwater concentrations suggests that mercury is associated with colloidal material native from the aquifer. Dissolved concentrations of mercury at AD-33 are consistently lower than the reported total values (**Figure 11**), with most dissolved concentrations detected below the MCL of 2 µg/L. The method for measuring dissolved mercury in groundwater (EPA Method 245.7 [USEPA 2005]) involves filtering the sample through a 0.45 µm filter prior to analysis, which would remove colloid-sized particles prior to preservation. The inclusion of suspended particles (including colloids) in totals samples is likely to result in an overestimation of metals due to the mobilization of metals from the colloidal or solid to aqueous phase following acid preservation during sample collection. Thus, the lower dissolved mercury concentrations compared to total aqueous mercury suggests that mercury is associated with colloidal material from the aquifer and the SSL of mercury at AD-33 is not due to a release from the FGD Stackout Area.

3.1.4 Conceptual Site Model

The seasonal fluctuations in beryllium and cobalt concentrations at AD-22 can be attributed to variations in the amount of the aquifer solids that are in contact with groundwater as the water table elevation changes. When the water table is higher, more clay material is in contact with groundwater, allowing greater desorption of cations (including beryllium) from the cation exchange sites on the clay. In the case of cobalt, more iron oxides are in contact with groundwater as the water table rises, allowing for the release of cobalt from mineral phases where it has isomorphically substituted for iron. Thus, the observed SSLs were attributed to natural variation associated with seasonal fluctuation of beryllium and cobalt concentrations in groundwater as the amount of aquifer solids that are saturated increases. For mercury, seasonal variations in groundwater concentrations were not observed. The observed mercury concentrations in groundwater at AD-33 were attributed to interactions with mercury-bearing aquifer solids or colloids.

3.2 Sampling Requirements

Because the ASD presented above supports the position that the identified SSLs are not due to a release from the Pirkey FGD Stackout Area, the unit will remain in the assessment monitoring program. Groundwater at the unit will continue to be sampled for Appendix IV parameters semiannually.

4. CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with 30 TAC §352.951(e) and supports the position that the SSLs of beryllium and cobalt at AD-22 and mercury at AD-33 identified during the second semiannual assessment monitoring event of 2022 were not due to a release from the FGD Stackout Area. The identified SSLs were, instead, attributed to natural variation related to desorption of beryllium and seasonal dissolution of cobalt-bearing minerals comprising the aquifer solids. The mercury SSL was attributed to natural variation associated with the aquifer solids of the uppermost aquifer. Therefore, no further action is warranted, and the Pirkey FGD Stackout Area will remain in the assessment monitoring program. Certification of this ASD by a qualified professional engineer is provided in **Attachment G**.

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TABLES

**Table 1. X-Ray Diffraction Results
Alternative Source Demonstration Report
Flue Gas Desulfurization Stackout Area, H. W. Pirkey Plant**

Boring Location Associated Well	SP-B4		
	6-8	18-20	28-30
Depth (ft bgs)			
Sample Location	Within Seasonal Water Table	Below Seasonal Water Table	Within Screened Interval
Quartz	28	47.5	95
Plagioclase Feldspar	<0.5	<0.5	1
K-Feldspar	1	0.5	-
Goethite	1	-	2
Hematite	-	-	-
Chlorite	1	-	-
Siderite		10	-
Pyrite	-	2	-
Clays	*	40	2
Kaolinite	13		
Illite/Mica	2		
Smectite	43		
Mixed-Layered Illite/Smectite	11		

Notes:

1. Mineral constituents are reported in percentage.
 2. Values shown as less than indicate the mineral constituent is present but below the quantification limit.
- *: The clay fraction at SP-B4-6-8 was further analyzed to characterize the types of clays present, as listed below.
 -: not detected
 ft bgs: feet below ground surface

**Table 2. Summary of Key Analytical Data
Alternative Source Demonstration Report: Texas State CCR Rule
FGD Stackout Area, H.W. Pirkey Plant**

Sample	Type	Mercury (µg/L)	Boron (mg/L)
Pirkey Sludge FGD	SPLP	2.272	22.3
	7-Day Leaching Procedure	<5	8.44
Pirkey Sludge FGD 2	SPLP	<0.025	26.7
	7-Day Leaching Procedure	<5	16.4
AD-33	Historical Average	4.72	0.117
	Nov-22	5.9	0.086

Notes:

1. Average values were calculated using truncated mercury and boron data (March 2020-November 2022).
2. Pirkey Sludge FGD samples were collected on July 17, 2019.
3. Non-detect values reported as less than (<) the detection limit.

CCR: coal combustion residuals

FGD: Flue Gas Desulfurization

mg/L: milligram per liter

SPLP: Synthetic Precipitation Leaching Procedure

µg/L: micrograms per liter

**Table 3. Solid Phase Mercury Data
Alternative Source Demonstration Report
FGD Stackout Area, H.W. Pirkey Plant**

Location ID	Date Sampled	Sample Depth (ft bgs)	Mercury (mg/kg)
AD-33	4/30/2018	11	0.0026
		21	0.0038
Pirkey Sludge FGD	7/17/2019	N/A	0.653
Pirkey Sludge FGD 2	7/17/2019	N/A	0.606

Notes:

1. For AD-33 locations, samples were collected from additional boreholes advanced in the immediate area of AD-33. Samples were not collected from the cuttings of the borings advanced for well installation.

FGD: Flue Gas Desulfurization

ft bgs: feet below ground surface

mg/kg: milligram per kilogram

N/A: not applicable

FIGURES



Potentiometric Contours - Uppermost Aquifer
November 2022
 AEP Pitkey Power Plant
 Hallsville, Texas

Digitally signed
 by Beth Gross,
Beth Ann Gross
 Date: 2023.01.23
 09:40:36 -05'00'
 Texas Eng Firm
 Registration No. 1182

Notes

- Monitoring well coordinates and water level data (collected on November 15, 2022) provided by AEP.
- Site features based on information available in CCR Groundwater Monitoring Well Network Evaluation Update (Arcadis, 2022) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- AD-10, AD-19, AD-20, AD-21, AD-29, and W-3 were not gauged during the November 2022 event.
- AD-35 was abandoned on November 13, 2018.

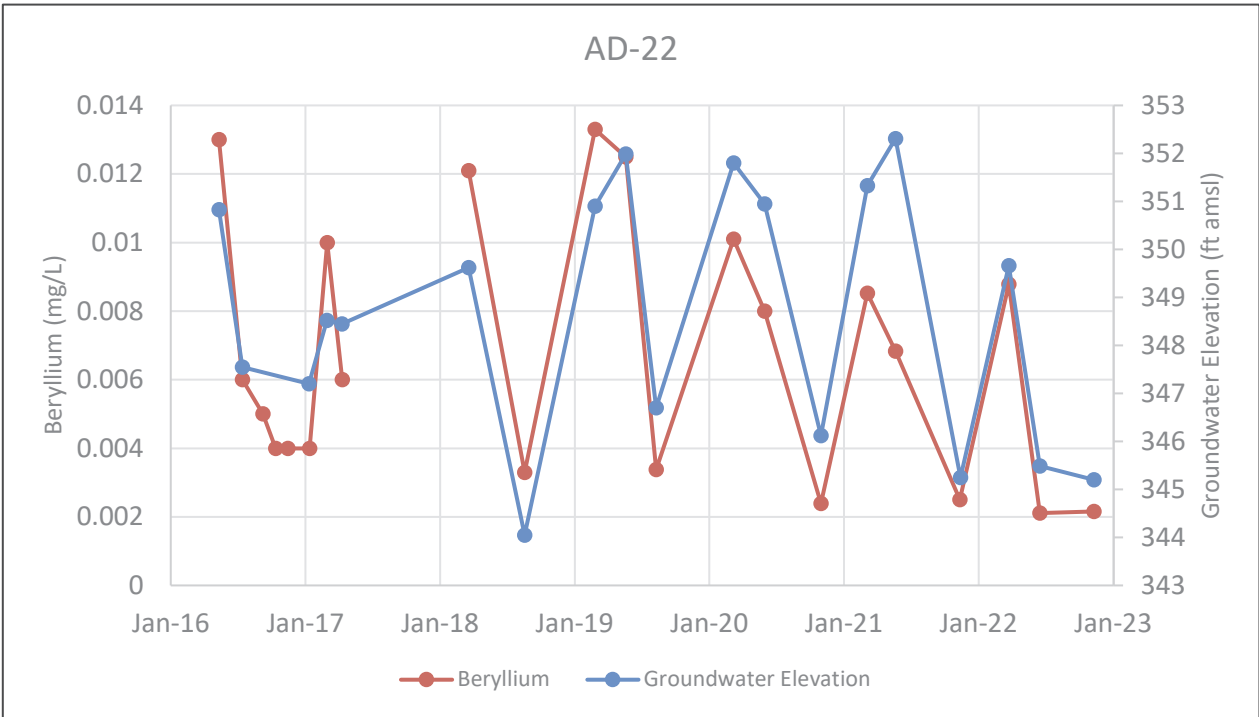
Legend

- Groundwater Monitoring Wells
- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP
- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Groundwater Elevation Contours (Interred)
- Approximate Groundwater Flow Direction



Scale: 1,000 feet

Figure 1



Notes: Beryllium concentrations are shown in milligrams per liter (mg/L). Water level is shown as groundwater elevation in feet above mean sea level (ft amsl). The gap in beryllium data represents the time period in which detection monitoring took place and samples were not analyzed for beryllium.

FGD: Flue Gas Desulfurization

Beryllium v. Groundwater Elevation
Pirkey FGD Stackout Pad

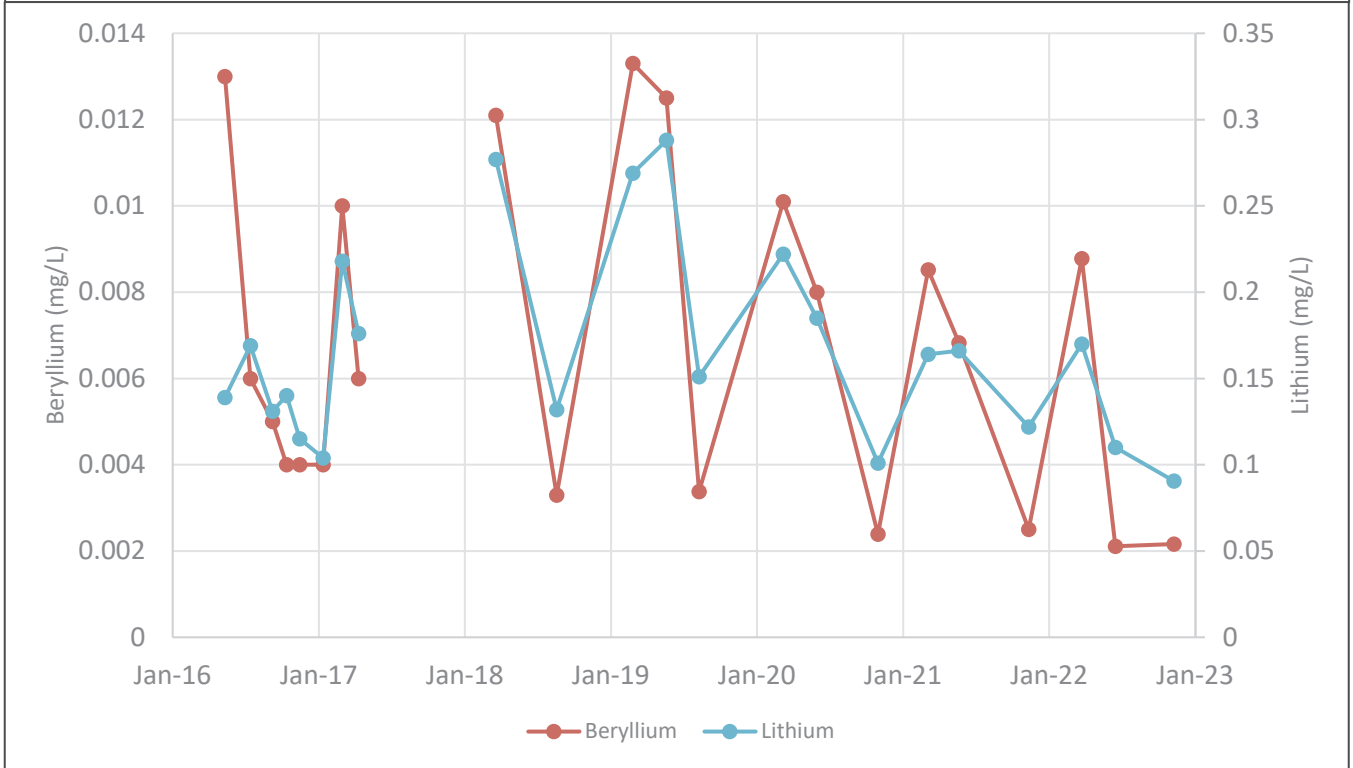
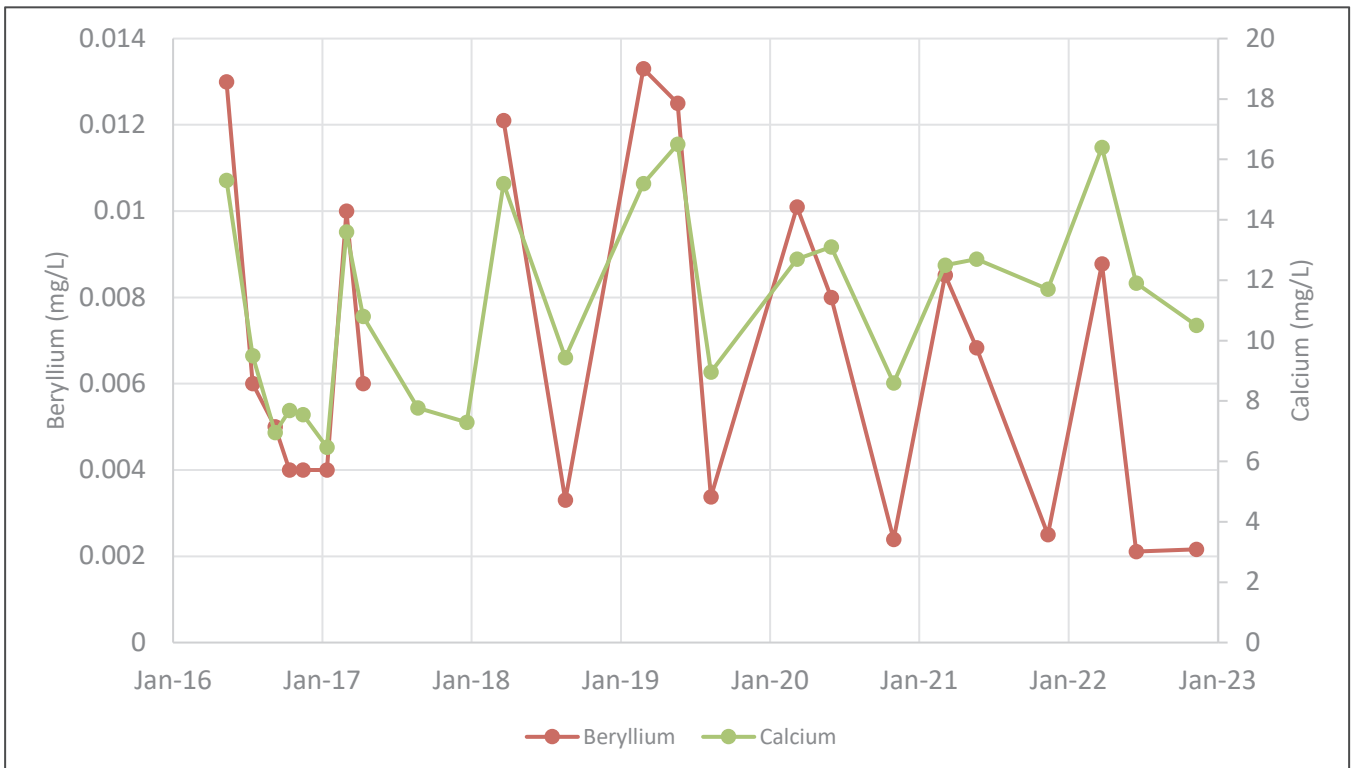


Figure

2

Columbus, Ohio

Jun-2023



Notes: Beryllium, calcium, and lithium concentrations are shown in milligrams per liter (mg/L). The gaps in beryllium data represent the time period in which detection monitoring took place and samples were not analyzed for beryllium and lithium.

FGD: Flue Gas Desulfurization

Beryllium v. Calcium and Lithium

Pirkey FGD Stackout Pad



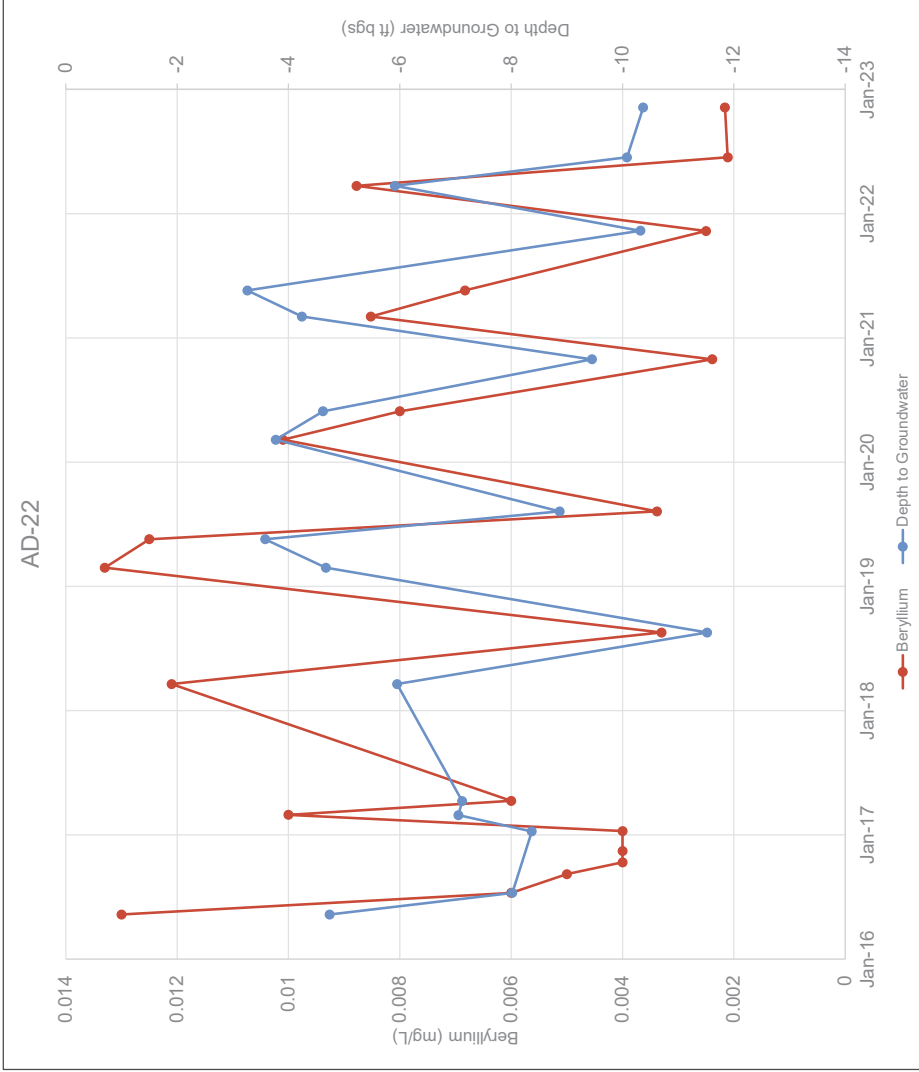
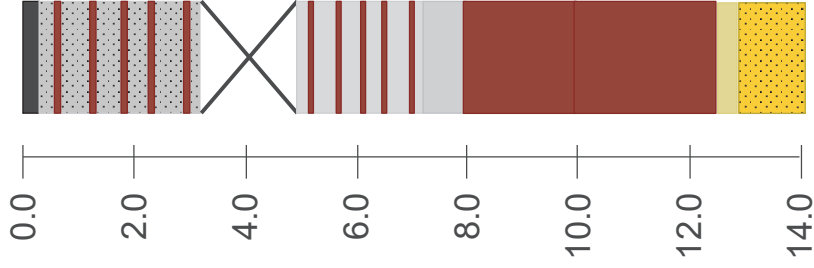
Figure

3

Columbus, Ohio

Jun-2023

Depth (ft bgs)



Notes:
 1. A sample was collected for analysis of mineralogy from 6-8 ft bgs.
 2. This illustration represents the log for boring SP-B4. The full boring log is available in Attachment D.
 3. AD-22 is screened at the interval of 10-30 ft bgs.

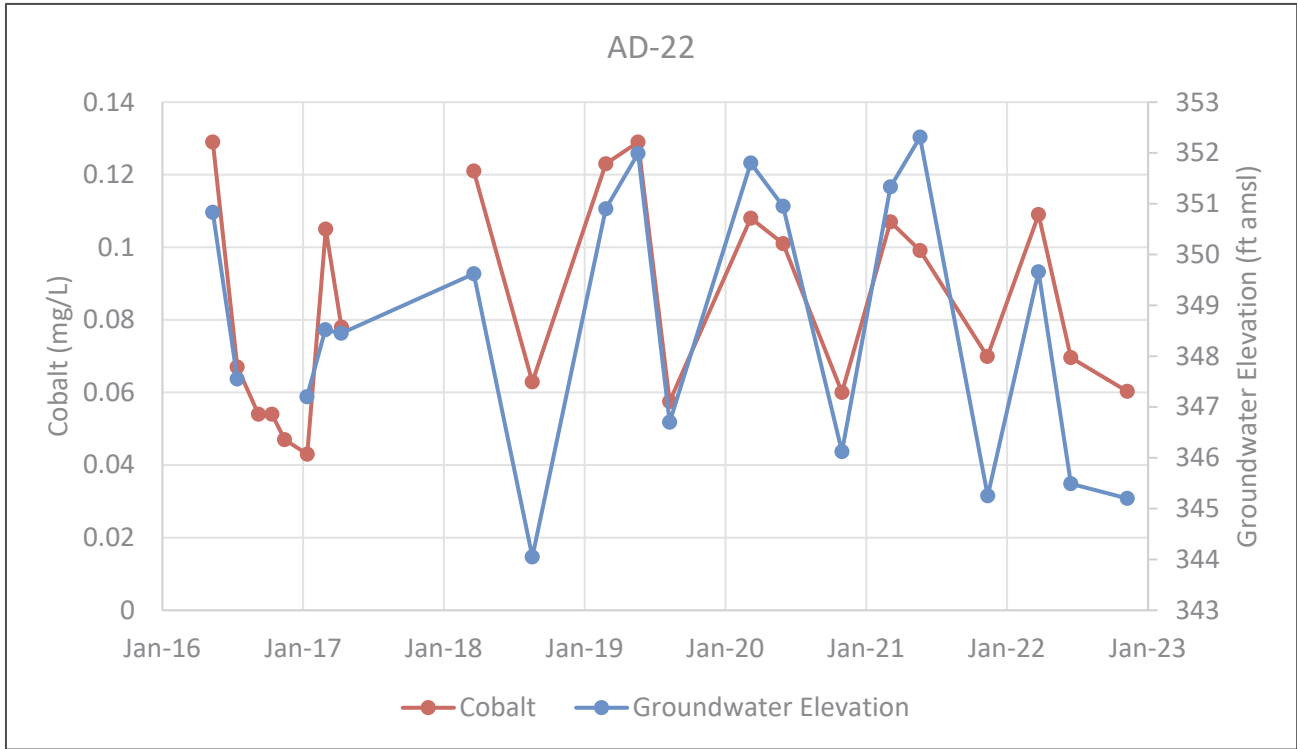
FGD: Flue Gas Desulfurization
 ft bgs: feet below ground surface
 mg/L: milligrams per liter

AD-22 Seasonal Water Table Geology
 Pirkey FGD Stackout Pad



Columbus, OH Jun-2023

Figure
4



Notes: Cobalt concentrations are shown in milligrams per liter (mg/L). Water level is shown as groundwater elevation in feet above mean sea level (ft amsl). The gap in cobalt data represents the time period in which detection monitoring took place and samples were not analyzed for cobalt.

FGD: Flue Gas Desulfurization

AD-22 Cobalt v. Groundwater Elevation
Pirkey FGD Stackout Pad

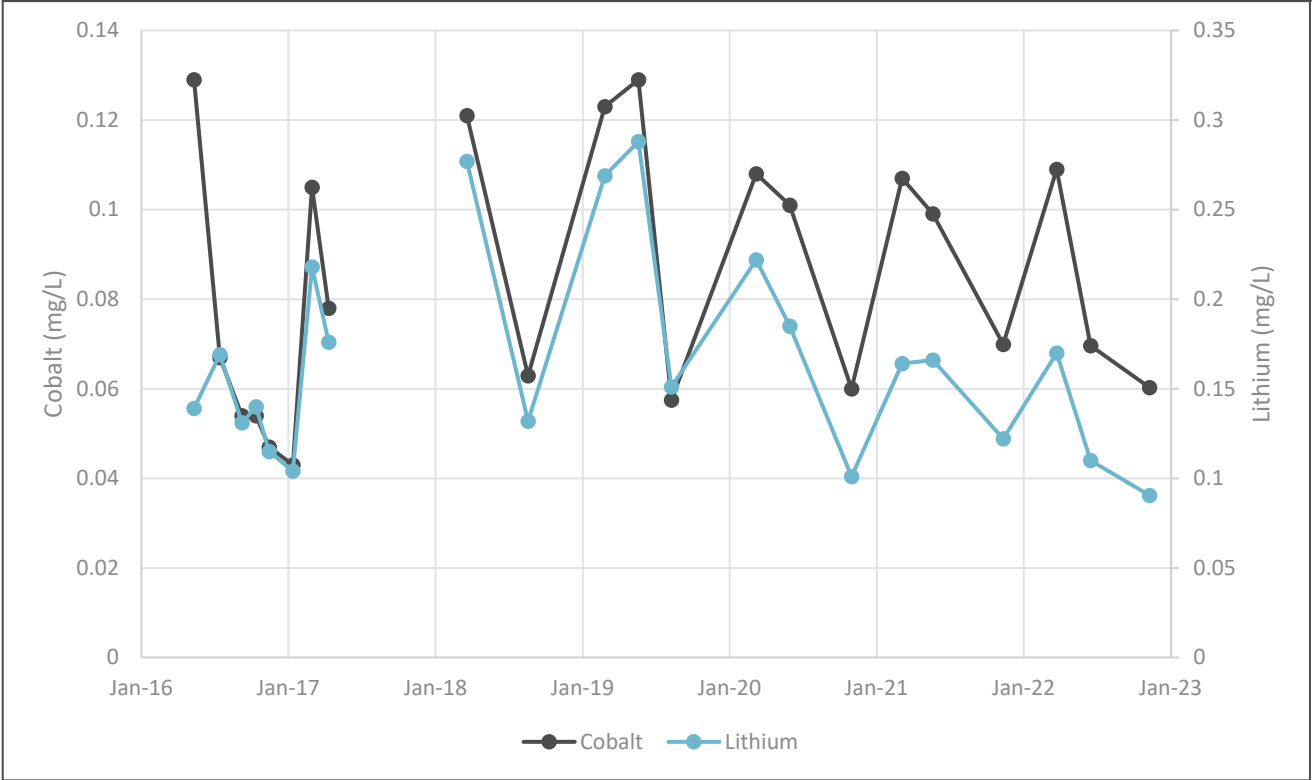
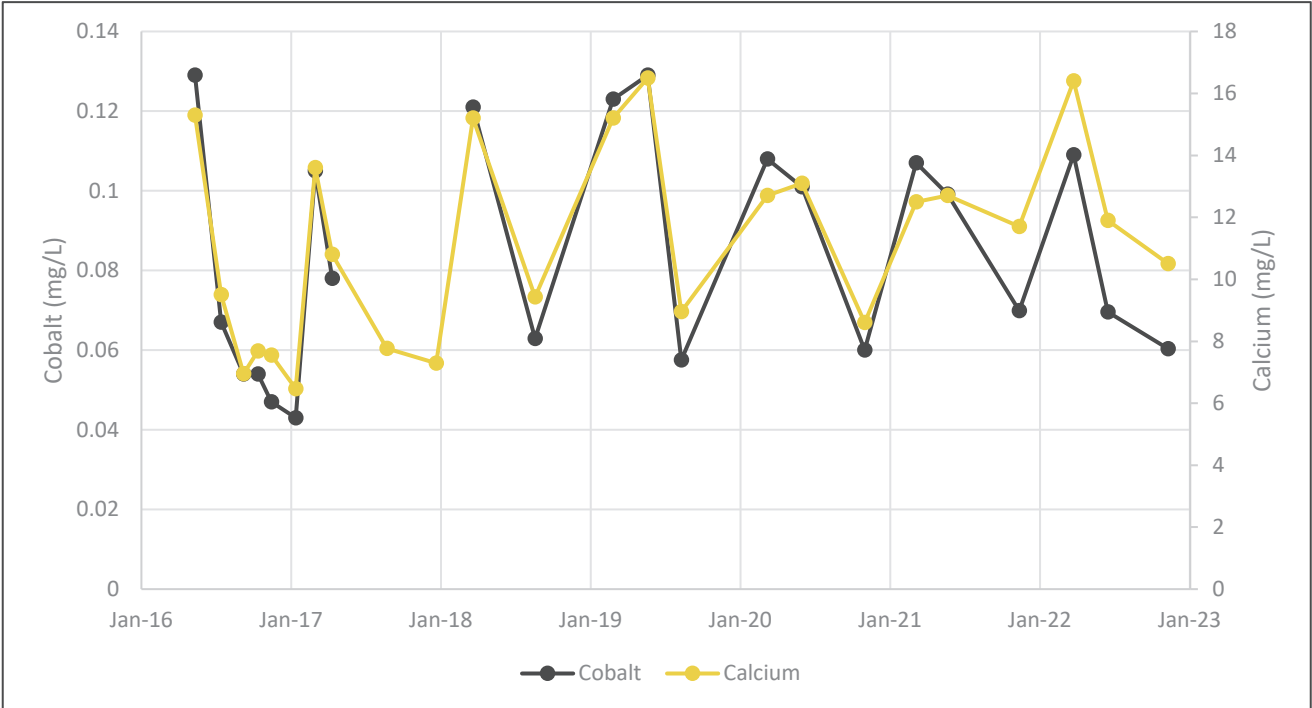


Figure

5

Columbus, Ohio

Jun-2023



Notes: Cobalt, calcium, and lithium concentrations are shown in milligrams per liter (mg/L). The gaps in cobalt and lithium data represent the time period during which detection monitoring took place and samples were not analyzed for cobalt and lithium.

FGD: Flue Gas Desulfurization

AD-22 Cobalt v. Calcium and Lithium
Pirkey FGD Stackout Pad

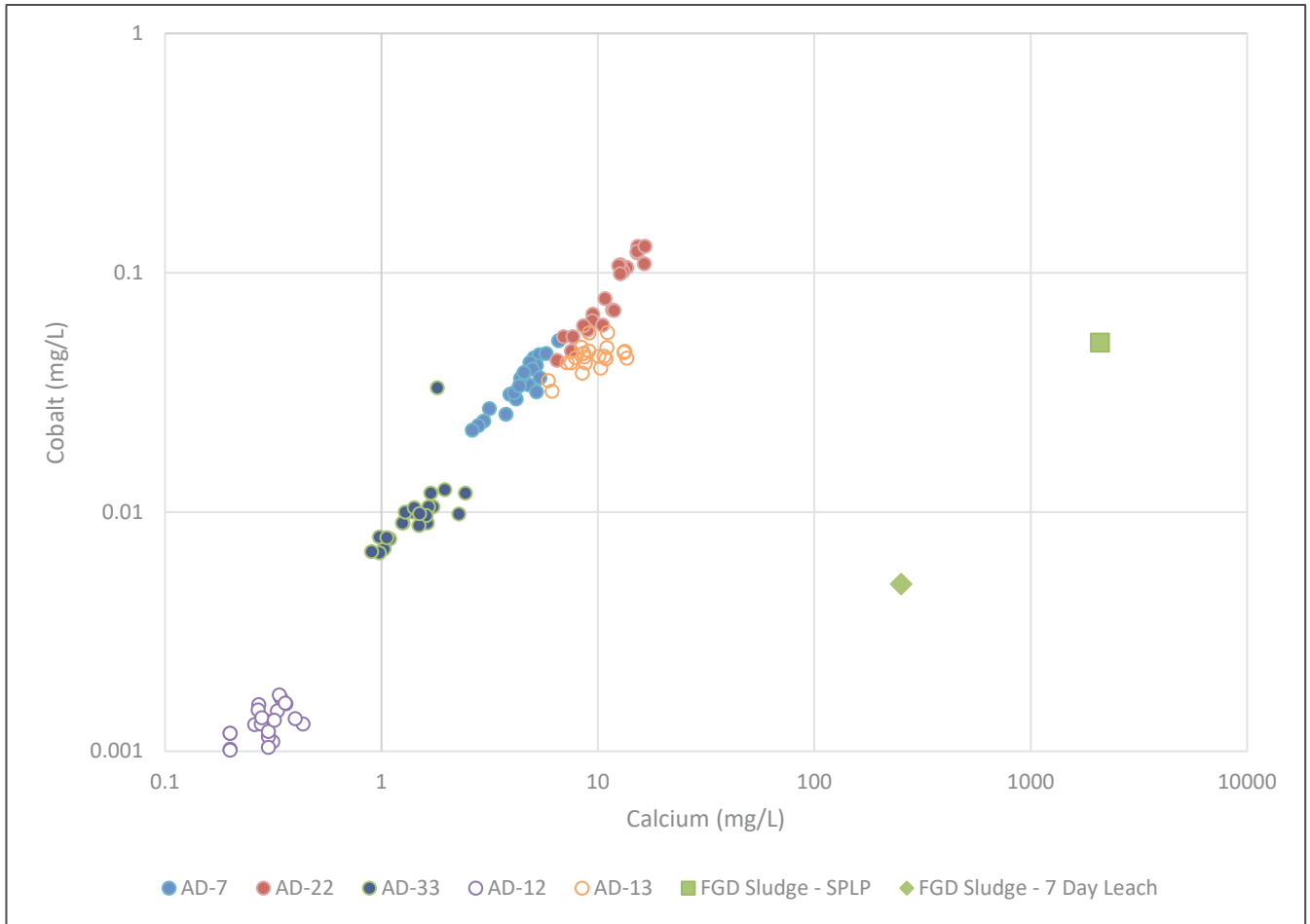


Figure

6

Columbus, Ohio

Jun-2023



Notes: Cobalt and calcium concentrations are shown in milligrams per liter (mg/L). Upgradient wells are shown with hollow circles. ‘FGD Sludge-SPLP’ and ‘FGD Sludge 7 Day Leach’ present the leached concentrations of cobalt and calcium using the Synthetic Precipitation Leaching Procedure (SPLP) (SW-846 Test Method 1312) and the 7-Day Distilled Water Leachate Test Procedure (30 Texas Administration Code 335.521 Appendix 4), respectively. FGD: Flue Gas Desulfurization

Cobalt and Calcium Concentration Distribution

Pirkey FGD Stackout Pad

Geosyntec
consultants

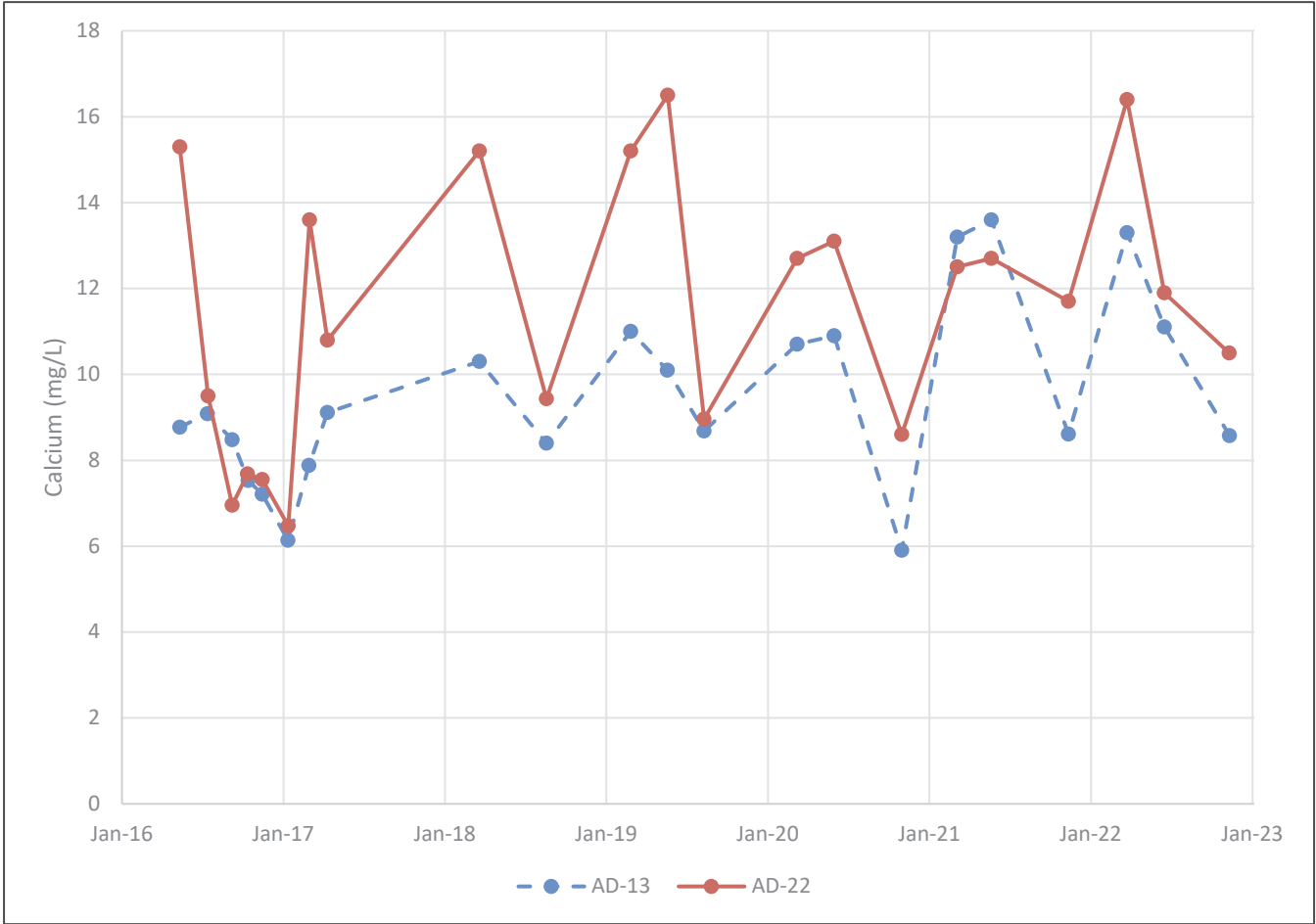


Figure

7

Columbus, Ohio

Jun-2023



Notes: Calcium concentrations are shown in milligrams per liter (mg/L). Upgradient monitoring well AD-13 is shown with a dashed line.

FGD: Flue Gas Desulfurization

Calcium Time Series Graph
Pirkey FGD Stackout Pad

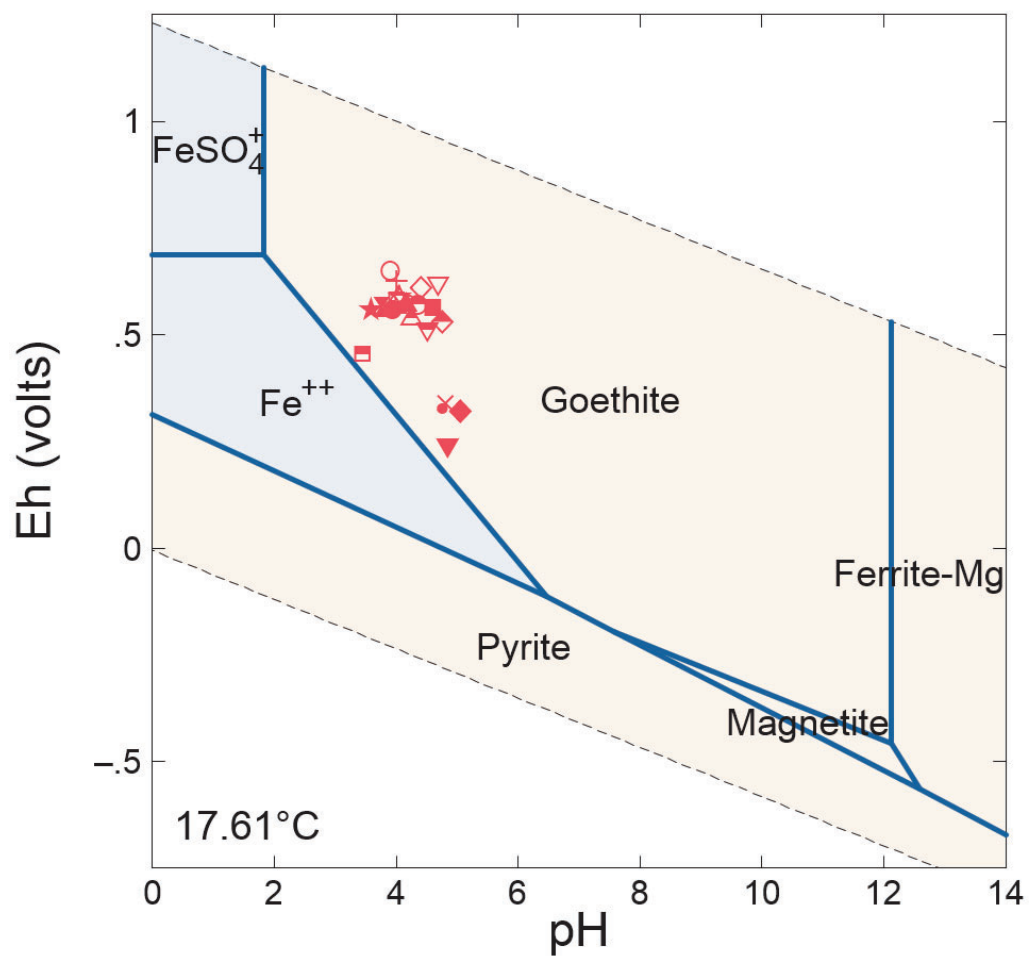


Figure

8

Columbus, Ohio

Jun-2023



- 11-May-16
- 14-Jul-16
- △ 07-Sep-16
- ▽ 12-Oct-16
- ◇ 14-Nov-16
- 12-Jan-17
- × 01-Mar-17
- ☆ 11-Apr-17
- 23-Aug-17
- 21-Mar-18
- ▲ 20-Aug-18
- ▼ 27-Feb-19
- ◇ 22-May-19
- 12-Aug-19
- × 10-Mar-20
- ☆ 02-Jun-20
- × 02-Nov-20
- +
- 08-Mar-21
- 24-May-21
- 15-Nov-21
- ▲ 28-Mar-22
- ▼ 20-Jun-22
- ◇ 14-Nov-22

Notes: Groundwater concentrations of major cations and anions at AD-22 from the November 2022 sampling event were used to establish baseline conditions for the diagram. Eh and pH values for sampling dates at AD-22 are shown on the diagram.

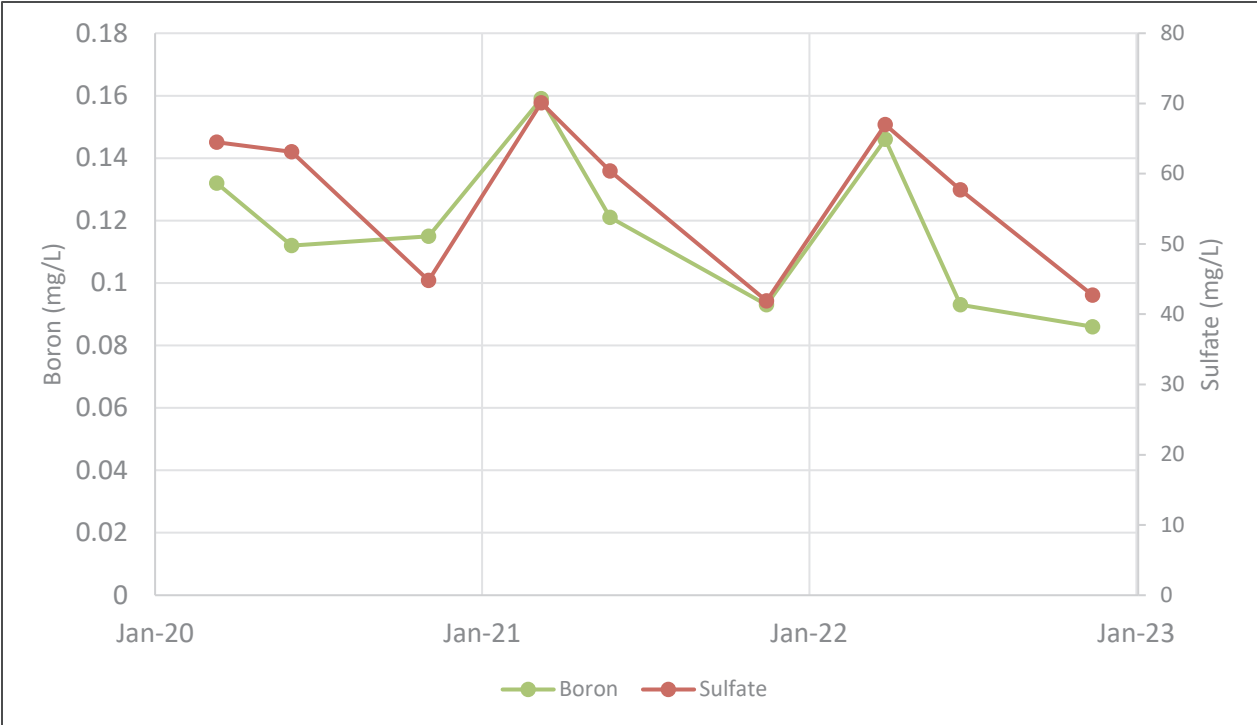
AD-22 Eh-pH Diagram
Pirkey FGD Stackout Pad



Figure
9

Columbus, Ohio

Jun-2023



Notes: Boron and sulfate concentrations are shown in milligrams per liter (mg/L).

FGD: Flue Gas Desulfurization

Boron and Sulfate Time Series Graph
Pirkey FGD Stackout Pad

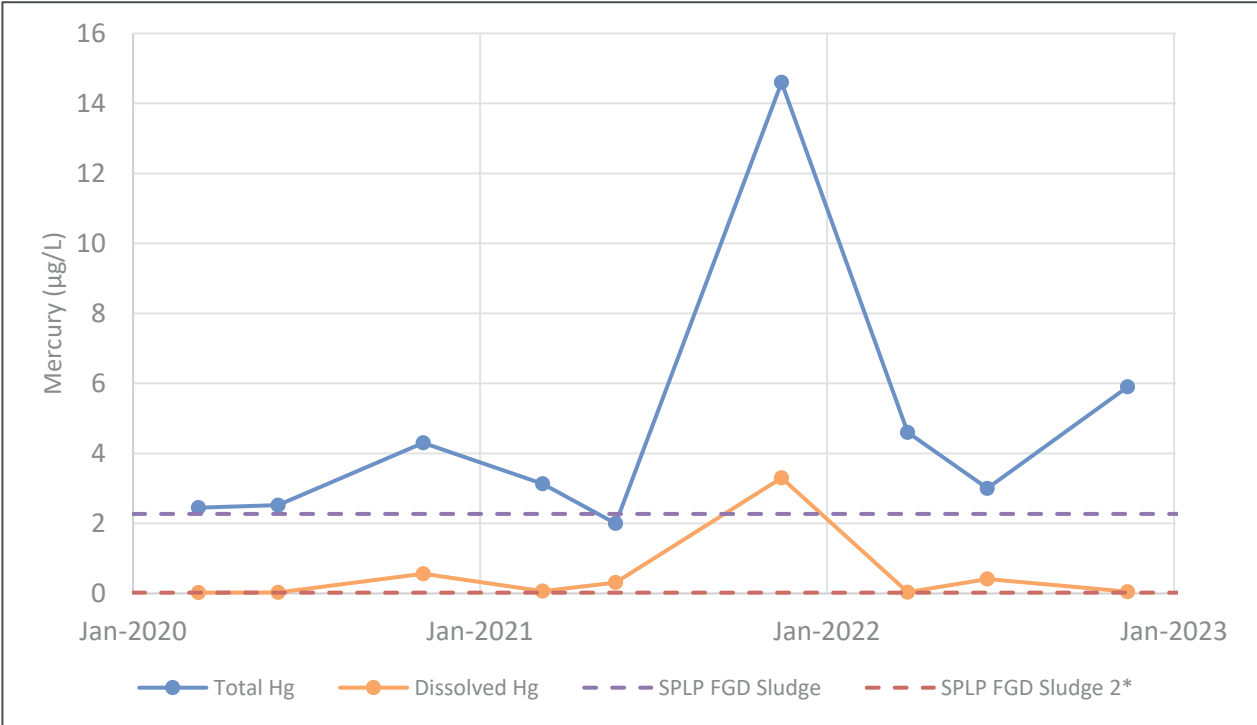


Figure

10

Columbus, Ohio

Jun-2023



Notes: Mercury (Hg) concentrations are shown in micrograms per liter (µg/L). FGD sludge samples collected on 7/17/2019. 7-day leaching procedure results were not shown due to non-detects.

*: Non-detect presented as the reporting limit
 FGD: Flue Gas Desulfurization
 SPLP: Synthetic Precipitation Leaching Procedure

Mercury Time Series Graph
 Pirkey FGD Stackout Pad



Figure

11

Columbus, Ohio

Jun-2023

ATTACHMENT A

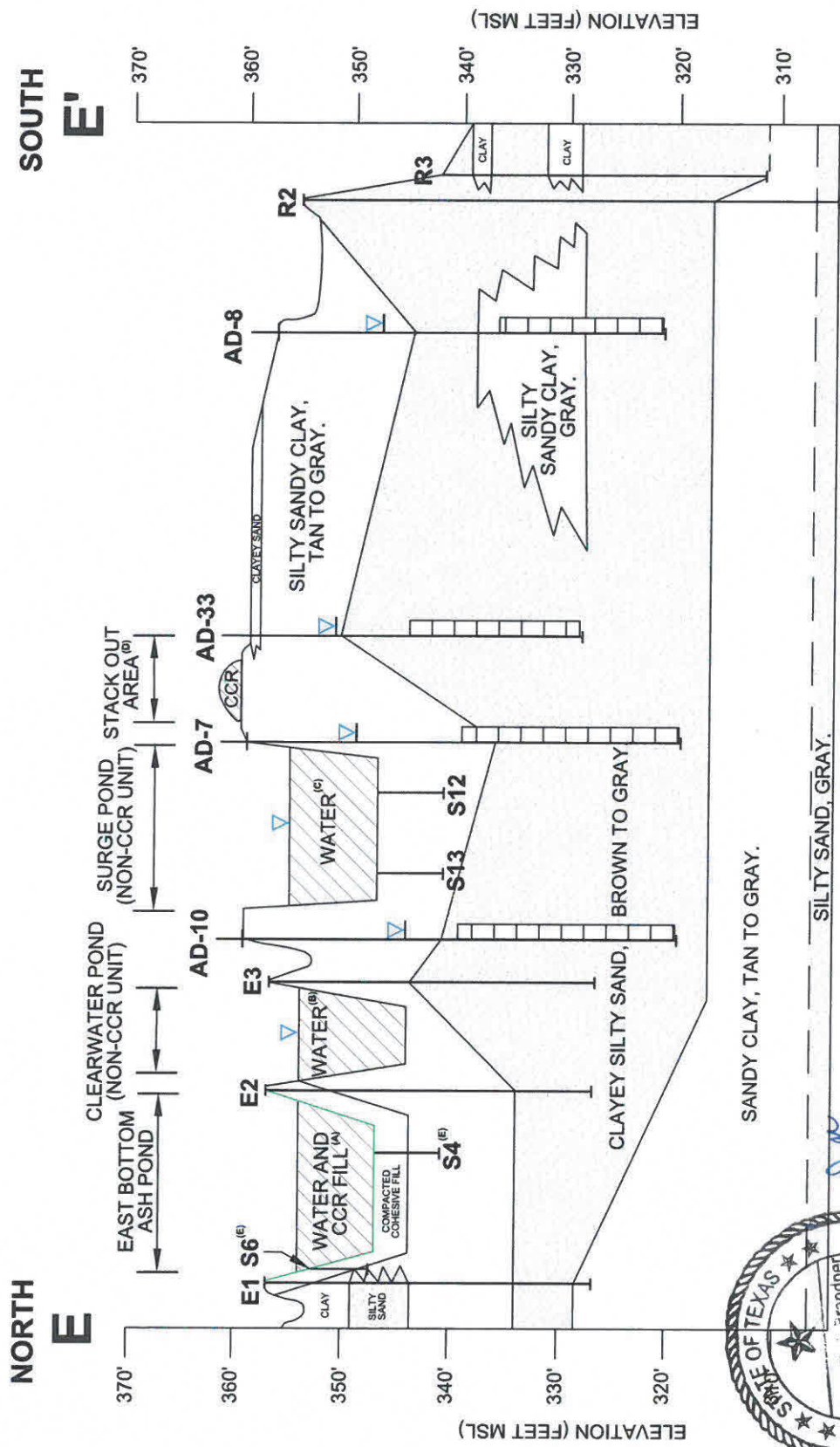
Geologic Cross Sections



PIRKEY POWER PLANT
 2400 FM 3251
 HALLSVILLE, HARRISON COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

FIGURE 3



- NOTES:
- A) TOP OF EAST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357. TOP OF SURGE POND PERIMETER BERM ELEVATION IS 357. TOP OF CLEARWATER POND PERIMETER BERM ELEVATION IS 357. TOP OF EAST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357. TOP OF SURGE POND PERIMETER BERM ELEVATION IS 357. TOP OF CLEARWATER POND PERIMETER BERM ELEVATION IS 357.
 - B) TOP OF CLEARWATER POND PERIMETER BERM ELEVATION IS 357. TOP OF SURGE POND PERIMETER BERM ELEVATION IS 357. TOP OF EAST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357. TOP OF SURGE POND PERIMETER BERM ELEVATION IS 357. TOP OF CLEARWATER POND PERIMETER BERM ELEVATION IS 357.
 - C) POND IS 354' (JOHNSON & PACE, MAY 2011). BASE ELEVATION OF CLEARWATER POND IS 344' (SARGENT & LUNDY, JANUARY 1983).
 - D) DESIGN SURVEY FROM JANUARY 31, 1983 (SARGENT & LUNDY REPORT). DESIGN SURVEY FROM JANUARY 31, 1983 (SARGENT & LUNDY REPORT).
 - E) SOIL BORING INSTALLED BY SOUTHWESTERN LABORATORIES DURING ASH POND CONSTRUCTION IN 1983.



- LEGEND
- ☐ MONITORING WELL SCREENED INTERVAL
 - ▽ WATER LEVEL IN MONITORING WELL (1/20/16)
 - BASE OF CCR UNIT



PIRKEY POWER PLANT
 2400 FM 3251
 HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION
E-E'

FIGURE 8

ATTACHMENT B

SP-B4 Boring Log

Soil Boring Log

Project: AEP Pirkey

Boring/Well Name: _____ SP-B4

Project Location: _____ Hallsville, TX

Boring Date: __ 3/3/2020


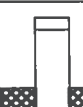

Depth Scale Feet	Water Table	Soil Profile Description	PID*
0		pp= pocket penetrometer	
		0.0'-0.4': Top soil, black silt, vegetation	
		0.4'-0.7': Brown clayey silt, good cohesion	
		0.7'-1.5': Red and light gray silty clay, moderate stiffness (pp. 2.5), high plasticity	
		1.5'-3.7': Maroon and light gray clay, high stiffness (pp. 4.5-5.0), low plasticity; iron ore present 3.1'-3.7'	
		3.7'-5.0': NO RECOVERY	
5		5.0'-7.0': Maroon and light gray clay, high stiffness (pp. 4.5-5.0), low plasticity; iron ore present throughout	
		7.0'-8.0': Light gray clay with iron ore, moderate stiffness (pp.2.5-3.0), moderate plasticity	
		8.0'-10.0': Maroon clay, moderate stiffness (pp. 3.5), moderate plasticity; iron ore present; moist at 9'	
10		10.0'-12.6': Maroon clay, moderate stiffness (pp. 3.5), moderate plasticity; iron ore present; wet at 12'	
	▼	12.6'-13.3': Tan clay, low stiffness (pp.1.5), high plasticity; wet	
		13.3'-18.5': Tan and brown clayey silt, moderate cohesion; iron ore present; wet	
15			
		18.5'-20.3': Maroon silty clay, low stiffness (pp. 1.0), moderate plasticity; iron ore; wet	
20		20.3'-21.1': Dark gray/black clay, trace silt, low stiffness (pp. 1.5), high plasticity; wet	
		21.1'-21.3': Dark gray silt, good cohesion; wet	
		21.3'-21.9': Dark gray silty clay, low stiffness (pp. 1.5), high plasticity; wet	
		21.9'-22.3': Dark gray silt, moderate cohesion; wet	
		22.3'-22.7': light brown silt; low cohesion; wet	
		22.7'-24.4': Dark gray and dark green silty clay, moderate/high stiffness (pp.3.5), moderate plasticity; wet, glauconite present	
25		24.4'-27.8': Dark green/gray fine grained sand, well sorted; wet; glauconite present	
		27.8'-30.0': Red and orange fine grained sand, well sorted, with iron ore; wet	
30			
		Samples collected at 6-8'; 18-20'; 28-30'	
		TD at 30' bgs; refusal	
		*PID readings not collected	
35			

Drill Rig Geoprobe 3230 DT
 Drilling Contractor: _____ C&S
 Driller: _____ DJ Diduch

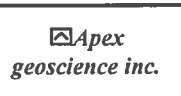
Geosyntec Consultants

ATTACHMENT C
AD-22 Boring Log and Well Installation Diagram

BORING MONITOR WELL
 APEX PROJECT NO.: 110-089 BORING NUMBER: _____ MONITOR WELL NUMBER: AD-22
 FACILITY NAME: AEP- Pirkey Power Plant FACILITY ID NO.: N/A
 FACILITY ADDRESS: Hallsville, Texas
 DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig
 DRILLER: Ed Wilson, Apex Geoscience Inc. COMPLETION DATE: 12/16/2010
 PREPARED BY: David Bedford LOGGED BY: David Bedford
 LATITUDE: N 32°27'03.3" Datum: WGS-84 WELL LOCATION: Triangle- South side Quansit Hut
 LONGITUDE: W94°29'41.3"

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture	
1				0-0.5	SC	Clayey sand, light brown, very fine grained	None	Moist
2				0.5-12	CL	Lean clay, light brown mottled with light gray	None	Slightly Moist
3								
4						Few iron ore (small) pebbles in clayey sandy streaks		
5								
6								
7								
8								
9								
10								
11								
12								
13				12-20	SC	Clayey sand, grayish brown with orangish brown streaks, very fine grained	None	Slightly Wet
14						Slightly wet @ 12.5' from seepage		
15						Large amount of iron ore 15-17'		
16								
17								
18						Very firm 18-18.5'		
19								
20								
21				20-25	SC	(Dense crystalline rock 21-21.1'), light brown clayey sand, greenish black, mica, black clay streaks, very fine grained, wet @ 20'	None	Wet
22								
23								
24								
25								
26				25-30	SM	Sand, greenish brown (1') grading to orangish brown, silty, very fine grained	None	Wet
27								
28								
29								
30								
31						Boring Terminated at 30'		
32								
33								
34								
35								
36								
37								
38								
39								
40								

 Cement
  Bentonite
  Filter Sand
  Water Level



Total Depth: 30 feet Riser Interval: +3 (ags)-10'
 Filter Sand (Size/Interval): 8-30' Screen Interval: 10-30'
 Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-8' Water level: 12.5'
 Surface Completion Flush Above Ground 3'

Note: This log is not to be used separate from this report.

ATTACHMENT D
FGD Sludge Materials Analytical Report



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue	
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101	
	Phone: (318) 673-2721	Fax: (318) 673-3960	
AEP Sample ID : 227040		By: RF	
Cust Sample ID: Dirt/Sludge		Matrix: Solid	
Sample Desc.: Pirkey Sludge FGD Total			
Collected Date: 07/17/2019			
Location: H.W. Pirkey Power Plant			

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	20500	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Antimony	0.993	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Arsenic	28.3	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Barium	142	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Beryllium	2.12	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Boron	845	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18	M4	JDB
Cadmium	1.68	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Calcium	77500	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Chromium	30.6	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Cobalt	24.8	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Copper	30.2	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Dry Weight, Percent	94.7	%	0.001	1		07/22/2019 15:30	T5	JDB
Iron	36300	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:18	M4	JDB
Lead	5.31	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Lithium	11.5	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47	T5	JDB
Magnesium	7150	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Manganese	498	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Mercury	0.653	mg/Kg	0.00025	1	EPA 7471B 1998	07/24/2019 14:37		LNM
Molybdenum	8.45	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Nickel	28.8	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Potassium	1370	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Selenium	36.4	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Silver	0.208	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Sodium	1230	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Strontium	382	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Thallium	0.503	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)		Address: 502 North Allen Avenue					
Date Received: 07/18/2019	Contact: Terry Wehling		Shreveport, LA 71101					
	Phone: (318) 673-2721		Fax: (318) 673-3960					
Tin	1.28	mg/Kg	0.2	1:50	EPA 6010B 1996	07/26/2019 0:47	T5	JDB
Titanium	1360	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18	M4	JDB
Vanadium	77.5	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Zinc	26	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Waste Characterization (227040)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
pH, Soil	8.44	pH		1	EPA 9045D 2002	07/25/2019 12:30		GB

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Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue	
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101	
	Phone: (318) 673-2721	Fax: (318) 673-3960	
AEP Sample ID : 227041		By: RF	
Cust Sample ID: Dirt/Sludge		Matrix: Solid	
Sample Desc.: Pirkey Sludge FGD SPLP			
SPLP (227041)			

Collected Date: 07/17/2019
Location: H.W. Pirkey Power Plant

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	14.2	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Antimony	0.018	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Arsenic	0.015	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Barium	3.46	mg/L	0.05	1:50	EPA 1312/6010B	1996		JDB
Beryllium	0.012	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Boron	22.3	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Cadmium	0.002	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Calcium	2090	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Chromium	0.005	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Cobalt	0.051	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Copper	0.009	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Iron	52.4	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Lithium	0.146	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Magnesium	62.3	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Manganese	2.83	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Mercury	0.002272	mg/L	0.00025	1	EPA 7470A	1994		LNM
Molybdenum	0.229	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Nickel	0.054	mg/L	0.025	1	EPA 1312/6010B	1996		JDB
Potassium	9.61	mg/L	0.01	1	EPA 1312/6010B	1996		JDB
Selenium	0.93	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Sodium	35.6	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Strontium	12.7	mg/L	0.05	1:50	EPA 1312/6010B	1996		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB

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 Phone: (318) 673-3802
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Report ID	: 40143	Company:	SEP - Flint Creek (TW)			Address:	502 North Allen Avenue		
Date Received:	07/18/2019	Contact:	Terry Wehling				Shreveport, LA 71101		
		Phone:	(318) 673-2721			Fax:	(318) 673-3960		
Titanium	0.041	mg/L	0.005	1	EPA 1312/6010B	1996	07/25/2019	23:09	JDB
Vanadium	0.269	mg/L	0.001	1	EPA 1312/6010B	1996	07/25/2019	23:09	JDB
Zinc	0.299	mg/L	0.005	1	EPA 1312/6010B	1996	07/25/2019	23:09	JDB

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Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue	
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101	
	Phone: (318) 673-2721	Fax: (318) 673-3960	
AEP Sample ID : 227042		By: RF	
Cust Sample ID: Dirt/Sludge		Matrix: Solid	
Sample Desc.: Pirkey Sludge FGD 7 Day Leachate			
7-Day Leachate (227042)			

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	0.563	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Antimony	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Arsenic	0.011	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Barium	0.134	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Beryllium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Boron	8.44	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:43		JDB
Cadmium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Calcium	252	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:43		JDB
Chromium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Cobalt	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Copper	0.002	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Iron	0.211	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Lithium	0.069	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Magnesium	6.73	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Manganese	0.008	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Mercury	< 0.005	mg/L	0.005	1:200	EPA 7470A 1994	07/30/2019 10:19		LNM
Molybdenum	0.18	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Nickel	< 0.025	mg/L	0.025	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Potassium	4.82	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Selenium	0.208	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Sodium	19.8	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:43		JDB
Strontium	1.6	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)		Address: 502 North Allen Avenue				
Date Received: 07/18/2019	Contact: Terry Wehling		Shreveport, LA 71101				
	Phone: (318) 673-2721		Fax: (318) 673-3960				
Titanium	0.015	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35	JDB
Vanadium	0.03	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35	JDB
Zinc	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35	JDB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue	
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101	
	Phone: (318) 673-2721	Fax: (318) 673-3960	
AEP Sample ID : 227043	Collected Date: 07/17/2019	By: RF	
Cust Sample ID: Dirt/Sludge 2	Location: H.W. Pirkey Power Plant	Matrix: Solid	
Sample Desc.: Pirkey Sludge FGD 2 Total			

Metals (227043)	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	19600	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Antimony	0.919	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Arsenic	22.8	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Barium	121	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Beryllium	1.66	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Boron	891	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25	T5	JDB
Cadmium	1.37	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Calcium	84500	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Chromium	28.5	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Cobalt	20.3	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Copper	26.9	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Dry Weight, Percent	97.2	%	0.001	1		07/22/2019 15:30	T5	JDB
Iron	28800	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Lead	5.78	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Lithium	12	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26	T5	JDB
Magnesium	7070	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Manganese	388	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Mercury	0.606	mg/Kg	0.00025	1	EPA 7471B 1998	07/24/2019 14:27		LNM
Molybdenum	11	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Nickel	25.7	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Potassium	1460	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Selenium	30.4	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Silver	0.19	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Sodium	1780	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Strontium	451	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Thallium	0.562	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB

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AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)		Address: 502 North Allen Avenue					
Date Received: 07/18/2019	Contact: Terry Wehling		Shreveport, LA 71101					
	Phone: (318) 673-2721		Fax: (318) 673-3960					
Tin	1.06	mg/Kg	0.2	1:50	EPA 6010B 1996	07/26/2019 1:26	T5	JDB
Titanium	1280	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Vanadium	68.3	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Zinc	33.8	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Waste Characterization (227043)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
pH, Soil	8.71	pH		1	EPA 9045D 2002	07/25/2019 12:30		GB

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Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101	
	Phone: (318) 673-2721	Fax: (318) 673-3960	
AEP Sample ID : 227044	Collected Date: 07/17/2019	By: RF	
Cust Sample ID: Dirt/Sludge 2	Location: H.W. Pirkey Power Plant	Matrix: Solid	
Sample Desc.: Pirkey Sludge FGD 2 SPLP			

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	10.5	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Antimony	0.017	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Arsenic	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Barium	2.57	mg/L	0.05	1:50	EPA 1312/6010B	1996		JDB
Beryllium	0.009	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Boron	26.7	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Cadmium	0.002	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Calcium	1960	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Chromium	0.004	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Cobalt	0.051	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Copper	0.003	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Iron	47.7	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Lithium	0.136	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Magnesium	70.2	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Manganese	2.87	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Mercury	< 0.000025	mg/L	0.000025	1	EPA 7470A	1994		LNM
Molybdenum	0.288	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Nickel	0.071	mg/L	0.025	1	EPA 1312/6010B	1996		JDB
Potassium	11.4	mg/L	0.01	1	EPA 1312/6010B	1996		JDB
Selenium	0.775	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 1312/6010B	1996		JDB
Sodium	56.7	mg/L	0.5	1:50	EPA 1312/6010B	1996		JDB
Strontium	13.2	mg/L	0.05	1:50	EPA 1312/6010B	1996		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 1312/6010B	1996		JDB

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Report ID	: 40143		Company:	SEP - Flint Creek (TW)		Address:	502 North Allen Avenue		
Date Received:	07/18/2019		Contact:	Terry Wehling			Shreveport, LA 71101		
			Phone:	(318) 673-2721		Fax:	(318) 673-3960		
Titanium	0.037	mg/L	0.005	1	EPA 1312/6010B	1996	07/25/2019	23:55	JDB
Vanadium	0.194	mg/L	0.001	1	EPA 1312/6010B	1996	07/25/2019	23:55	JDB
Zinc	0.338	mg/L	0.005	1	EPA 1312/6010B	1996	07/25/2019	23:55	JDB

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Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101	
	Phone: (318) 673-2721	Fax: (318) 673-3960	
AEP Sample ID : 227045		By: RF	
Cust Sample ID: Dirt/Sludge 2		Matrix: Solid	
Sample Desc.: Pirkey Sludge FGD 2 7 Day Leachate			
7-Day Leachate (227045)			

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	0.994	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Antimony	0.006	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Arsenic	0.031	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Barium	0.121	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Beryllium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Boron	16.4	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Cadmium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Calcium	633	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Chromium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Cobalt	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Copper	0.003	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Iron	0.225	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Lithium	0.1	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Magnesium	9.54	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Manganese	0.015	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Mercury	< 0.005	mg/L	0.005	1:200	EPA 7470A 1994	07/30/2019 10:36		LNM
Molybdenum	0.448	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Nickel	< 0.025	mg/L	0.025	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Potassium	9.02	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Selenium	0.201	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Sodium	48.3	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Strontium	3.79	mg/L	0.05	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB

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Report ID : 40143	Company: SEP - Flint Creek (TW)		Address: 502 North Allen Avenue				
Date Received: 07/18/2019	Contact: Terry Wehling		Shreveport, LA 71101				
	Phone: (318) 673-2721		Fax: (318) 673-3960				
Titanium	0.02	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45	JDB
Vanadium	0.087	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45	JDB
Zinc	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45	JDB

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Analysis Report

02004
 502 North Allen Ave.
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 Phone: (318) 673-3802
 Fax: (318) 673-3960

Report ID : 40143 **Company:** SEP - Flint Creek (TW) **Address:** 502 North Allen Avenue
Date Received: 07/18/2019 **Contact:** Terry Wehling Shreveport, LA 71101
Phone: (318) 673-2721 **Fax:** (318) 673-3960

Quality Control Data													
* Quality control units are the same as reported analytical results													
Date	Parameter	Sample ID	Blank		Standard		Spike		Surrogate % Recovery	Duplicate % Difference	Tech		
			Value	*	Value	*	Value	*				Value	%
7/25/2019	Aluminum	226939.1	<0.005		2	2.0229733	101.1	2	2.071639	103.6	0.4	JDB	
7/25/2019	Aluminum	227041.1	<0.005		2	2.0229733	101.1	2	2.2242	111.2	0.0	JDB	
7/26/2019	Aluminum	227040.1	<12.5		2	2.0358232	101.8	100	132.38333	132.4	1.2	JDB	
7/25/2019	Antimony	226939.1	<0.005		0.8	0.8092462	101.2	0.8	0.8159776	102.0	0.2	JDB	
7/25/2019	Antimony	227041.1	<0.005		0.8	0.8092462	101.2	0.8	0.7671843	95.9	0.5	JDB	
7/26/2019	Antimony	227040.1	<0.25		0.8	0.8071122	100.9	40	32.643192	81.6	1.8	JDB	
7/25/2019	Arsenic	227041.1	<0.005		0.8	0.8086795	101.1	0.8	0.7758421	97.0	0.0	JDB	
7/25/2019	Arsenic	226939.1	<0.005		0.8	0.8086795	101.1	0.8	0.8086275	101.1	0.1	JDB	
7/26/2019	Arsenic	226915.1	<0.25		0.8	0.7906797	98.8	40	40.306278	100.8	0.8	JDB	
7/26/2019	Arsenic	227040.1	<0.25		0.8	0.7940238	99.3	40	34.433917	86.1	2.3	JDB	
7/25/2019	Barium	226939.1	<0.001		0.2	0.2080557	104.0	0.2	0.209543	104.8	0.1	JDB	
7/25/2019	Barium	227041.1	<0.05		0.2	0.2080557	104.0	0.2	0.1829767	91.5	0.4	JDB	
7/26/2019	Barium	227040.1	<2.5		0.2	0.2112650	105.6	500	543.5715	108.7	7.2	JDB	
7/25/2019	Beryllium	226939.1	<0.001		0.2	0.2122779	106.1	0.2	0.2142832	107.1	0.3	JDB	
7/25/2019	Beryllium	227041.1	<0.001		0.2	0.2122779	106.1	0.2	0.1992329	99.6	0.4	JDB	
7/26/2019	Beryllium	227040.1	<0.05		0.2	0.2131235	106.6	10	9.40679	94.1	0.2	JDB	
7/25/2019	Boron	226939.1	<0.01		0.3	0.2995651	99.9	0.3	0.2984183	99.5	0.7	JDB	
7/25/2019	Boron	227041.1	<0.5		0.3	0.2995651	99.9	0.3	0.2855333	95.2	0.5	JDB	
7/25/2019	Cadmium	227041.1	<0.001		0.2	0.2069934	103.5	0.2	0.1836838	91.8	0.6	JDB	
7/25/2019	Cadmium	226939.1	<0.001		0.2	0.2069934	103.5	0.2	0.2061243	103.1	0.5	JDB	
7/26/2019	Cadmium	226915.1	<0.05		0.2	0.1973571	98.7	10	10.058007	100.6	1.8	JDB	
7/26/2019	Cadmium	227040.1	<0.05		0.2	0.2013293	100.7	10	8.0453767	80.5	1.6	JDB	
7/25/2019	Calcium	226939.1	<0.01		1	1.0087505	100.9	1	1.0243667	102.4	0.9	JDB	
7/26/2019	Calcium	227040.1	<25		1	0.8616568	86.2	50	113.63333	227.3	0.8	JDB	
7/25/2019	Chromium	226939.1	<0.001		0.4	0.4116387	102.9	0.4	0.4125529	103.1	0.4	JDB	
7/25/2019	Chromium	227041.1	<0.001		0.4	0.4116387	102.9	0.4	0.3867339	96.7	0.3	JDB	
7/26/2019	Chromium	227040.1	<0.05		0.4	0.40798	102.0	20	17.692233	88.5	1.6	JDB	
7/26/2019	Chromium	226915.1	<0.05		0.4	0.4059509	101.5	20	20.758823	103.8	0.8	JDB	
7/25/2019	Cobalt	227041.1	<0.005		0.2	0.2043482	102.2	0.2	0.1839347	92.0	0.4	JDB	
7/25/2019	Cobalt	226939.1	<0.005		0.2	0.2043482	102.2	0.2	0.2054714	102.7	0.4	JDB	
7/26/2019	Cobalt	227040.1	<0.05		0.2	0.2032547	101.6	10	7.7614833	77.6	1.8	JDB	
7/25/2019	Copper	227041.1	<0.001		0.3	0.3066399	102.2	0.3	0.2963301	98.8	0.1	JDB	



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Analysis Report

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Date Received: 07/18/2019		Contact: Terry Wehling		Shreveport, LA 71101							
		Phone: (318) 673-2721		Fax: (318) 673-3960							
7/25/2019	Copper	226939.1	<0.001	0.3	0.3066399	102.2	0.3	0.3109092	103.6	0.1	JDB
7/26/2019	Copper	227040.1	<0.05	0.3	0.3124104	104.1	15	15.003017	100.0	1.9	JDB
7/25/2019	Iron	226939.1	<0.01	3	3.1158893	103.9	3	3.1231158	104.1	1.0	JDB
7/25/2019	Iron	227041.1	<0.5	3	3.1158893	103.9	150	159.28837	106.2	0.8	JDB
7/26/2019	Iron	227040.1	<12.5	3	3.0861005	102.9				3.1	JDB
7/25/2019	Lead	227041.1	<0.005	1	1.0430644	104.3	1	0.9320653	93.2	0.6	JDB
7/25/2019	Lead	226939.1	<0.005	1	1.0430644	104.3	1	1.0416574	104.2	0.4	JDB
7/26/2019	Lead	226915.1	<0.25	1	1.0147827	101.5	50	51.881956	103.8	1.4	JDB
7/26/2019	Lead	227040.1	<0.25	1	1.0194305	101.9	50	41.227533	82.5	1.1	JDB
7/25/2019	Lithium	227041.1	<0.001	0.2	0.2119096	106.0	0.2	0.2353987	117.7	0.1	JDB
7/25/2019	Lithium	226939.1	<0.001	0.2	0.2119096	106.0	0.2	0.2163799	108.2	0.4	JDB
7/26/2019	Lithium	227040.1	<0.05	0.2	0.211291	105.6	10	11.698417	117.0	2.8	JDB
7/25/2019	Magnesium	226939.1	<0.01	2	2.0868175	104.3	2	2.0877567	104.4	0.2	JDB
7/25/2019	Magnesium	227041.1	<0.5	2	2.0868175	104.3	2	1.9791333	99.0	0.6	JDB
7/26/2019	Magnesium	227040.1	<25	2	2.0570549	102.9	100	76.916667	76.9	1.4	JDB
7/25/2019	Manganese	226939.1	<0.001	0.2	0.2072869	103.6	0.2	0.2077536	103.9	0.2	JDB
7/25/2019	Manganese	227041.1	<0.001	0.2	0.2072869	103.6	0.2	0.16684	83.4	0.7	JDB
7/26/2019	Manganese	227040.1	<2.5	0.2	0.2066368	103.3	500	572.398	114.5	1.1	JDB
7/24/2019	Mercury	227041.1	<0.00002	0.001	0.00097	97.0	0.2	0.16373	81.9	7.0	LNM
7/24/2019	Mercury	227040.1	<0.00002	0.001	0.00097	97.0	0.04	0.0496	124.0	4.4	LNM
7/30/2019	Mercury	227042.1	<0.005	0.001	0.0009	90.0	0.2	0.156162	78.1	4.0	LNM
7/25/2019	Molybdenum	227041.1	<0.005	0.2	0.2067657	103.4	0.2	0.197727	98.9	0.5	JDB
7/25/2019	Molybdenum	226939.1	<0.005	0.2	0.2067657	103.4	0.2	0.2076129	103.8	0.4	JDB
7/26/2019	Molybdenum	227040.1	<0.05	0.2	0.2073308	103.7	10	9.2486633	92.5	0.4	JDB
7/25/2019	Nickel	227041.1	<0.025	0.5	0.5192594	103.9	0.5	0.46183	92.4	0.6	JDB
7/25/2019	Nickel	226939.1	<0.025	0.5	0.5192594	103.9	0.5	0.5209379	104.2	0.6	JDB
7/26/2019	Nickel	227040.1	<0.05	0.5	0.5228273	104.6	25	19.992767	80.0	1.9	JDB
7/25/2019	Potassium	227041.1	<0.01	10	9.3692109	93.7	10	11.11754	111.2	0.3	JDB
7/25/2019	Potassium	226939.1	<0.01	10	9.3692109	93.7	10	9.4631223	94.6	0.2	JDB
7/26/2019	Potassium	227040.1	<25	10	9.1397018	91.4	500	428.035	85.6	2.9	JDB
7/25/2019	Selenium	226939.1	<0.005	2	1.9998495	100.0	2	1.9816300	99.1	0.8	JDB
7/25/2019	Selenium	227041.1	<0.005	2	1.9998495	100.0	2	1.991203	99.6	0.7	JDB
7/26/2019	Selenium	227040.1	<0.25	2	1.9551138	97.8	100	89.733067	89.7	3.0	JDB
7/25/2019	Silver	227041.1	<0.001	0.075	0.0712930	95.1	0.075	0.0708639	94.5	0.2	JDB
7/25/2019	Silver	226939.1	<0.001	0.075	0.0712930	95.1	0.075	0.0714285	95.2	0.1	JDB
7/26/2019	Silver	227040.1	<0.05	0.075	0.0712215	95.0	3.75	3.6188628	96.5	0.5	JDB

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Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)		Address: 502 North Allen Avenue								
Date Received: 07/18/2019	Contact: Terry Wehling		Shreveport, LA 71101								
	Phone: (318) 673-2721		Fax: (318) 673-3960								
7/25/2019	Sodium	227041.1	<0.5	3	3.1384831	104.6	3	2.3746333	79.2	0.0	JDB
7/25/2019	Sodium	226939.1	<0.01	3	3.1384831	104.6	3	2.4693667	82.3	0.1	JDB
7/26/2019	Sodium	227040.1	<25	3	3.1256605	104.2	150	120.525	80.4	1.9	JDB
7/25/2019	Strontium	226939.1	<0.001	0.2	0.2059899	103.0	0.2	0.2081687	104.1	0.4	JDB
7/26/2019	Strontium	227040.1	<2.5	0.2	0.2078256	103.9	500	577.76733	115.6	17.9	JDB
7/25/2019	Thallium	227041.1	<0.005	0.4	0.4152040	103.8	0.4	0.3682771	92.1	1.2	JDB
7/25/2019	Thallium	226939.1	<0.005	0.4	0.4152040	103.8	0.4	0.4171124	104.3	0.0	JDB
7/26/2019	Thallium	227040.1	<0.25	0.4	0.4155052	103.9	20	15.947380	79.7	1.2	JDB
7/25/2019	Tin	226939.1	<0.005	0.7	0.6995446	99.9	0.7	0.6930628	99.0	0.2	JDB
7/25/2019	Tin	227041.1	<0.005	0.7	0.6995446	99.9	0.7	0.644164	92.0	0.2	JDB
7/26/2019	Tin	227040.1	<0.2	0.7	0.6896072	98.5	35	28.438362	81.3	0.8	JDB
7/25/2019	Titanium	227041.1	<0.005	0.2	0.2109341	105.5	0.2	0.2098874	104.9	0.2	JDB
7/25/2019	Titanium	226939.1	<0.005	0.2	0.2109341	105.5	0.2	0.2124567	106.2	0.1	JDB
7/26/2019	Titanium	227040.1	<2.5	0.2	0.2121079	106.1				1.6	JDB
7/25/2019	Vanadium	226939.1	<0.001	0.3	0.3076519	102.6	0.3	0.3104754	103.5	0.4	JDB
7/25/2019	Vanadium	227041.1	<0.001	0.3	0.3076519	102.6	0.3	0.2997157	99.9	0.6	JDB
7/26/2019	Vanadium	227040.1	<0.05	0.3	0.30789	102.6	15	15.291667	101.9	0.0	JDB
7/25/2019	Zinc	226939.1	<0.005	0.2	0.2091679	104.6	0.2	0.2081374	104.1	0.3	JDB
7/25/2019	Zinc	227041.1	<0.005	0.2	0.2091679	104.6	0.2	0.1851907	92.6	0.1	JDB
7/26/2019	Zinc	227040.1	<0.25	0.2	0.2074233	103.7	10	8.4881167	84.9	0.5	JDB

Code **Code Description**

M4 The analysis of the spiked sample required a dilution such that the spike recovery calculation does not provide useful information. The associated blank spike recovery was acceptable.

T5 This parameter is not included in the Laboratory's LELAP Laboratory Scope of Accreditation.


Jonathan Banhill
Quality Assurance Officer

05-Aug-19
Report Date

DOB 7-18-19

Figure 1 - Chain of Custody

American Electric Power
Analytical Chemistry Services

CHAIN OF CUSTODY

COC 40143

OPCO/PROJECT NAME H.W Pirkey		FAX NO.		ANALYSIS REQUESTED			
Power Plant		(903) 927-5840		Metals to analyze for each (Total SPL, Deionized) Bi, Ca, Sb, As, Ba, Be, Cd, Cr Co, Pb, Li, Hg, Ni, Se, Te and any other metals in calibration.			
CONTACT PERSON (Please Print) Ron Franklin, Randy Rountree, Ben House		PHONE NO. (903) 927-5889					
SAMPLE SIGNATURE <i>Ron Franklin</i>							
DATE	TIME	SAMPLE SOURCE & DESCRIPTION	SAMPLE ID	C G O R M A P B	NUMBER OF CONTAINERS	Lab Number	REMARKS
7-17-19	1800	Pirkey Sludge FGD	Dirt Sludge	✓	✓	927040-42	Tony Wehling
11 " "	1800	" "	Dirt Sludge	✓	✓	227043-45	
RELINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY	RELINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY
RELINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY	RELINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY
RECEIVED FOR LABORATORY		RECEIVED BY		COMMENTS			
<i>Jonathan Bandild</i>		7-18-19 1036					



SHREVEPORT CHEMICAL LABORATORY

502 N. Allen Ave.
Shreveport, LA 71101
Phone 318-673-3802
FAX 318-673-3960

PROJECT RECEIPT FORM

Container Type				Delivery Type					
Ice Chest	<u>Bag</u>	Action Pak	PCB Mailer	Bottle	UPS	FEDEX	US Mail	<u>Walk in</u>	Shuttle
Other _____				Other _____					
Tracking # _____									

Client Terry Wehling
Received By JOB
Received Date 7-18-19
Open Date 7-18-19

Sample Matrix
DGA PCB Oil Water Oil Soil
Solid Liquid Other _____

Container Temp Read NA
Correction Factor _____
Corrected Temp _____
Thermometer Serial #F04103

Project I.D. _____
Were samples received on ice? YES NO

Did container arrive in good condition? YES NO _____

Was sample documentation received? YES NO _____

Was documentation filled out properly? YES NO _____

Were samples labeled properly? YES NO _____

Were correct containers used? YES NO _____

Were the pH's of samples appropriately checked? YES NO _____

Total number of sample containers 2 _____

Was any corrective action taken? NO Person Contacted _____
Date & Time _____

Comments _____

ATTACHMENT E
AD-33 Soil Samples Analytical Report

Client: Burns & McDonnell
 Project: 106665 PIRKEY
 Sample ID: AD-33 (11')
 Legal Location:
 Collection Date: 4/30/2018 16:05

Date: 08-Jun-18
 Work Order: 1805081
 Lab ID: 1805081-15
 Matrix: SOIL
 Percent Moisture: 18.1

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Gamma Spectroscopy Results						
			SOP 713		Prep Date: 5/17/2018	PrepBy: MRL
Ra-226	1.29 (+/- 0.3)	G	0.47	pCi/g	NA	6/7/2018 08:54
Ra-228	1.36 (+/- 0.47)	G,TI	0.7	pCi/g	NA	6/7/2018 08:54
ICPMS Metals						
			SW6020		Prep Date: 5/14/2018	PrepBy: JML
ARSENIC	4.9		0.23	MG/KG	10	5/17/2018 01:02
BARIUM	20		0.57	MG/KG	10	5/17/2018 01:02
BERYLLIUM	0.15		0.057	MG/KG	10	5/17/2018 01:02
CADMIUM	ND		0.23	MG/KG	10	5/17/2018 01:02
COBALT	0.61		0.57	MG/KG	10	5/17/2018 01:02
CHROMIUM	9.5		1.1	MG/KG	10	5/17/2018 01:02
LITHIUM	0.25	J	2.3	MG/KG	10	5/17/2018 01:02
MOLYBDENUM	0.18	J	0.23	MG/KG	10	5/17/2018 01:02
LEAD	3.2		0.23	MG/KG	10	5/17/2018 01:02
ANTIMONY	0.086	J	0.11	MG/KG	10	5/17/2018 01:02
SELENIUM	0.81	J	1.1	MG/KG	10	5/17/2018 01:02
THALLIUM	0.044		0.011	MG/KG	10	5/17/2018 01:02
Ion Chromatography						
			EPA300.0		Prep Date: 5/10/2018	PrepBy: HMA
FLUORIDE	ND		1	MG/KG	1	5/11/2018 21:43
Mercury						
			SW7471		Prep Date: 5/11/2018	PrepBy: AJL2
MERCURY	0.0026	J	0.039	MG/KG	1	5/11/2018 16:07

Client: Burns & McDonnell
 Project: 106665 PIRKEY
 Sample ID: AD-33 (21')
 Legal Location:
 Collection Date: 4/30/2018 16:05

Date: 08-Jun-18
 Work Order: 1805081
 Lab ID: 1805081-16
 Matrix: SOIL
 Percent Moisture: 20.0

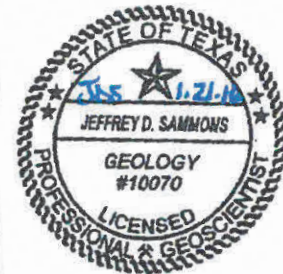
Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Gamma Spectroscopy Results						
			SOP 713		Prep Date: 5/17/2018	PrepBy: MRL
Ra-226	0.7 (+/- 0.22)	LT	0.37	pCi/g	NA	6/7/2018 08:16
Ra-228	0.72 (+/- 0.5)	NQ	0.67	pCi/g	NA	6/7/2018 08:16
ICPMS Metals						
			SW6020		Prep Date: 5/14/2018	PrepBy: JML
ARSENIC	12		0.25	MG/KG	10	5/17/2018 01:05
BARIUM	9.1		0.62	MG/KG	10	5/17/2018 01:05
BERYLLIUM	0.09		0.062	MG/KG	10	5/17/2018 01:05
CADMIUM	ND		0.25	MG/KG	10	5/17/2018 01:05
COBALT	0.64		0.62	MG/KG	10	5/17/2018 01:05
CHROMIUM	4.6		1.2	MG/KG	10	5/17/2018 01:05
LITHIUM	0.24	J	2.5	MG/KG	10	5/17/2018 01:05
MOLYBDENUM	0.061	J	0.25	MG/KG	10	5/17/2018 01:05
LEAD	1.5		0.25	MG/KG	10	5/17/2018 01:05
ANTIMONY	0.19		0.12	MG/KG	10	5/17/2018 01:05
SELENIUM	0.42	J	1.2	MG/KG	10	5/17/2018 01:05
THALLIUM	0.03		0.012	MG/KG	10	5/17/2018 01:05
Ion Chromatography						
			EPA300.0		Prep Date: 5/10/2018	PrepBy: HMA
FLUORIDE	ND		1	MG/KG	1	5/11/2018 22:29
Mercury						
			SW7471		Prep Date: 5/11/2018	PrepBy: AJL2
MERCURY	0.0038	J	0.04	MG/KG	1	5/11/2018 16:09

ATTACHMENT F
AD-33 Boring Log and
Well Installation Diagram



Monitor Well

Monitor Well No.: AD-33



PROJECT INFORMATION

PROJECT: Pitkey Power Plant
 PROJECT NO.: I-04-1821
 LOGGED BY: Jeffrey D. Sammons, P.G.
 SUPERVISING PG: Jeffrey D. Sammons, P.G.
 COMPLETION: 12/11/2016
 DEVELOPMENT: 12/16/2016
 SITE LOCATION: 2400 FM 3261, Hallsville, Texas
 WELL OWNER: AEP

DRILLING INFORMATION

DRILLER: Buford Collier
 DRILLER'S LICENSE NO.: 60089
 RIG TYPE: Geoprobe 3230DT
 METHOD OF DRILLING: Hollow Stem Auger
 SAMPLING METHODS: Split Core
 SURFACE ELEVATION: 362.37 (Top of Casing)
 HOLE DIAMETER: 8.25"
 LATITUDE 32 27' 38.70" LONGITUDE 94 28' 16.82"

TBPG No. 50027

Water Level Upon Installation

Water Level at Time of Drilling

Geotechnical Lab Sample

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	WATER LEVEL	SAMPLE	% MOISTURE	% FINES	LL	PL	PI	WELL CONSTRUCTION
			0								Locking Well Casing Cover Locking Well Cap Protective Well Casing Concrete Pad Ground Surface Cement
CLAYEY SAND: very fine to fine sand, some silt, dark brownish black and brown, very moist	SC		0 - 1								
FAT CLAY: trace sand and silt, reddish brown and light gray - some iron ore gravel at 2.0' - some silt and ironstone in thin seams at 2.5', light gray, yellowish brown, and reddish brown,	CH		1 - 8			29	93	74	32	42	Bentonite
CLAYEY SAND: Interbedded clays and fine to very fine sand and silt, some iron ore gravel, light reddish brown and light gray - some clay and trace of iron ore gravel at 11', light gray and reddish brown, moist - trace clay at 13', thin saturated ironstone and gravel seams at 13' to 16', reddish brown, light reddish brown, and light gray - dark reddish brown at 15' - clay lense at 15.5' to 16.5', light reddish brown and light gray	SC		8 - 17			21	35	35	23	12	2" Sch. 40 PVC Riser
SILTY CLAYEY SAND: very fine to fine sand, reddish brown, very moist to saturated - some clay lenses and iron ore gravel at 20' - clayey at 20.5' to 21' - trace clay at 21', light gray, saturated	SM-SC		17 - 28			23	19	27	18	9	20/40 Silica Sand
CLAYEY SAND: very fine to fine sand, dark gray and gray, moist	SC		28 - 30			23	30	25	18	7	0.010" Slotted Sch. 40 PVC Well Screen PVC Bottom Cap

NOTES: This log should not be used separately from the original report. Not all USCS descriptors were laboratory verified.

ATTACHMENT G
Certification by a Qualified Professional Engineer

CERTIFICATION BY A QUALIFIED PROFESSIONAL ENGINEER

I certify that the above described alternative source demonstration is appropriate for evaluating the groundwater monitoring data for the Pirkey FGD Stackout Area CCR management area and that the requirements of 30 TAC §352.951(e) have been met.

Beth Ann Gross
Printed Name of Licensed Professional Engineer

Beth Ann Gross

Signature



Geosyntec Consultants
2039 Centre Pointe Blvd, Suite 103
Tallahassee, Florida 32308

Texas Registered Engineering Firm
No. F-1182

79864
License Number

Texas
Licensing State

June 27, 2023
Date

**ALTERNATIVE SOURCE
DEMONSTRATION REPORT –
1ST SEMIANNUAL EVENT 2023
TEXAS STATE CCR RULE
H.W. Pirkey Power Plant
Flue Gas Desulfurization Stackout Area
Hallsville, Texas**

Prepared for

American Electric Power
1 Riverside Plaza
Columbus, Ohio 43215-2372

Prepared by

Geosyntec Consultants, Inc.
500 West Wilson Bridge Road, Suite 250
Worthington, Ohio 43085

Project CHA8495B

January 2024

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Attachment I: Certification by a Qualified Professional Engineer

LIST OF ACRONYMS

Å	angstrom
AEP	American Electric Power
amsl	above mean sea level
ASD	alternative source demonstration
bgs	below ground surface
CCR	coal combustion residuals
EPRI	Electric Power Research Institute
FGD	flue gas desulfurization
GWPS	groundwater protection standard
LCL	lower confidence limit
MCL	maximum contaminant level
mg/L	milligrams per liter
SPLP	Synthetic Precipitation Leaching Procedure
SSL	statistically significant level
SU	standard unit
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
XRD	X-ray diffraction

1. INTRODUCTION AND SUMMARY

This alternative source demonstration (ASD) report has been prepared to address statistically significant levels (SSLs) for beryllium, cobalt, and mercury in the groundwater monitoring network at the H.W. Pirkey Plant Flue Gas Desulfurization (FGD) Stackout Area in Hallsville, Texas, following the first semiannual assessment monitoring event of 2023. The H.W. Pirkey Plant has four coal combustion residuals (CCR) storage units regulated by the Texas Commission on Environmental Quality (TCEQ) under Registration No. CCR104, including the FGD Stackout Area (**Figure 1**).

In June 2023, a semiannual assessment monitoring event was conducted at the FGD Stackout Area in accordance with Title 30, §352.951(a) of the Texas Administrative Code (TAC, 2020). The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. Confidence intervals were recalculated for Appendix IV parameters at the compliance wells to assess whether these parameters were present at SSLs above the groundwater protection standards (GWPSs). Seasonal patterns were observed for cadmium, cobalt, and lithium at AD-22 (Geosyntec 2023a). To correctly account for seasonality, confidence intervals for these wells and constituents were constructed using deseasonalized values. An SSL was attributed to a parameter if its lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). The following SSLs were identified at the Pirkey FGD Stackout Area (Geosyntec 2023a):

- The LCL for beryllium exceeded the GWPS of 0.00400 milligrams per liter (mg/L) at AD-7 (0.00406 mg/L) and AD-22 (0.00502 mg/L).
- The deseasonalized LCL for cobalt exceeded the GWPS of 0.0560 mg/L at AD-22 (0.0737 mg/L).
- The LCL for mercury exceeded the GWPS of 0.00200 mg/L at AD-33 (0.00252 mg/L).

No other SSLs were identified.

1.1 CCR Rule Requirements

TCEQ regulations regarding assessment monitoring programs for CCR landfills and surface impoundments provide owners and operators with the option to make an ASD when an SSL is identified:

In making a demonstration under this subsection, the owner or operator must, within 90 days of detecting a statistically significant level above the groundwater protection standard of any constituent listed in Appendix IV adopted by reference in §352.1431 of this title, submit a report prepared and certified in accordance with §352.4 of this title (relating to Engineering and Geoscientific Information) to the executive director, and any local pollution agency with jurisdiction that has requested to be notified, demonstrating that a source other than a CCR unit caused the exceedance or that the exceedance resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. (30 TAC §352.951(e))

Pursuant to 30 TAC §352.951(e), Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report to document that the SSLs identified for beryllium at AD-7 and AD-22, cobalt at AD-22 and mercury at AD-33 are from a source other than the FGD Stackout Area.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which each identified SSL could be attributed. Alternative sources were categorized into the following five types, based on methodology provided by the Electric Power Research Institute (EPRI 2017):

- ASD Type I: Sampling Causes
- ASD Type II: Laboratory Causes
- ASD Type III: Statistical Evaluation Causes
- ASD Type IV: Natural Variation
- ASD Type V: Alternative Sources

A demonstration was conducted to show that the SSLs identified for beryllium, cobalt, and mercury were based on a Type IV cause and not by a release from the Pirkey FGD Stackout Area.

2. SUMMARY OF SITE CONDITIONS

The FGD Stackout Area design, construction, and closure, regional geology and site hydrogeology, and groundwater monitoring system and flow conditions are described below.

2.1 FGD Stackout Area Design, Construction, and Closure

The Pirkey FGD Stackout Area is an approximately 7-acre former FGD storage area located due west of the Pirkey Plant (**Figure 1**). It was designed for temporary stockpiling of stabilized FGD material placed on the native clay soil in the unit until it could be hauled to the on-site landfill for disposal (Arcadis 2016). Prior to closure, the nature ground surface elevation in the Stackout Area ranged from approximately 360 to 365 feet above mean sea level, and based on lithological borings advanced in the vicinity, the Stackout Area was underlain by approximately 20 feet of clay (Arcadis 2016).

A Closure Plan for the Stackout Area was developed in October 2016 and revised in May 2023 (American Electric Power [AEP] 2023). On September 1, 2023 AEP removed the final volume of CCR from the unit for the purpose of beneficial reuse and commenced closure of the unit in accordance with the requirements of 40 CFR §257.102(c) (which were adopted by the State of Texas under 30 TAC §352.1221) and the certified Closure Plan (AEP 2023). The removal of the remaining CCR material and an additional 12 inches of underlying soil was completed on September 18, 2023, and the removal was certified by Akron Consulting (2023).

2.2 Regional Geology / Site Hydrogeology

The Stackout Area is positioned on an outcrop of the Eocene Recklaw Formation, which consists predominantly of clay and fine-grained sand (Arcadis 2016). The Recklaw Formation is underlain by the Carrizo Sand, which crops out in the topographically lower southern portion of the plant. The Carrizo Sand consists of fine- to medium-grained sand interbedded with silt and clay.

The very-fine- to fine-grained clayey and silty sand located about 10 to 20 feet below the Stackout Area, with an average thickness of approximately 20 feet, is considered to be the uppermost aquifer below this area (Arcadis, 2016).

2.3 Groundwater Monitoring System and Flow Conditions

The Stackout Area monitoring well network monitors groundwater within the uppermost aquifer. Geologic cross sections B-B' and E-E' from Arcadis (2016) show the subsurface structure of the uppermost aquifer (indicated on the figures as clayey silty sand, brown to gray in color) underlying the Stackout Area. These figures and a cross section location map are provided in **Attachment A**. The geologic cross sections demonstrate lateral continuity of the uppermost aquifer at and around the Stackout Area.

Groundwater flow direction at and near the Stackout Area is west-northwesterly (**Figure 1**). Groundwater flow velocities in the uppermost aquifer in the vicinity of the Stackout Area have been reported as approximately 5 to 35 feet per year. The Stackout Area monitoring well network consists of upgradient monitoring wells AD-12 and AD-13 and downgradient compliance wells AD-7, AD-22, and AD-33, all of which are screened within the uppermost aquifer. AD-7 was abandoned following the June 2023 sampling event during Stackout Area closure activities.

3. ALTERNATIVE SOURCE DEMONSTRATION

The ASD evaluation method and proposed alternative source of beryllium, cobalt, and mercury, and future groundwater sampling requirements are described below.

3.1 Proposed Alternative Source

An initial review of site geochemistry, site historical data, and laboratory quality assurance and quality control data did not identify alternative sources for beryllium, cobalt, and mercury due to Type I (sampling), Type II (laboratory), Type III (statistical evaluation), or Type V (anthropogenic) issues. Groundwater sampling, laboratory analysis, and statistical evaluations were generally completed in accordance with 30 TAC §352.931 and the draft TCEQ guidance for groundwater monitoring (TCEQ 2020). As described below, the SSLs for beryllium and cobalt have been attributed to natural variation associated with seasonal effects, which is a Type IV (natural variation) issue. The SSL for mercury has also been attributed to natural variation associated with the lithology of the uppermost aquifer.

3.1.1 Beryllium

SSLs were identified for beryllium at AD-7 and AD-22 (Geosyntec 2023a). Previous ASDs for the FGD Stackout Area showed that beryllium concentrations at AD-7 and AD-22 appear to correlate with groundwater elevations (Geosyntec 2019, Geosyntec 2020a, Geosyntec 2020b, Geosyntec 2021a, Geosyntec 2021d, Geosyntec 2022b, Geosyntec 2023b, Geosyntec 2023c). This relationship generally still holds true (**Figure 2**). Beryllium concentrations at AD-7 and AD-22 are generally correlated with seasonal changes in other relatively mobile cationic constituents, including calcium and lithium (**Figures 3a and 3b**). The correlation between beryllium and both monovalent (lithium) and divalent (calcium) cations suggests that the variability in observed beryllium concentrations is related to cation exchange behavior with clay minerals present in the native soil.

In March of 2020, the geology near AD-7 was relogged at soil boring SP-B2. Silty clay was identified from approximately 2.5-6.9 feet below ground surface (bgs) before transitioning to clay until 18.8 ft bgs (**Figure 4a**). It was also noted that the depth to water fluctuated between approximately 9 and 15 ft bgs. The boring log for SP-B2 is provided in **Attachment B**, and the original boring log and well construction diagram is provided in **Attachment C**. Soil boring SP-B4, which was advanced in March 2020 to re-log AD-22, found that clay materials were present in the seasonally saturated zones above the permanent water table (**Figure 4b**). The boring log for SP-B4 is provided in **Attachment D**, and the original boring log and well construction diagram is provided in **Attachment E**. At AD-22, the depth to water fluctuated between approximately 3 and 12 ft bgs. Clay was identified from approximately 1.5 ft bgs to 13.3 ft bgs, where it transitioned to a clayey silt (**Figure 4b**). Analysis by X-ray diffraction (XRD) confirmed the presence of clay minerals within the seasonal water table and sand within the screened intervals for both AD-7 and AD-22, as summarized in **Table 1**. The clay fraction of the uppermost samples collected from within the seasonal water table was further analyzed to identify the type of clays present. Smectite-type clays, which are 2:1-layer high-activity clays with characteristically high cation exchange capacity (compared to low-activity 1:1 clay minerals), make up the majority of the clay minerals present at those intervals.

Sorption and desorption of beryllium from smectite-type clays is well documented (You et al. 1989, Boschi and Willenbring 2016a). Desorption was found to be affected by pH, with 75% of beryllium desorbing from a smectite-type clay as pH decreased from 6.0 standard units (SU) to 3.0 SU (Boschi and Willenbring 2016b). The pH values recorded at AD-7 and AD-22 for samples collected under the Texas CCR Rule ranged from 4.3 to 5.1 and 3.9 to 5.1 SU, respectively. This suggests that conditions are favorable for beryllium desorption from smectite-type clays. The presence of these exchangeable clays provides further evidence that the exceedances of beryllium at AD-7 and AD-22 can be attributed to the effects on groundwater quality of seasonal groundwater elevation changes and the resulting cation exchange between groundwater and the exchangeable clay within the seasonal water table.

3.1.2 Cobalt

An SSL was identified for cobalt at AD-22 using deseasonalized statistics (Geosyntec 2023a). According to the United States Environmental Protection Agency (USEPA) document Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance (USEPA 2009a), “seasonal correction should be done both to minimize the chance of mistaking a seasonal effect for evidence of contaminated groundwater, and also to build more powerful background to compliance point tests. Problems can arise, for instance, from measurement variations associated with changing recharge rates during different seasons” (USEPA 2009b).

As shown in previous ASDs (Geosyntec 2020a, Geosyntec 2020b, Geosyntec 2021a, Geosyntec 2021b, Geosyntec 2022, Geosyntec 2023b, Geosyntec, 2023c), the cobalt groundwater concentrations at AD-22 also appear to correlate with seasonal changes in groundwater elevation (**Figure 5**). In addition, the cobalt concentrations are well correlated with changes in other cations, including calcium and lithium (**Figure 6**), which suggests that natural variability associated with groundwater-mineral interactions within the seasonally saturated zone is governing dissolved cobalt concentrations.

A sample of the solid FGD sludge material accumulated on the FGD Stackout Area was collected in July 2019 and submitted for laboratory analyses. The solid-phase sample was leached using both Synthetic Precipitation Leaching Procedure (SPLP) analysis (SW-846 Test Method 1312 [USEPA 1994]) and Seven-Day Distilled Water Leachate Test Procedure (7-day leaching procedure) analysis (Appendix 4 of 30 TAC Chapter 335, Subchapter R [TAC 2016]) to evaluate the material as a potential source of cobalt. No changes to material handling or plant operations occurred prior to closure that would have altered the anticipated chemical composition since this sample was collected. Calcium-cobalt ratios for the leached sludge material and site groundwater are displayed on **Figure 7**. The concentration ratio between calcium and cobalt is consistently on the order of 100:1 at both upgradient and downgradient locations (**Figure 7**). Calcium concentrations in groundwater are generally consistent between AD-22 and upgradient well AD-13 (**Figure 8**); however, leached calcium concentrations from the FGD sludge material are approximately two to three orders of magnitude greater than concentrations in site groundwater. The difference between the ratio of calcium to cobalt in the leached FGD sludge material (about 45,000:1) compared to the ratio for groundwater suggests that dissolved calcium concentrations at AD-22 would be significantly higher if the groundwater at this location were affected by leachate.

Siderite and pyrite, both reduced iron-bearing minerals, were identified below the seasonal water table (within the saturated zone) at AD-22 (**Table 1**). Cobalt is known to undergo isomorphic substitution for iron in both siderite and pyrite (Gross 1965, Hitzman et al. 2017, Krupka and Serne

2002). This is due to the similarity of their ionic radii (approximately 1.56 angstrom [Å] for iron and 1.52 Å for cobalt [Clementi and Raimondi 1963]). The proposed substitution of cobalt for iron in the crystal lattice of pyrite has been documented in other ASDs prepared for the Pirkey Plant's East Bottom Ash Pond (Geosyntec 2023d) and West Bottom Ash Pond (Geosyntec 2023e).

Goethite (an iron hydroxide) was identified within the seasonally saturated zone and the screened interval at AD-22 (**Table 1**). The weathering of siderite and pyrite to goethite under oxidizing conditions is a well-understood phenomenon, including in formations in East Texas (Senkayi et al. 1986, Dixon et al. 1982) and may have occurred within the seasonally saturated zone. A review of geochemical conditions at AD-22 shows that the conditions observed at AD-22 are favorable for goethite formation (**Figure 9**). During weathering from reduced (pyrite and siderite) to oxidized (goethite) iron minerals, isomorphically substituted cobalt may be released from the mineral structure into groundwater. The mobilization of cobalt, which was released during weathering of siderite or pyrite to goethite in the seasonally saturated zone, may explain the variability in aqueous cobalt concentrations and their correlation with the groundwater elevation as more or less aquifer solids are saturated with groundwater.

3.1.3 Mercury

An SSL was identified for mercury at AD-33 (Geosyntec 2023a). If the mercury detected at AD-33 were derived from CCR leachate from the FGD Stackout Area, we would anticipate similar effects on the concentrations of other CCR constituents, particularly those known to be more conservative. Boron, a geochemically conservative parameter, has high leachability from FGD material (USEPA 2009b). A release from the FGD Stackout Area would be anticipated to result in higher concentrations of boron and other conservative parameters, such as sulfate; however, the observed boron and sulfate concentrations at AD-33 do not display increasing trends (**Figure 10**). Two samples of FGD sludge material from the Stackout Area were collected in 2019 for characterization to assess if the FGD material was a likely source of mercury to groundwater at AD-33. As summarized in **Table 2**, both the historical average and the most recent boron groundwater concentrations at AD-33 are two orders of magnitude lower than the boron concentrations in leachate generated from both Synthetic Precipitation Leaching Procedure (SPLP) analysis (SW-846 Test Method 1312 [USEPA 1994]) and Seven-Day Distilled Water Leachate Test Procedure (7-day leaching procedure) analysis (Appendix 4 of 30 TAC Chapter 335, Subchapter R [TAC 2016]) of FGD sludge (**Attachment F**). The lack of increasing boron in AD-33 groundwater despite the relatively higher concentration of leached boron from the FGD sludge suggests groundwater at AD-33 is not impacted by the unit.

The FGD sludge material had detectable levels of total mercury at concentrations greater than those reported for two samples of aquifer solids collected from a soil boring advanced adjacent to AD-33 (**Table 3, Attachment G**). While the concentration of mercury in the aquifer solids is lower than the total mercury concentration in FGD sludge material, the low mobility of mercury from FGD suggests the FGD sludge is not the source of mercury in groundwater (USEPA 2009b, Hao et al. 2016). As shown in **Figure 11**¹, previous mercury groundwater concentrations at AD-33 were consistently at or above the mercury concentrations of leachate from SPLP analysis of FGD sludge material (**Table 2, Attachment F**). Mercury concentrations of leachate from 7-day leaching procedure analysis of FGD sludge material were below the laboratory detection limit of 0.005

¹ Due to a change in reported concentrations of more recent data, historical mercury data at well AD-33 were truncated to represent current groundwater quality conditions (Geosyntec 2023a).

mg/L. These results are in agreement with previous studies that have found that leached mercury concentrations are not correlated with total solid phase mercury in FGD samples (USEPA 2009b).

Detectable concentrations of mercury in aquifer solids at AD-33 present an alternative source of mercury in groundwater. Mercury is naturally occurring in soils and known to undergo isomorphic substitution for iron in crystalline iron minerals such as pyrite (Manceau et. al 2018). Analysis by XRD of material from the AD-33 soil boring showed detectable levels of pyrite below the seasonal water table (**Table 1**).

Reported differences between the total and dissolved mercury groundwater concentrations suggests that mercury is associated with colloidal material native from the aquifer. Dissolved concentrations of mercury at AD-33 are consistently lower than the reported total values (**Figure 11**), with most dissolved concentrations detected below the MCL of 2 micrograms per liter ($\mu\text{g/L}$). The method for measuring dissolved mercury in groundwater (EPA Method 245.7 [USEPA 2005]) involves filtering the sample through a $0.45\ \mu\text{m}$ filter prior to analysis, which would remove colloid-sized particles prior to preservation. The inclusion of suspended particles (including colloids) in totals samples is likely to result in an overestimation of metals due to the mobilization of metals from the colloidal or solid to aqueous phase following acid preservation during sample collection. Thus, the lower dissolved mercury concentrations compared to total aqueous mercury suggests that mercury is associated with colloidal material from the aquifer and the SSL of mercury at AD-33 is not due to a release from the FGD Stackout Area.

3.1.4 Conceptual Site Model

The seasonal fluctuations in beryllium at AD-7 and AD-22 and cobalt concentrations at AD-22 can be attributed to variations in the amount of the aquifer solids that are in contact with groundwater as the water table elevation changes. When the water table is higher, more clay material is in contact with groundwater, allowing greater desorption of cations (including beryllium) from the cation exchange sites on the clay. In the case of cobalt, more iron oxides are in contact with groundwater as the water table rises, allowing for the release of cobalt from mineral phases where it has isomorphically substituted for iron. Thus, the observed SSLs were attributed to natural variation associated with seasonal fluctuation of beryllium and cobalt concentrations in groundwater as the amount of aquifer solids that are saturated increases. For mercury, seasonal variations in groundwater concentrations were not observed. The observed mercury concentrations in groundwater at AD-33 were attributed to interactions with mercury-bearing aquifer solids or colloids.

3.2 Sampling Requirements

Because the ASD presented above supports the position that the identified SSLs are not due to a release from the Pirkey FGD Stackout Area, the unit will remain in the assessment monitoring program. Groundwater at the unit will continue to be sampled for Appendix IV parameters semiannually.

4. CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with 30 TAC §352.951(e) and supports the position that the SSLs of beryllium at AD-7 and AD-22, cobalt at AD-22, and mercury at AD-33 identified during the first semiannual assessment monitoring event of 2023 were not due to a release from the FGD Stackout Area. The identified SSLs were, instead, attributed to natural variation related to desorption of beryllium and seasonal dissolution of cobalt-bearing minerals comprising the aquifer solids. The mercury SSL was attributed to natural variation associated with the aquifer solids of the uppermost aquifer. Therefore, no further action is warranted, and the Pirkey FGD Stackout Area will remain in the assessment monitoring program. Certification of this ASD by a qualified professional engineer is provided in **Attachment I**.

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TABLES



**Table 1. X-Ray Diffraction Results
Alternative Source Demonstration Report
FGD Stackout Area, H. W. Pirkey Plant**

Boring Location	SP-B4		
Associated Well	AD-22		
Depth (ft bgs)	6-8	18-20	28-30
Sample Location	Within Seasonal Water Table	Below Seasonal Water Table	Within Screened Interval
Quartz	28	47.5	95
Plagioclase Feldspar	<0.5	<0.5	1
K-Feldspar	1	0.5	-
Goethite	1	-	2
Hematite	-	-	-
Chlorite	1	-	-
Siderite		10	-
Pyrite	-	2	-
Clays	*	40	2
Kaolinite	13	/	/
Illite/Mica	2		
Smectite	43		
Mixed-Layered Illite/Smectite	11		

Notes:

1. Mineral constituents are reported in percentage.
 2. Values shown as less than indicate the mineral constituent is present but below the quantification limit.
- *: The clay fraction at SP-B4-6-8 was further analyzed to characterize the types of clays present, as listed below.
 -: not detected
 ft bgs: feet below ground surface
 FGD: flue gas desulfurization

**Table 2. Summary of Key Analytical Data
FGD Stackout Area, H.W. Pirkey Plant**

Sample	Type	Mercury (µg/L)	Boron (mg/L)
Pirkey Sludge FGD	SPLP	2.272	22.3
	7-Day Leaching Procedure	<5	8.44
Pirkey Sludge FGD 2	SPLP	<0.025	26.7
	7-Day Leaching Procedure	<5	16.4
AD-33	Historical Average	4.92	0.123
	Jun-23	5.6	0.114

Notes:

1. Average values were calculated using truncated mercury and boron data (March 2020-June 2023).
2. Pirkey Sludge FGD samples were collected on July 17, 2019.
3. Non-detect values reported as less than (<) the detection limit.

CCR: coal combustion residuals

FGD: flue gas desulfurization

mg/L: milligram per liter

SPLP: Synthetic Precipitation Leaching Procedure

µg/L: micrograms per liter

**Table 3. Solid Phase Mercury Data
Alternative Source Demonstration Report
FGD Stackout Area, H.W. Pirkey Plant**

Location ID	Date Sampled	Sample Depth (ft bgs)	Mercury (mg/kg)
AD-33	4/30/2018	11	0.0026
		21	0.0038
Pirkey Sludge FGD	7/17/2019	N/A	0.653
Pirkey Sludge FGD 2	7/17/2019	N/A	0.606

Notes:

1. For AD-33 locations, samples were collected from additional boreholes advanced in the immediate area of AD-33. Samples were not collected from the cuttings of the borings advanced for well installation.

FGD: flue gas desulfurization

ft bgs: feet below ground surface

mg/kg: milligram per kilogram

N/A: not applicable

FIGURES





Legend

Groundwater Monitoring Wells

- Out of Network
- EBAP
- WBAP
- Landfill
- Stackout Area
- EBAP and WBAP
- All CCR Unit Networks
- Piezometer
- Groundwater Elevation Contour
- Groundwater Elevation Contours (Inferred)
- Approximate Groundwater Flow Direction

Notes

1. Monitoring well coordinates and water level data (collected on June 26 and 27, 2023) provided by American Electric Power (AEP).
2. Site features based on information available in coal combustion residuals (CCR) Groundwater Monitoring Well Network Evaluation Update (Arcadis 2022) provided by AEP.
3. Groundwater elevation units are feet above mean sea level.
4. AD-10, AD-19, AD-20, AD-21, AD-29, and W-3 were not gauged during the June 2023 event.
5. AD-35 was abandoned on November 13, 2018.
6. Removal of CCR plus one foot of material was completed on July 26, 2022 for the West Bottom Ash Pond (WBAP).

EBAP: East Bottom Ash Pond.

1,000 500 0 1,000 Feet

Beth Ann Gross
November 9, 2023

Geosyntec Consultants, Inc.
Texas Firm
Registration No. 1182

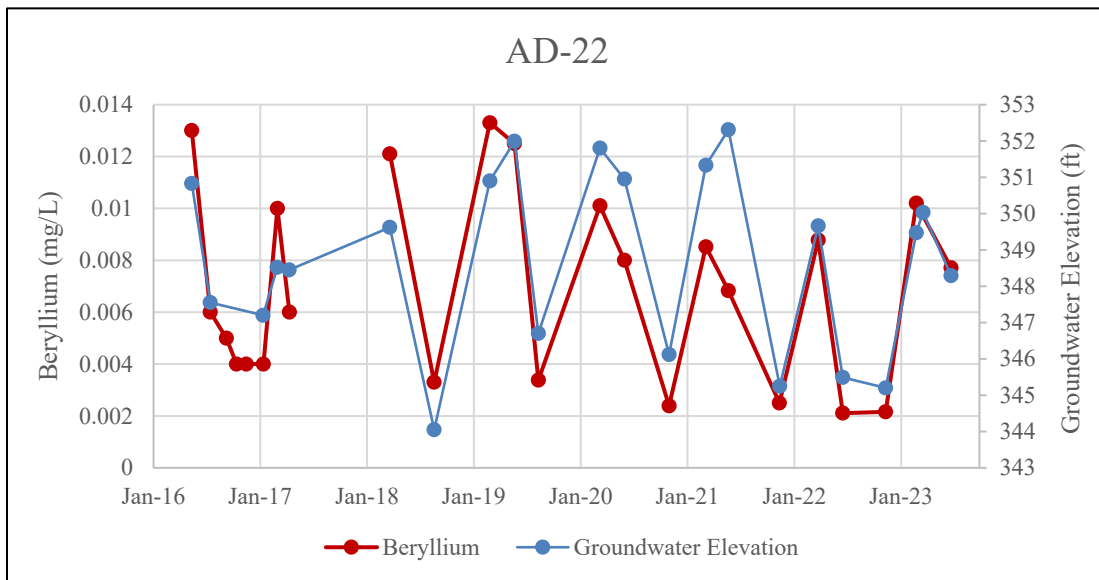
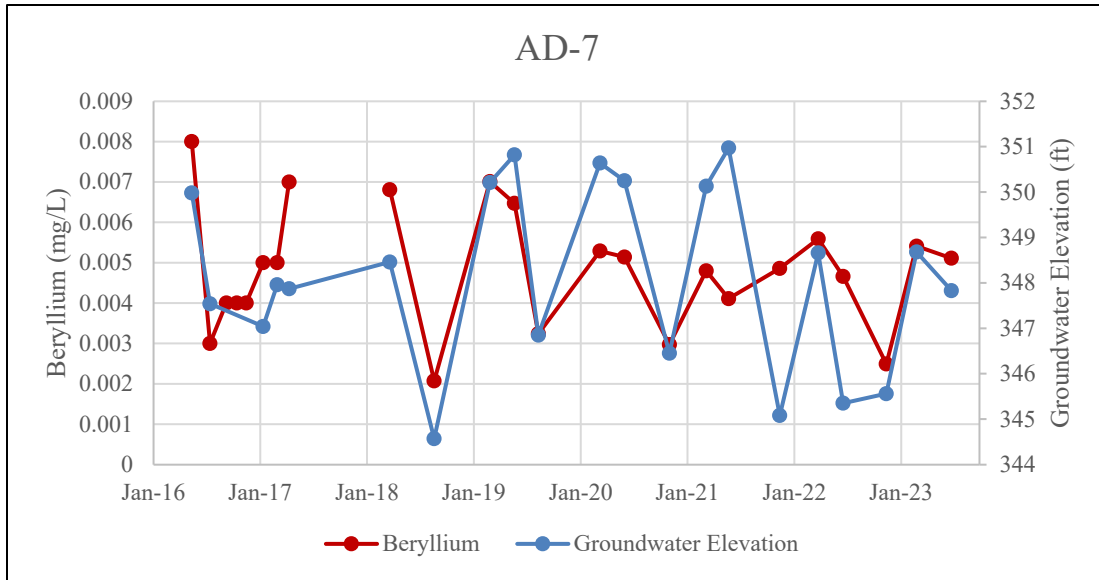
**Potentiometric Contours: Uppermost Aquifer
June 2023**

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Columbus, Ohio 2023/10/06

Figure 1



Notes:

1. Beryllium concentrations are shown in milligrams per liter (mg/L).
 2. Water level is shown as groundwater elevation in feet above mean sea level (ft amsl).
 3. The gap in beryllium data represents the time period in which detection monitoring took place and samples were not analyzed for beryllium.
- FGD: flue gas desulfurization

Beryllium v. Groundwater Elevation

Pirkey FGD Stackout Pad

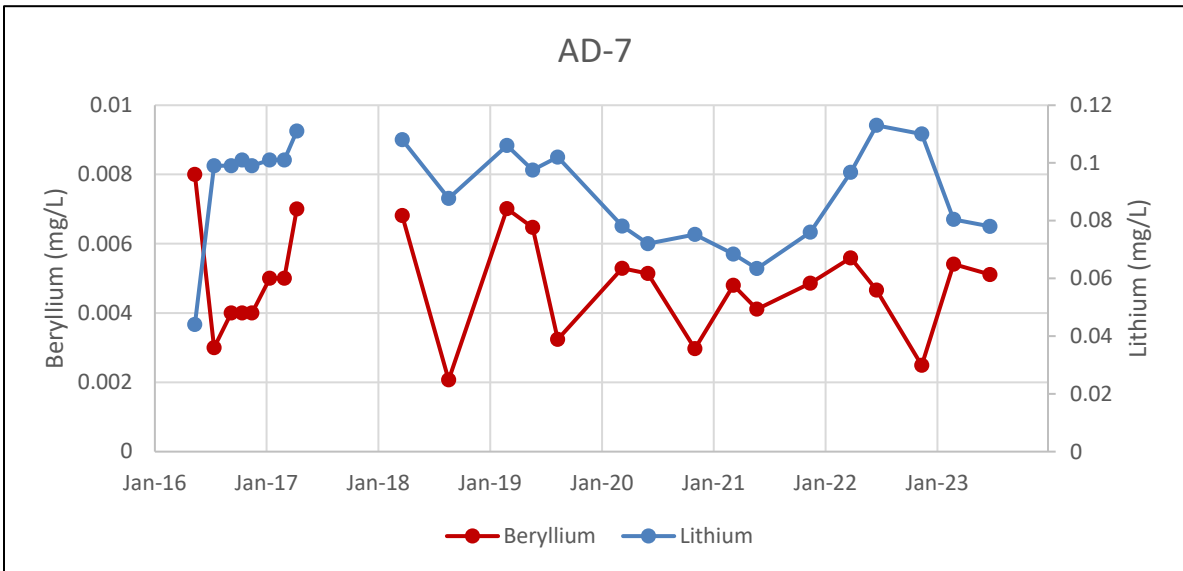
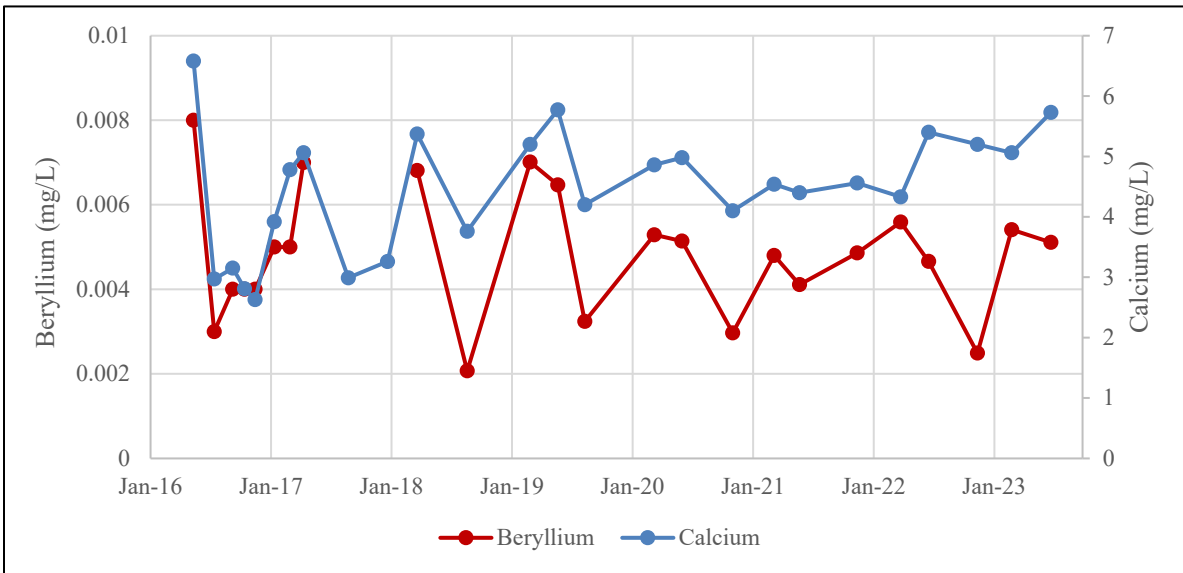


Figure

2

Columbus, Ohio

December 2023



Notes:

1. Beryllium, calcium, and lithium concentrations are shown in milligrams per liter (mg/L).
 2. The gaps in beryllium data represent the time period in which detection monitoring took place and samples were not analyzed for beryllium and lithium.
- FGD: flue gas desulfurization

AD-7 Beryllium v. Calcium and Lithium

Pirkey FGD Stackout Pad

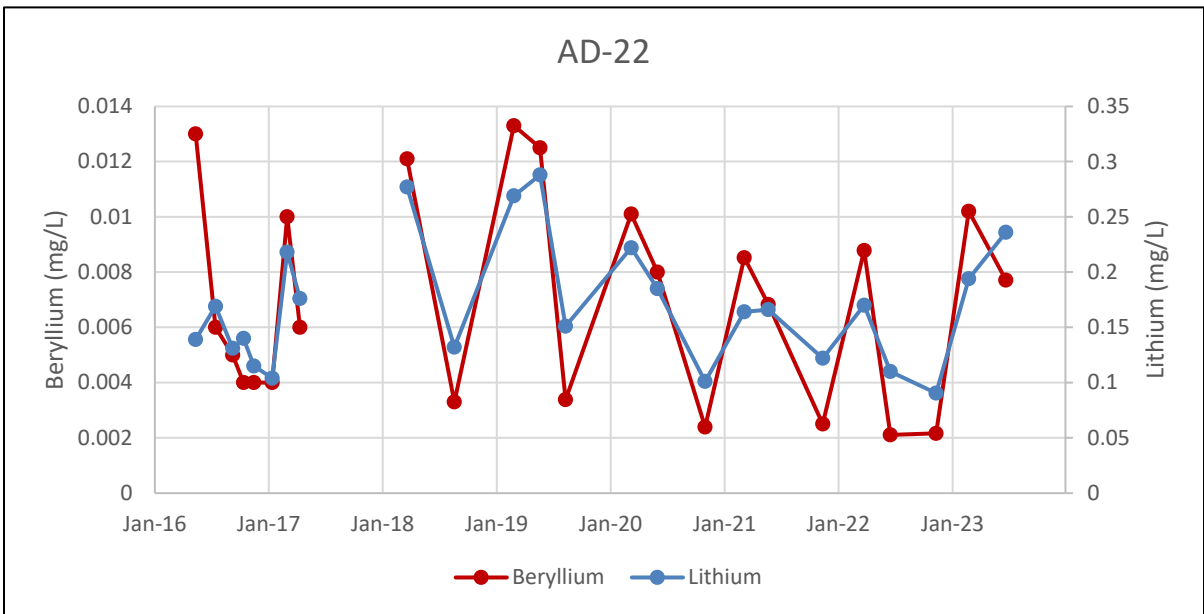
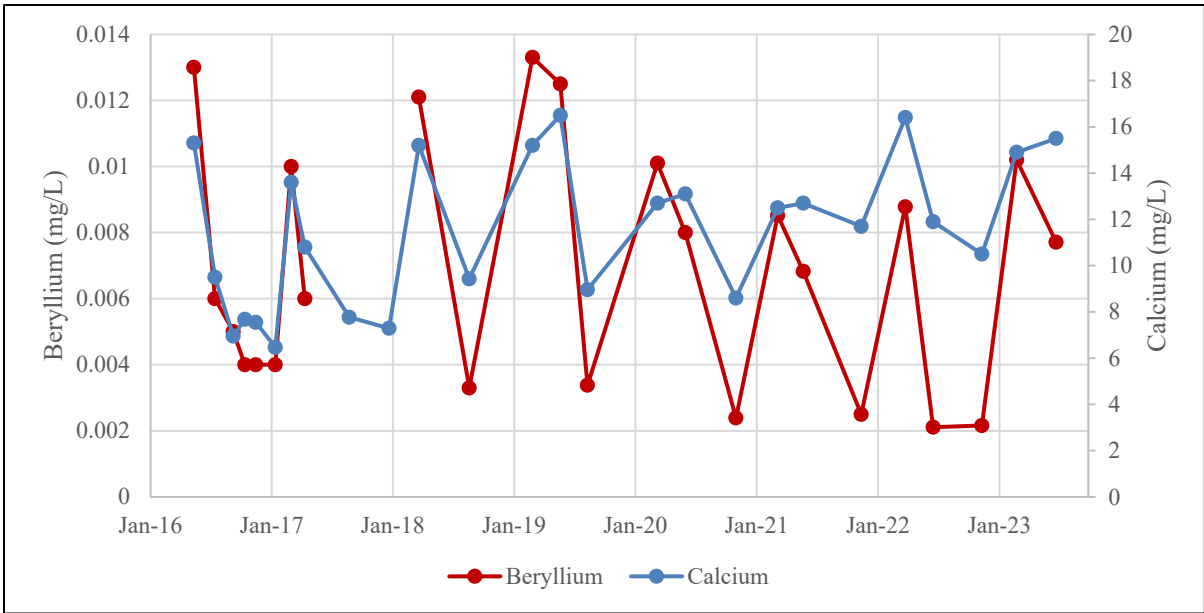


Figure

3a

Columbus, Ohio

November 2023



Notes:

1. Beryllium, calcium, and lithium concentrations are shown in milligrams per liter (mg/L).
 2. The gaps in beryllium data represent the time period in which detection monitoring took place and samples were not analyzed for beryllium and lithium.
- FGD: flue gas desulfurization

AD-22 Beryllium v. Calcium and Lithium

Pirkey FGD Stackout Pad

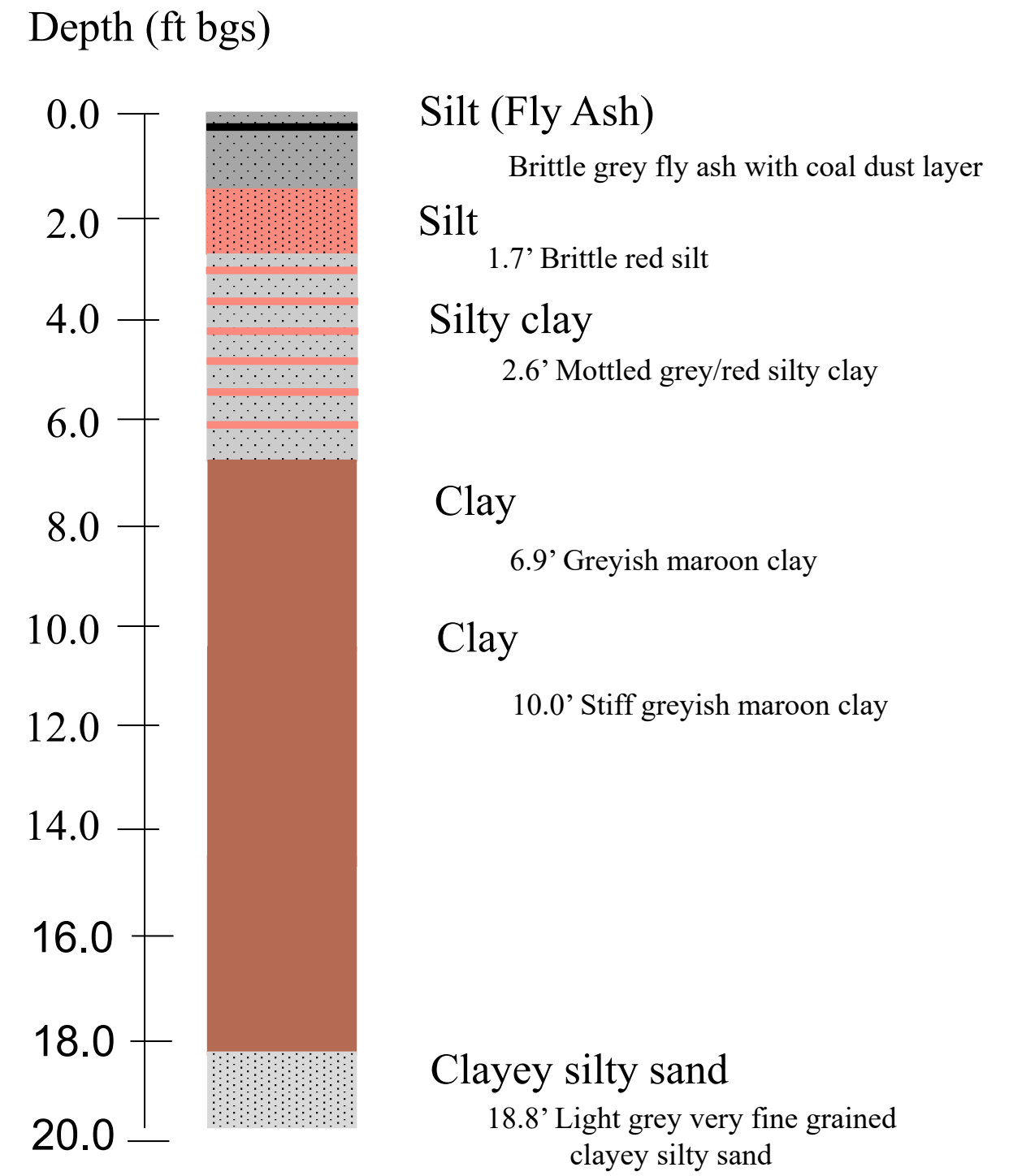
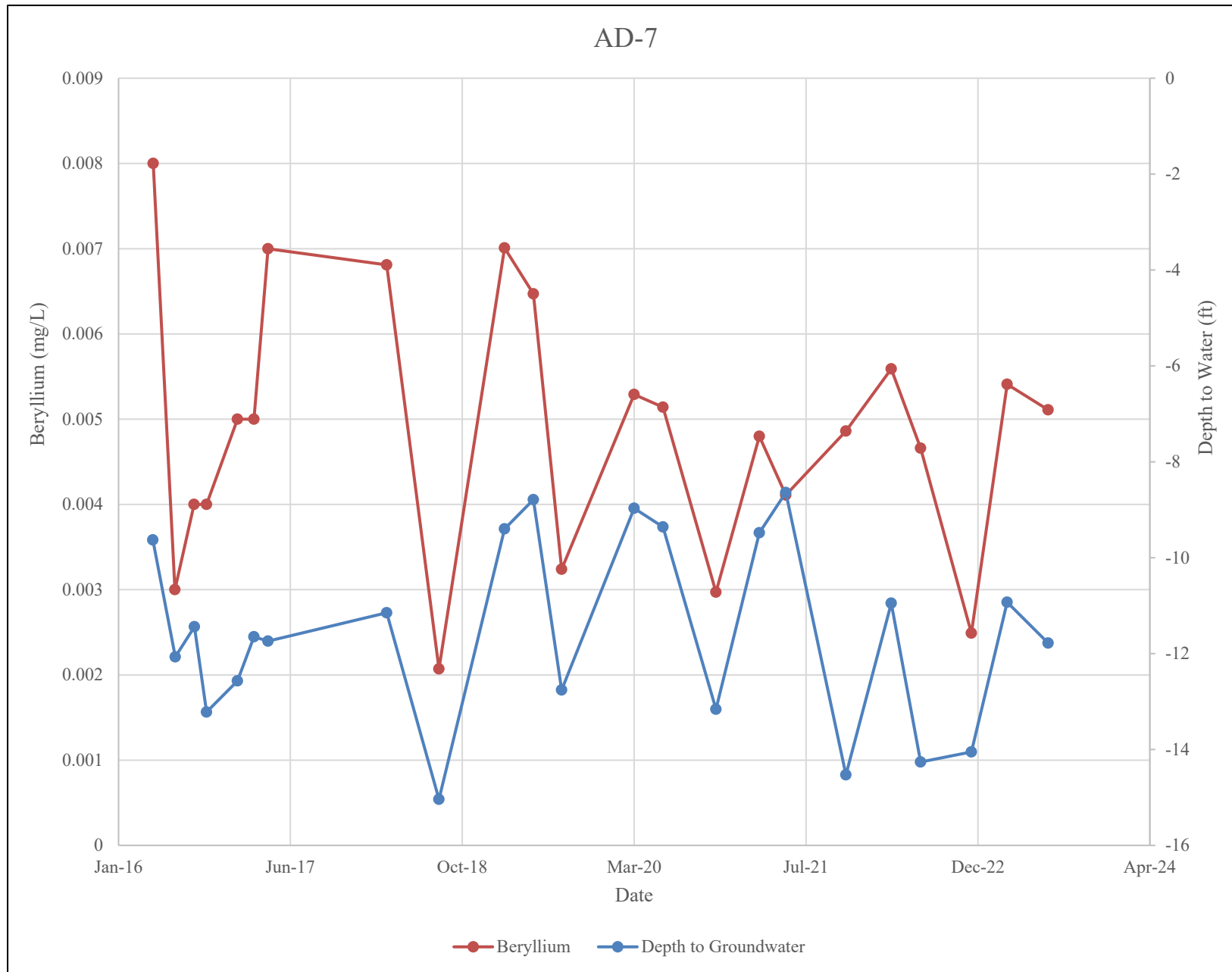


Figure

3b

Columbus, Ohio

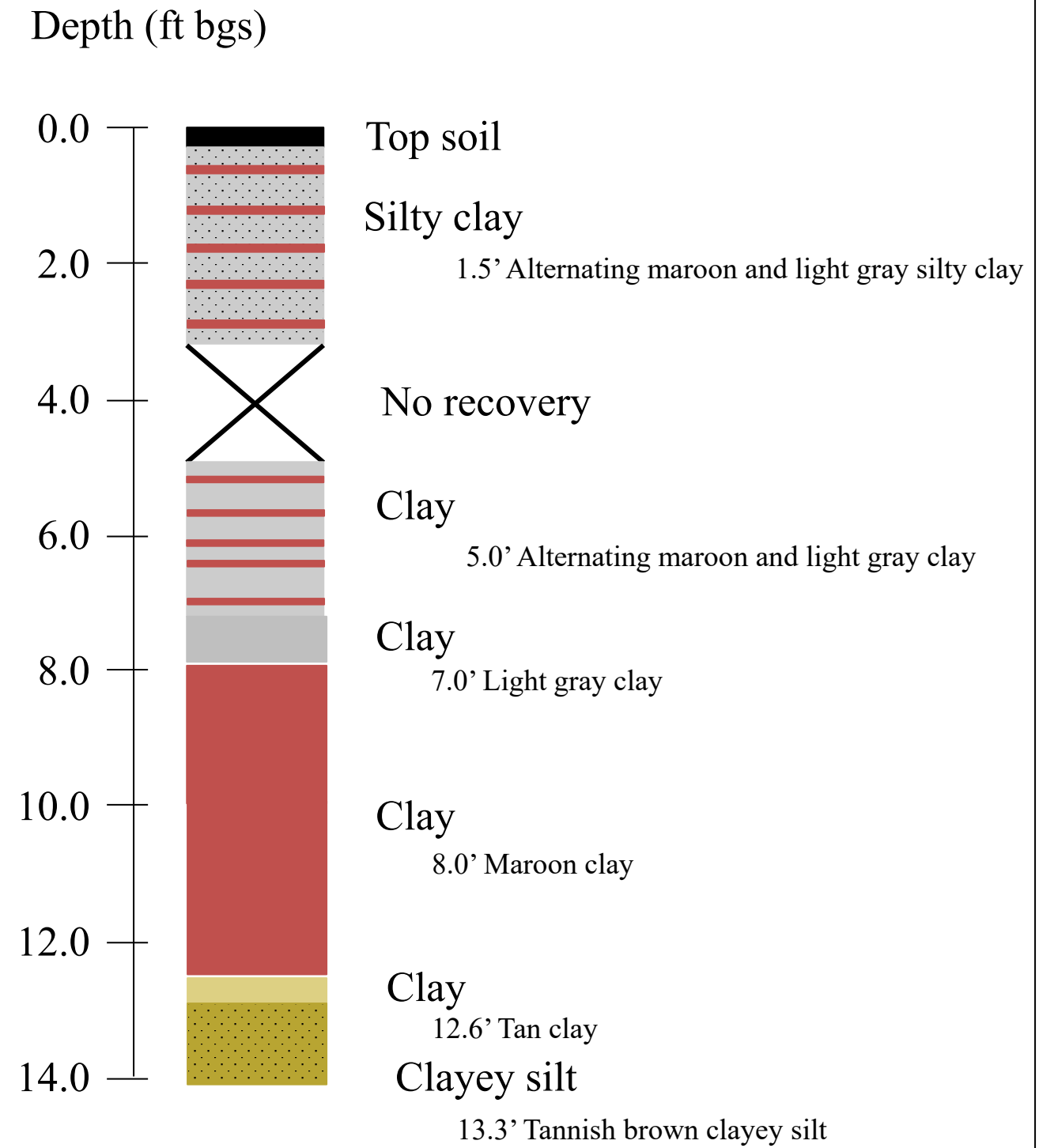
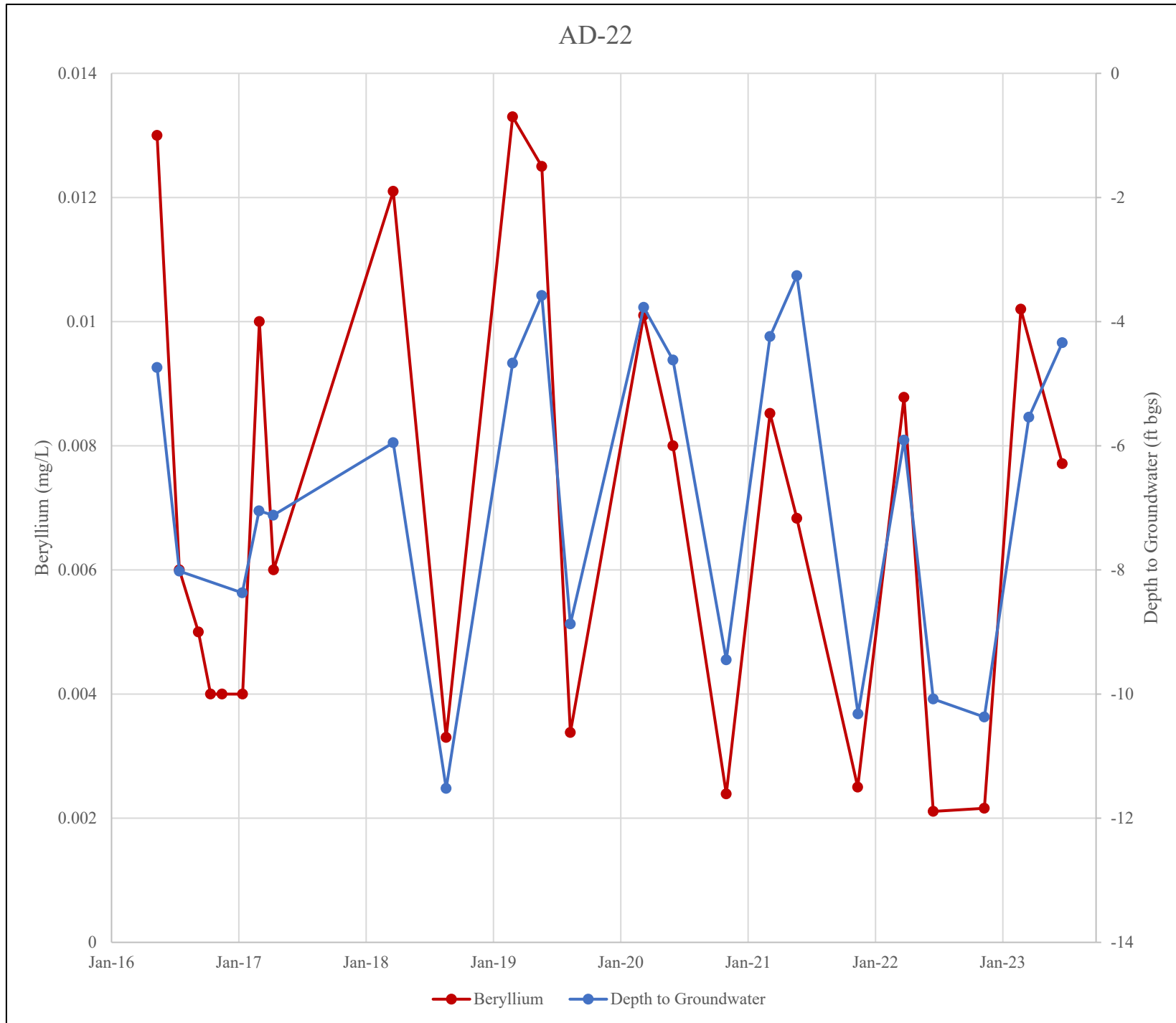
November 2023



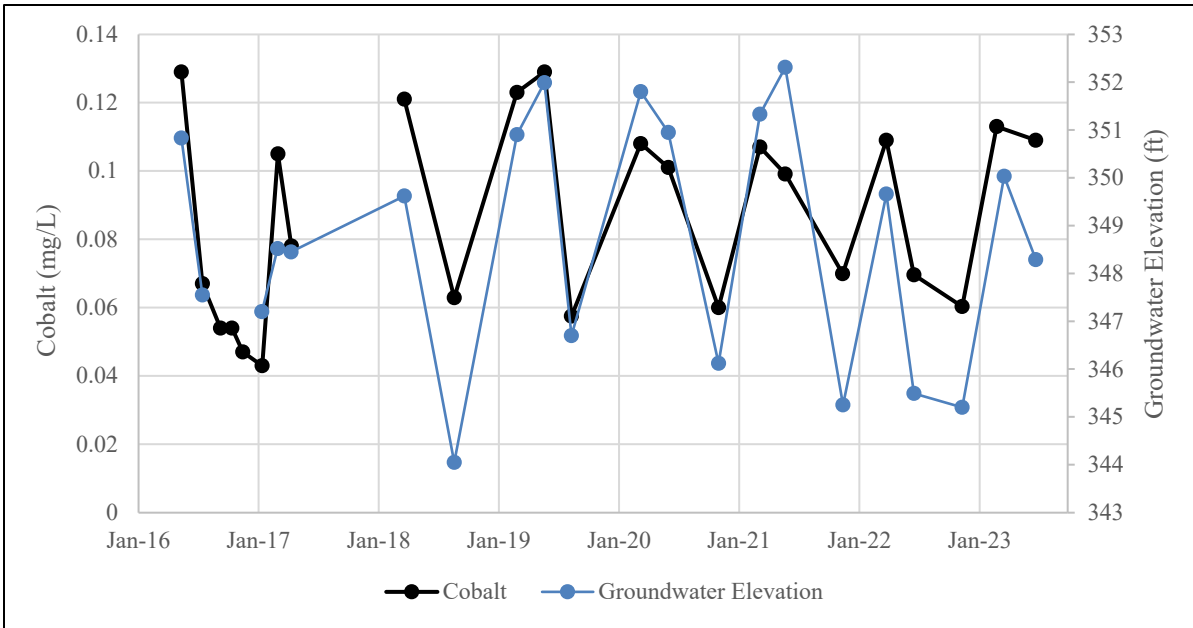
Notes:
 1. A sample was collected for analysis of mineralogy from 10-12 ft bgs.
 2. This illustration represents the log for boring SP-B2. The full boring log is available in Attachment B.
 3. AD-7 is screened at the interval of 19-39 ft bgs.
 Ft bgs: feet below ground surface

AD-7 Seasonal Water Table Geology H.W. Pirkey Plant – FGD Stackout Pad	
Columbus, OH	November 2023

Figure
4a



Notes:
 1. A sample was collected for analysis of mineralogy from 6–8 ft bgs.
 2. This illustration represents the log for boring SP-B4. The full boring log is available in Attachment D.
 3. AD-22 is screened at the interval of 10–30 ft bgs.
 FGD: Flue Gas Desulfurization
 ft bgs: feet below ground surface
 mg/L: milligrams per liter



Notes:

1. Cobalt concentrations are shown in milligrams per liter (mg/L)..
 2. Water level is shown as groundwater elevation in feet above mean sea level (ft amsl).
 3. The gap in cobalt data represents the time period in which detection monitoring took place and samples were not analyzed for cobalt.
- FGD: flue gas desulfurization

AD-22 Cobalt v. Groundwater Elevation

Pirkey FGD Stackout Pad

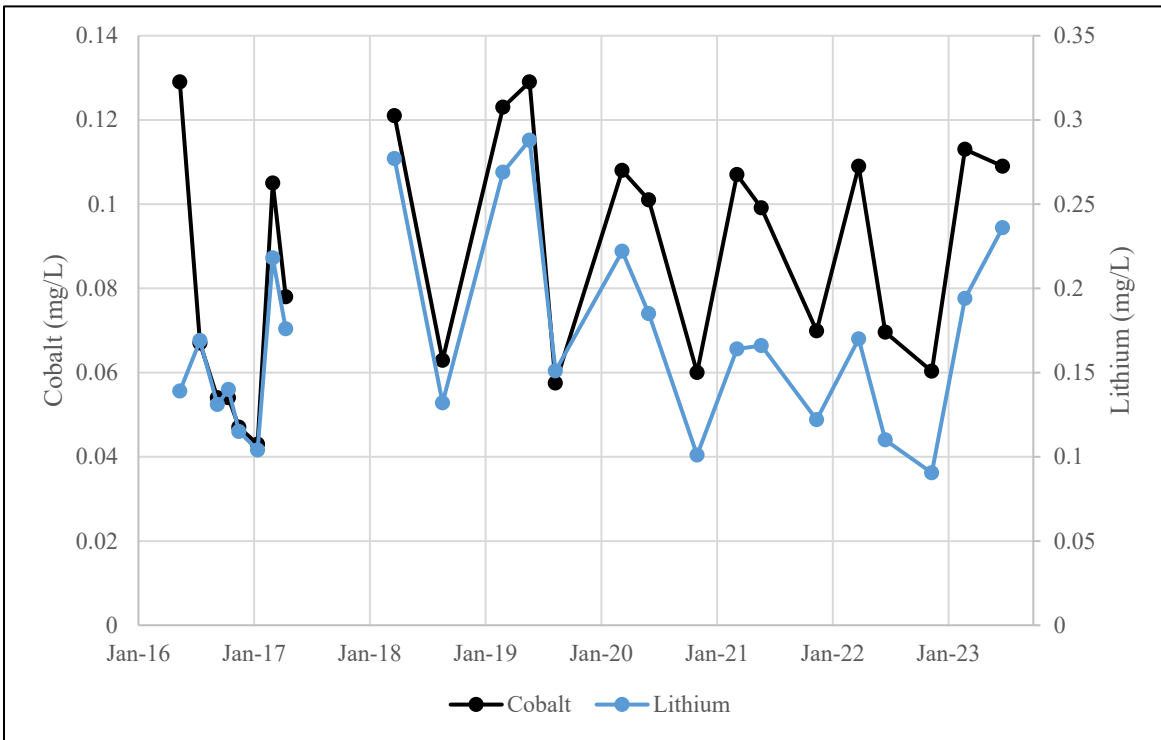
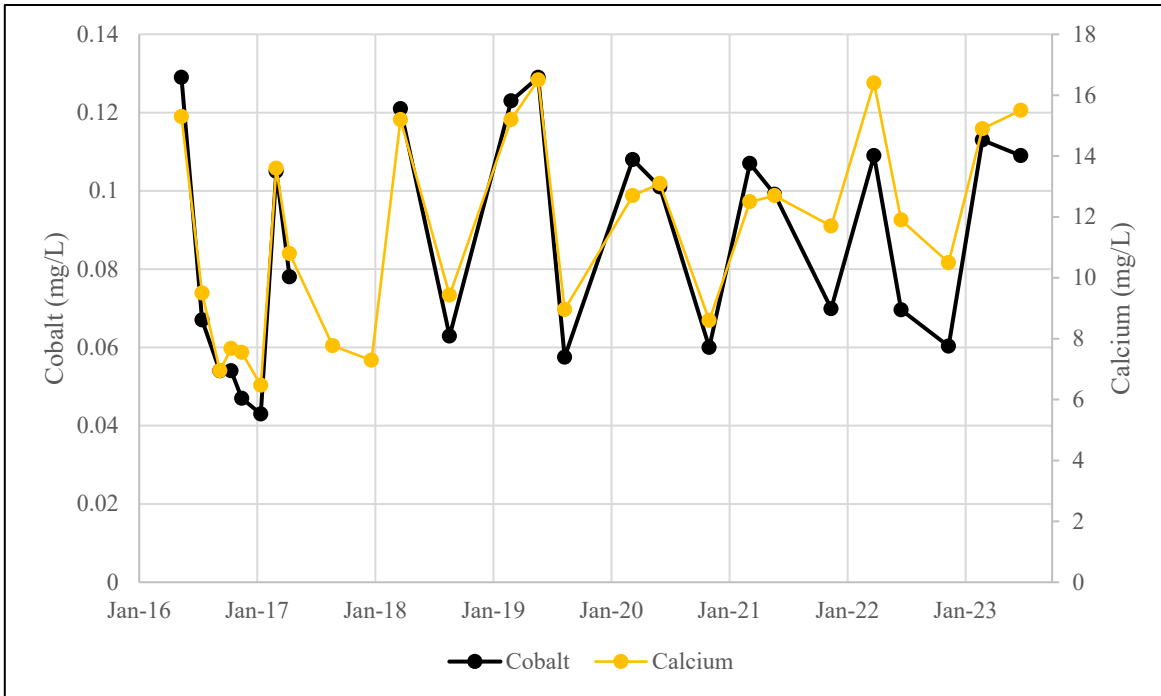


Figure

5

Columbus, Ohio

December 2023



Notes:

1. Cobalt, calcium, and lithium concentrations are shown in milligrams per liter (mg/L).
 2. The gaps in cobalt and lithium data represent the time period during which detection monitoring took place and samples were not analyzed for cobalt and lithium.
- FGD: flue gas desulfurization

AD-22 Cobalt v. Calcium and Lithium
Pirkey FGD Stackout Pad

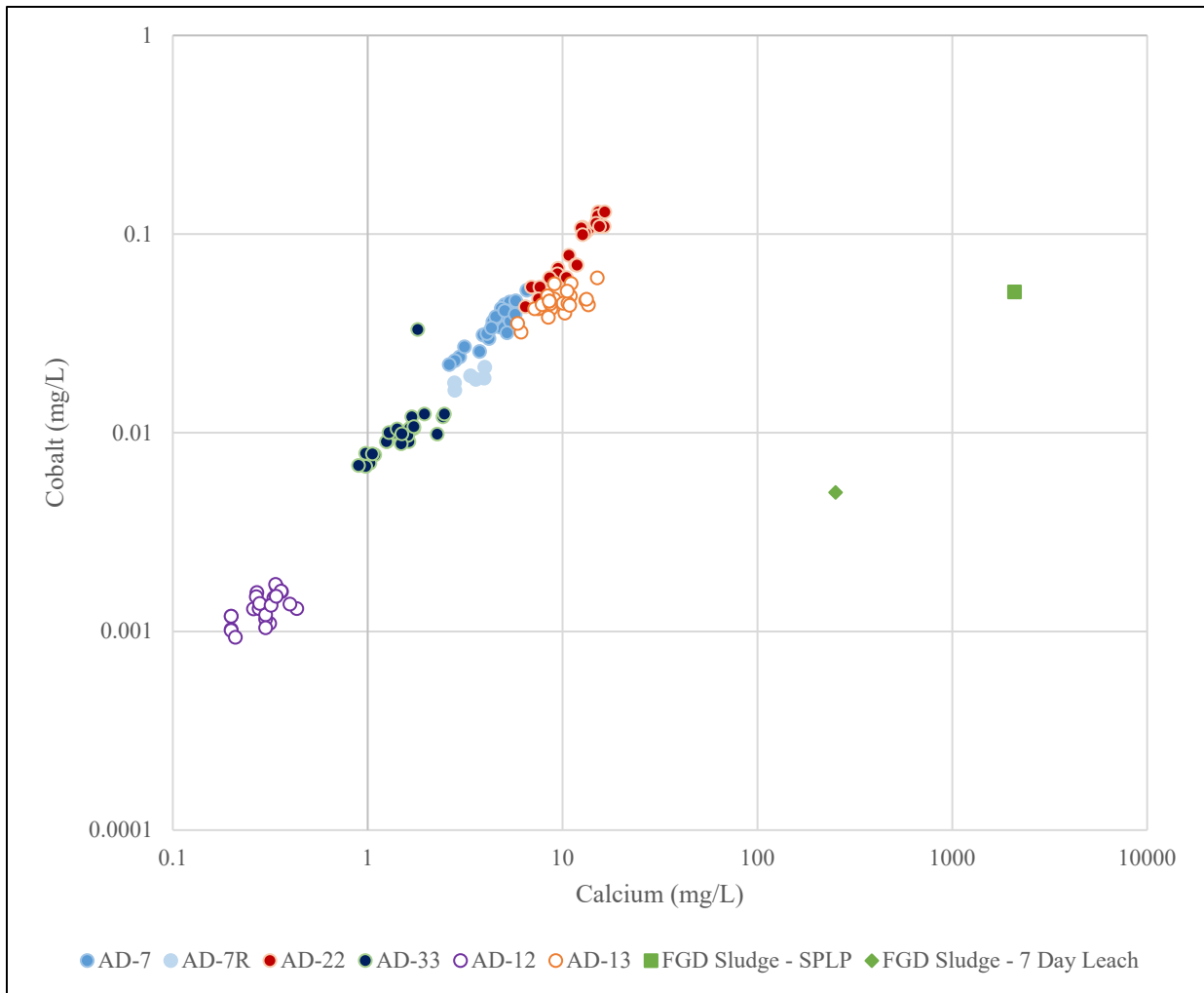


Figure

6

Columbus, Ohio

December 2023



Notes:

1. Cobalt and calcium concentrations are shown in milligrams per liter (mg/L).
2. Upgradient wells are shown with hollow circles.
3. 'FGD Sludge-SPLP' and 'FGD Sludge 7 Day Leach' present the leached concentrations of cobalt and calcium using the Synthetic Precipitation Leaching Procedure (SPLP) (SW-846 Test Method 1312) and the 7-Day Distilled Water Leachate Test Procedure (30 Texas Administration Code 335.521 Appendix 4), respectively.
FGD: Flue Gas Desulfurization

Cobalt and Calcium Concentration Distribution

Pirkey FGD Stackout Pad

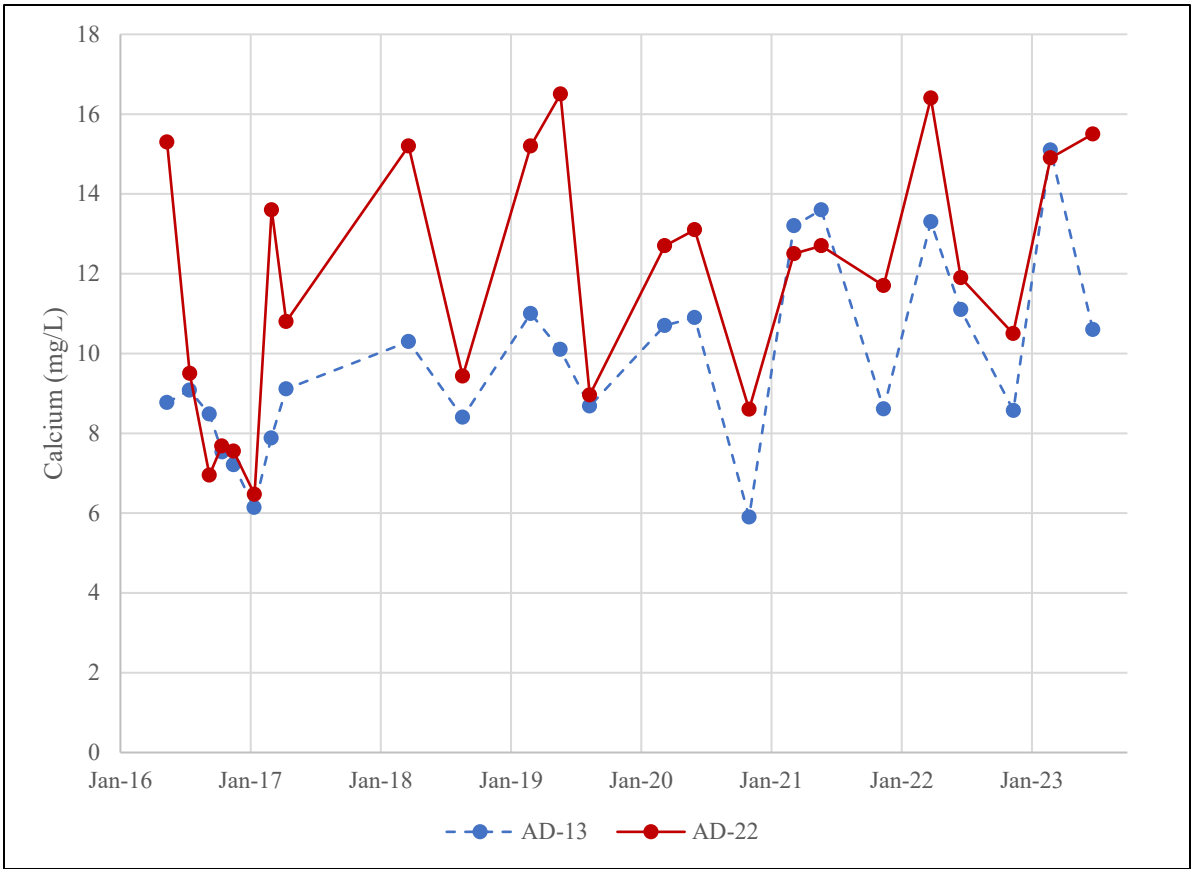


Figure

7

Columbus, Ohio

November 2023



Notes:

1. Calcium concentrations are shown in milligrams per liter (mg/L).
 2. Upgradient monitoring well AD-13 is shown with a dashed line.
- FGD: flue gas desulfurization

Calcium Time Series Graph

Pirkey FGD Stackout Pad

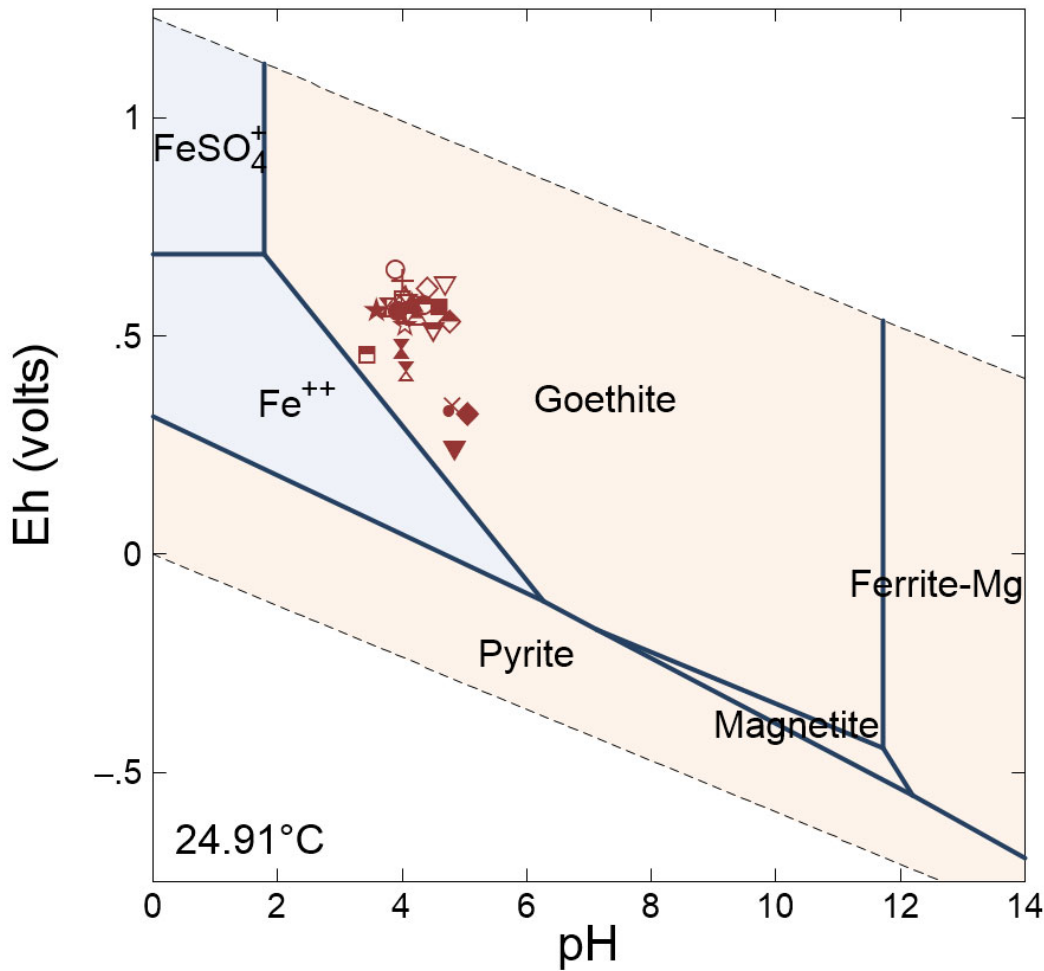


Figure

8

Columbus, Ohio

December 2023



- 11-May-16
- 14-Jul-16
- △ 07-Sep-16
- ▽ 12-Oct-16
- ◇ 14-Nov-16
- ◊ 12-Jan-17
- 01-Mar-17
- ☆ 11-Apr-17
- 23-Aug-17
- 21-Mar-18
- ▲ 20-Aug-18
- ▼ 27-Feb-19
- ◆ 22-May-19
- 12-Aug-19
- ⊠ 10-Mar-20
- ★ 02-Jun-20
- × 02-Nov-20
- ⊕ 08-Mar-21
- ⊞ 24-May-21
- ⊟ 15-Nov-21
- ▲ 28-Mar-22
- ▼ 20-Jun-22
- ◆ 14-Nov-22
- ★ 27-Feb-23
- ⊠ 26-Jun-23
- ⊞ 17-Oct-23

Notes: Groundwater concentrations of major cations and anions at AD-22 from the June 2023 sampling event were used to establish baseline conditions for the diagram. Eh and pH values for sampling dates at AD-22 are shown on the diagram.

AD-22 Eh-pH Diagram
Pirkey FGD Stackout Pad

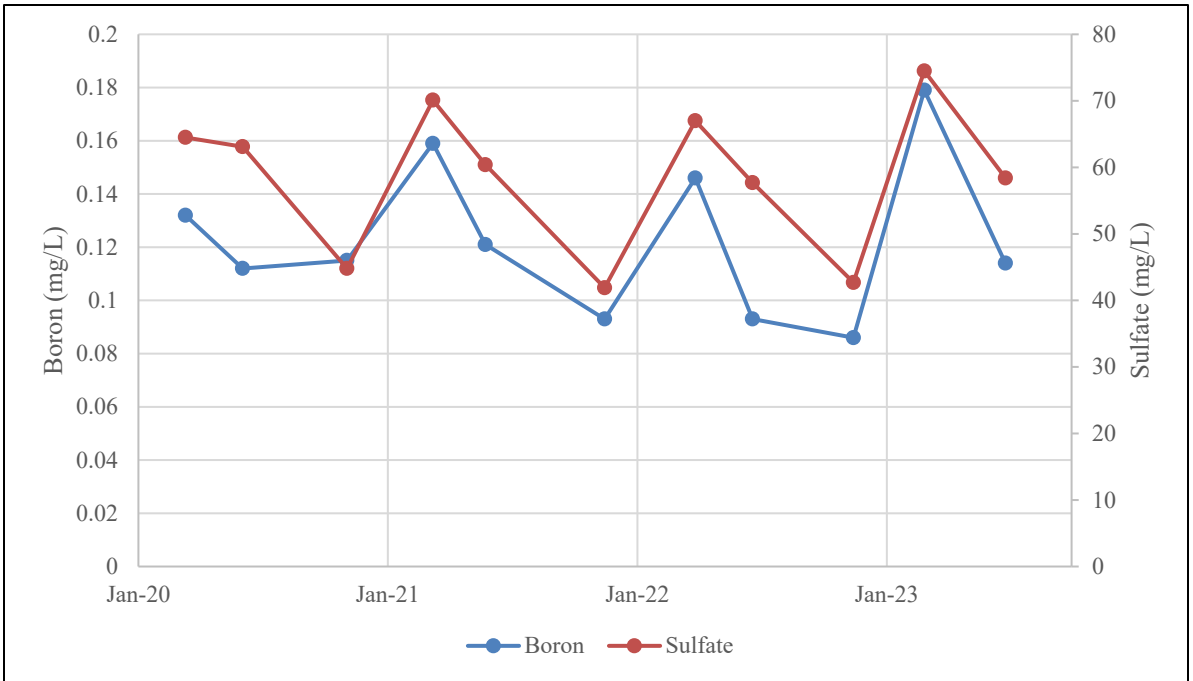


Figure

9

Columbus, Ohio

December 2023



Notes:

1. Boron and sulfate concentrations are shown in milligrams per liter (mg/L).
 FGD: flue gas desulfurization

AD-33 Boron and Sulfate Time Series Graph

Pirkey FGD Stackout Pad

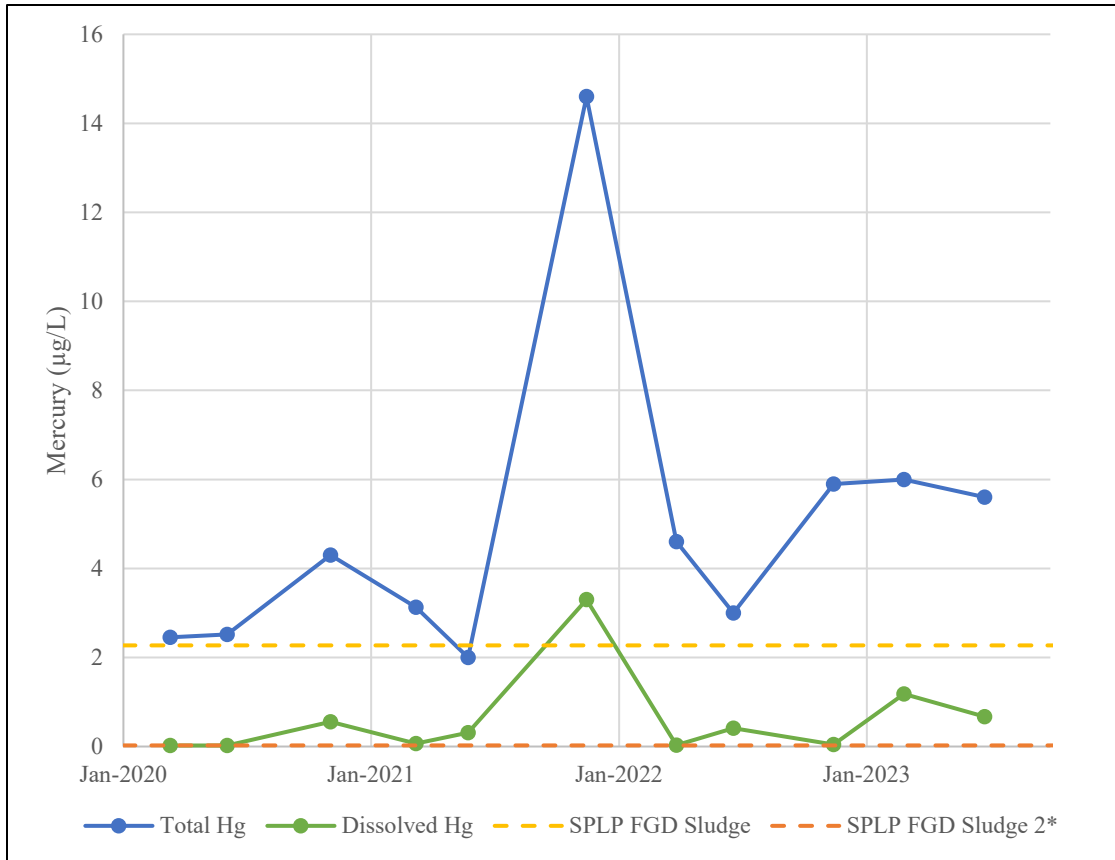


Figure

10

Columbus, Ohio

December 2023



Notes:

1. Mercury (Hg) concentrations are shown in micrograms per liter (µg/L).

2. FGD sludge samples collected on 7/17/2019.

3. 7-day leaching procedure results were not shown due to non-detects.

*: Non-detect presented as the reporting limit

FGD: flue gas desulfurization

SPLP: Synthetic Precipitation Leaching Procedure

Mercury Time Series Graph

Pirkey FGD Stackout Pad

Geosyntec
consultants



Figure

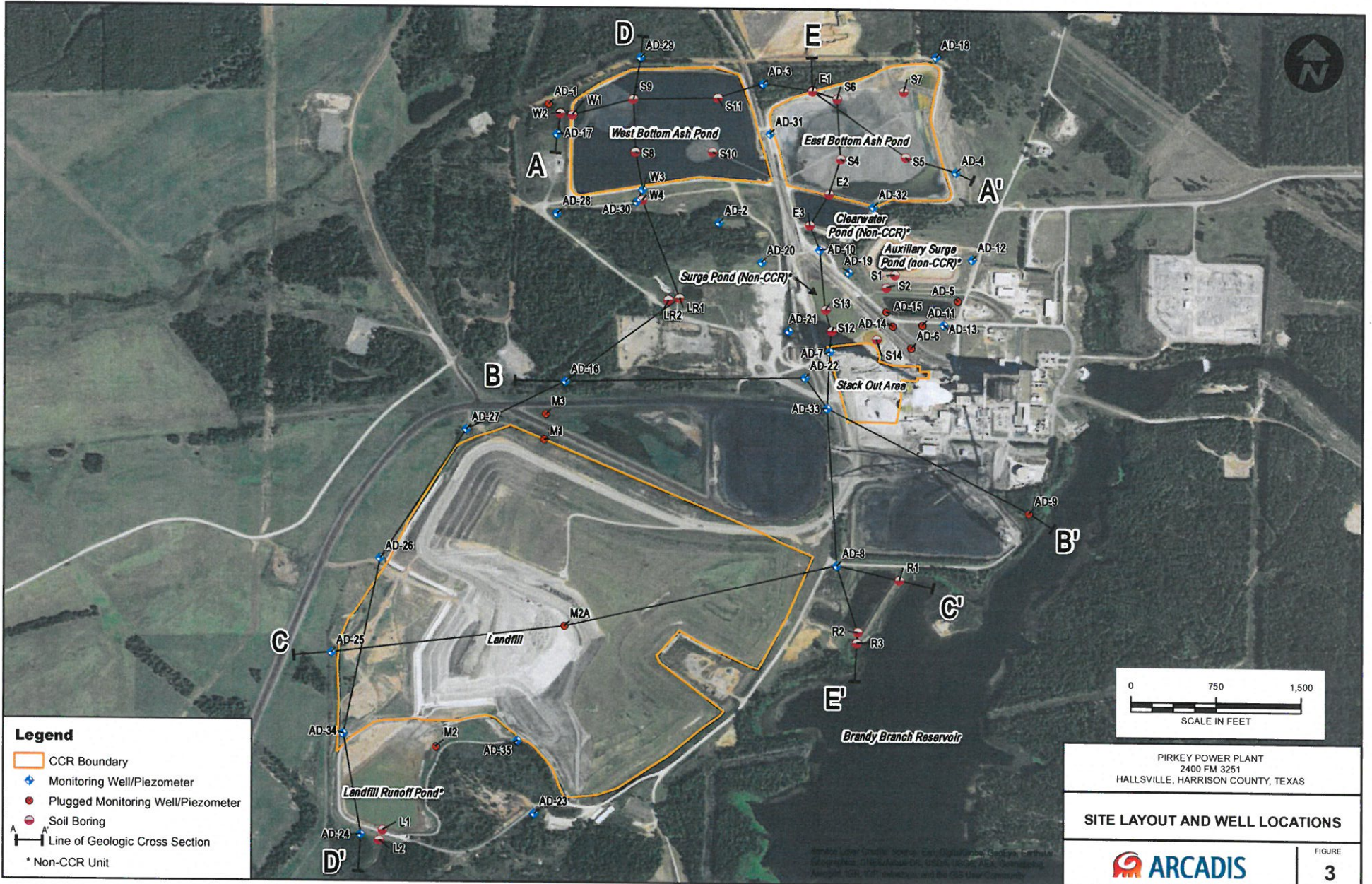
11

Columbus, Ohio

December 2023

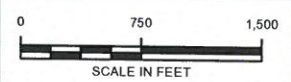
ATTACHMENT A

Geologic Cross Sections



Legend

- CCR Boundary
- ◆ Monitoring Well/Piezometer
- Plugged Monitoring Well/Piezometer
- Soil Boring
- Line of Geologic Cross Section
- * Non-CCR Unit



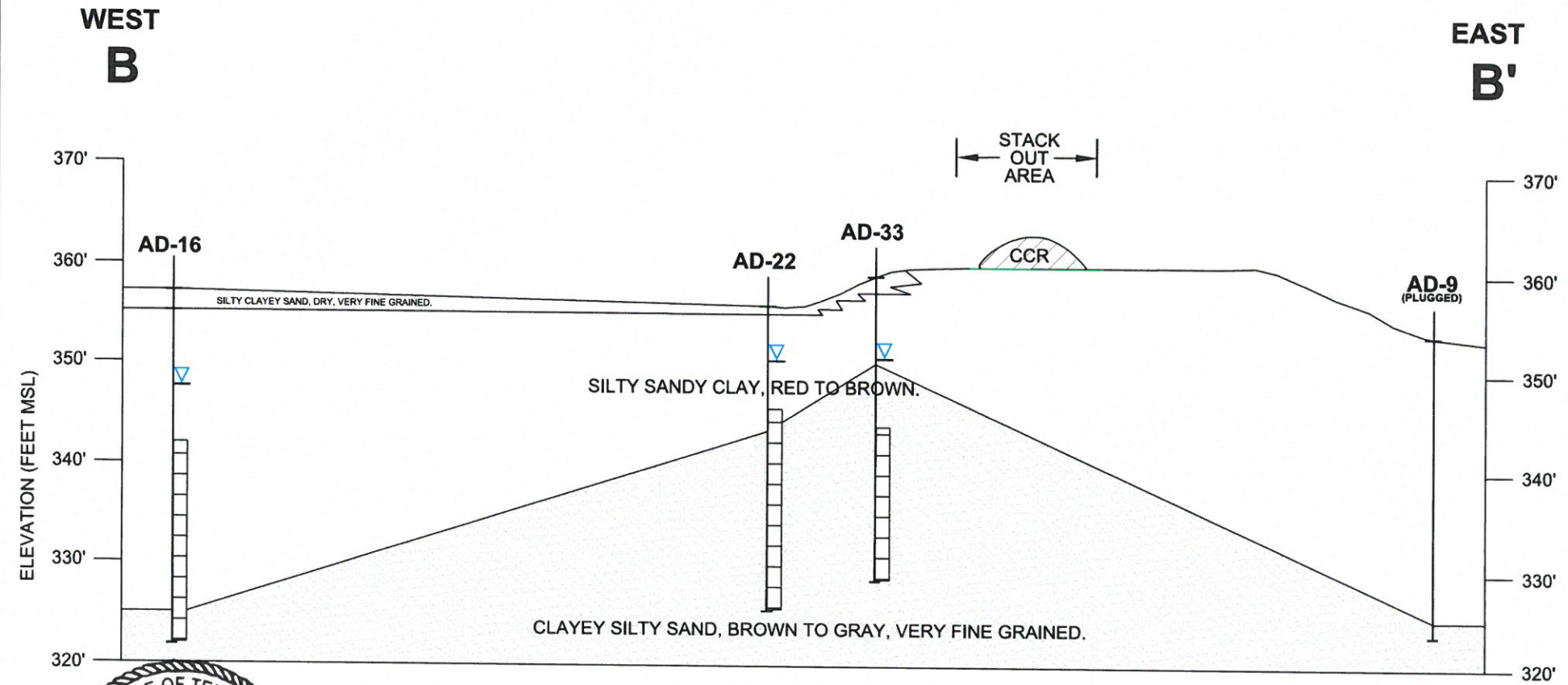
PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

ARCADIS

FIGURE
3

CITY: DRUGROUP: DR: LD: AN: PD: TR: LVS:CH:CF:R:SEF: 0:\Active\Projects\PIR\PIR1516 - CCR Plant Assessment\Play Power Plant\Fig 5 Cross Section B-B'.dwg
 LAYOUT: MODEL: 2/16/2016 1:49 PM: ACADEMY: 10.15 (LMS TECH) PAPERSETUP: PLOTSTYLETABLE: PLOTTED: 2/16/2016 2:21 PM: BY: LEASE: DMM



Kenneth J. Brandner
5-25-16

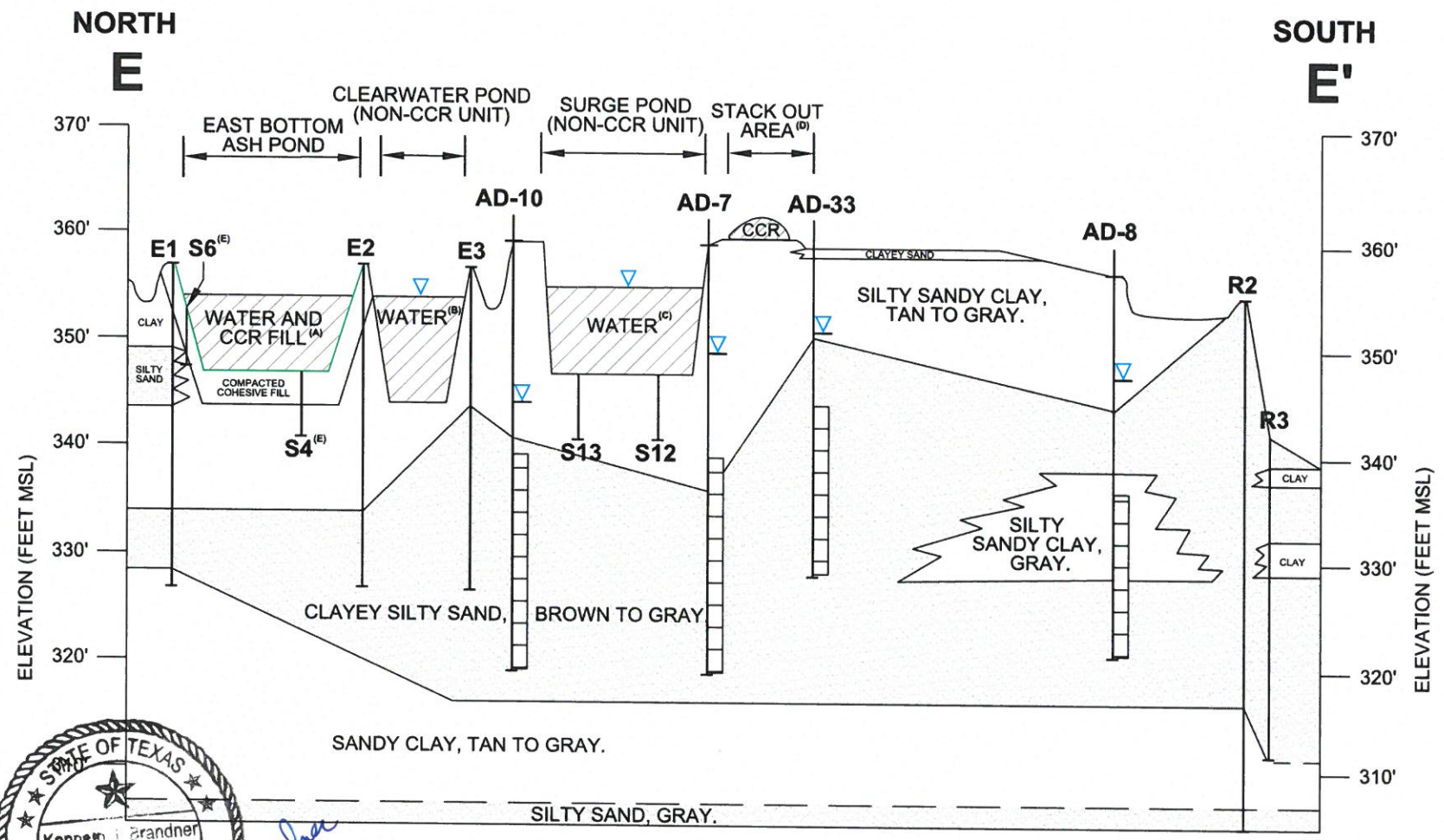
- LEGEND**
- MONITORING WELL SCREENED INTERVAL
 - WATER LEVEL IN MONITORING WELL (1/20/16)
 - BASE OF CCR UNIT

NOTES:

- A) BASE OF STACK OUT AREA CCR UNIT LOCATED AT GRADE, ELEVATION TAKEN FROM MAY 2012 AND JUNE 23, 2015 TOPOGRAPHIC SURVEYS BY BEACON AVIATION.
- B) ELEVATION OF CCR MATERIAL ABOVE STACK OUT AREA VARIES.

PIRKEY POWER PLANT 2400 FM 3251 HALLSVILLE, HARRISON COUNTY, TEXAS	
CROSS SECTION B - B'	
	FIGURE 5

CITY: DFW GROUP; DR: LD; AM: PD; TR: LVS; DATE: 08/25/2016; TITLE: CCR PERIMETER ASH POND; PROJECT: CCR PERIMETER ASH POND; DRAWING: CCR PERIMETER ASH POND; SCALE: AS SHOWN; SHEET: 8 OF 8; DATE PLOTTED: 2016/08/25 11:28 AM; BY: EASE; DANA; LAYOUT: MODEL; SAVED: 2016/08/25 11:28 AM; ACADWORK: 19.15 (LMS TECH); PAGESETUP: RAO1STYLETABLE



- LEGEND**
- MONITORING WELL SCREENED INTERVAL
 - WATER LEVEL IN MONITORING WELL (1/20/16)
 - BASE OF CCR UNIT

- NOTES:**
- A) TOP OF EAST BOTTOM ASH POND PERIMETER BERM ELEVATION IS 357'. OPERATING LEVEL IS 354' (JOHNSON & PACE, MAY 2011); BASE ELEVATION OF EAST BOTTOM ASH POND IS 347' (SARGENT & LUNDY, JANUARY 1983).
 - B) TOP OF CLEARWATER POND PERIMETER BERM ELEVATION IS 357'. OPERATING LEVEL IS 354' (JOHNSON & PACE, MAY 2011). BASE ELEVATION OF CLEARWATER POND IS 344' (SARGENT & LUNDY, JANUARY 1983).
 - C) BASE ELEVATION OF SURGE POND (347-352' MSL) AND POND DESIGN LEVEL (355' MSL) TAKEN FROM JANUARY 31, 1983 SARGENT & LUNDY REPORT "DESIGN SUMMARY FOR LIGNITE STORAGE AREA AND WASTEWATER POND FACILITIES".
 - D) BASE OF STACK OUT AREA CCR UNIT LOCATED AT GRADE. ELEVATION TAKEN FROM MAY 2012 AND JUNE 23, 2015 TOPOGRAPHIC SURVEYS BY BEACON AVIATION.
 - E) SOIL BORING INSTALLED BY SOUTHWESTERN LABORATORIES DURING ASH POND CONSTRUCTION IN 1983.

PIRKEY POWER PLANT
 2400 FM 3251
 HALLSVILLE, HARRISON COUNTY, TEXAS

CROSS SECTION
E - E'

FIGURE
8



ATTACHMENT B

SP-B2 Boring Log

Soil Boring Log

Project: AEP Pirkey

Boring/Well Name: _____ SP-B2

Project Location: _____ Hallsville, TX

Boring Date: __ 3/2/2020

Depth Scale Feet	Water Table	Soil Profile Description	PID*
0		pp= pocket penetrometer	
		0.0'-0.2': Gray silt, dry, brittle (fly ash)	
		0.2'-0.4': Black, coal dust, strong odor	
		0.4'-1.7': Gray silt, dry, brittle (fly ash)	
		1.7'-2.6': red silt, brittle, dry	
5		2.6'-6.5': Gray and red silty clay, high stiffness (pp. 4.0-5.0), low plasticity, iron ore/mottling present	
		6.5'-6.9': Light gray, red and tan clay, low stiffness (pp. 1.5), moderate plasticity	
		6.9'-10.0': Light gray and maroon clay, moderate stiffness (pp. 3.5), low plasticity, iron ore/mottling present; moist near 9'	
10	▼	10.0'-15.0': Light gray and maroon clay, moderate/high stiffness (pp. 3.5-4.5), low plasticity, iron ore/mottling present; wet	
15		15.0'-18.5': Maroon and light gray clay, moderate/high stiffness (pp. 3.0-4.0), low plasticity; wet	
		18.5'-18.8': Red/brown silt, trace clay, good cohesion	
		18.8'-20.5': Light gray clayey silty sand, very fine grained, moderate sorting, mottling present; wet	
20		20.5'-23.4': Light gray and orange clayey silty sand, very fine grained; mottling present, moderate sorting; wet	
		23.4'-25.0': Maroon and orange silty clay, low stiffness (pp. 0.5), high plasticity; wet	
25		25.0'-29.0': Same as above; interchanging between silty clay and clayey silt throughout	
		29.0'-29.5': Black clay, moderate stiffness (pp.3.0), low plasticity	
30		29.5'-30.0': Gray fine grained sand, well sorted; wet	
		Samples collected at 10-12'; 16-18'; 27-29'	
		TD at 30' bgs	
		*PID readings not collected	
35			

Drill Rig Geoprobe 3230 DT
 Drilling Contractor: _____ C&S
 Driller: _____ DJ Diduch

Geosyntec Consultants

ATTACHMENT C

AD-7 Boring Log

832964

LOG OF BORING

PROJECT: Waste Water Ponds
CLIENT: SWEPCO

BORING NO.: MW-7
LOCATION: Hallsville

Date: 10-3-83

Type: Auger

Ground Elevation:

Depth, Feet	Symbol	Sample	Legend:
			 Sample X Penetration ▼ Water
Description of Stratum			
5			Stiff red, tan and grey sandy silty clay w/iron ore
10			Stiff tan and grey clay w/iron ore
15			Stiff tan and grey silty sandy clay lenses w/iron ore
20			Stiff tan and grey very sandy silty clay
25			Firm tan and grey clayey silty sand
30			Very dense grey silty sand 23-27=12" 50 B/F
35			Very dense grey clayey silty sand 17-35=12" 50 B/F
40			Very dense grey clayey silty sand 25-25=10 1/2" 50 B/10 1/2"
Bottom of boring at 40 feet.			
45			
50			

ATTACHMENT D

SP-B4 Boring Log

Soil Boring Log

Project: AEP Pirkey

Boring/Well Name: _____ SP-B4

Project Location: _____ Hallsville, TX

Boring Date: __ 3/3/2020


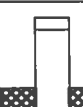

Depth Scale Feet	Water Table	Soil Profile Description	PID*
0		pp= pocket penetrometer	
		0.0'-0.4': Top soil, black silt, vegetation	
		0.4'-0.7': Brown clayey silt, good cohesion	
		0.7'-1.5': Red and light gray silty clay, moderate stiffness (pp. 2.5), high plasticity	
		1.5'-3.7': Maroon and light gray clay, high stiffness (pp. 4.5-5.0), low plasticity; iron ore present 3.1'-3.7'	
		3.7'-5.0': NO RECOVERY	
5		5.0'-7.0': Maroon and light gray clay, high stiffness (pp. 4.5-5.0), low plasticity; iron ore present throughout	
		7.0'-8.0': Light gray clay with iron ore, moderate stiffness (pp.2.5-3.0), moderate plasticity	
		8.0'-10.0': Maroon clay, moderate stiffness (pp. 3.5), moderate plasticity; iron ore present; moist at 9'	
10		10.0'-12.6': Maroon clay, moderate stiffness (pp. 3.5), moderate plasticity; iron ore present; wet at 12'	
	▼	12.6'-13.3': Tan clay, low stiffness (pp.1.5), high plasticity; wet	
		13.3'-18.5': Tan and brown clayey silt, moderate cohesion; iron ore present; wet	
15			
		18.5'-20.3': Maroon silty clay, low stiffness (pp. 1.0), moderate plasticity; iron ore; wet	
20		20.3'-21.1': Dark gray/black clay, trace silt, low stiffness (pp. 1.5), high plasticity; wet	
		21.1'-21.3': Dark gray silt, good cohesion; wet	
		21.3'-21.9': Dark gray silty clay, low stiffness (pp. 1.5), high plasticity; wet	
		21.9'-22.3': Dark gray silt, moderate cohesion; wet	
		22.3'-22.7': light brown silt; low cohesion; wet	
		22.7'-24.4': Dark gray and dark green silty clay, moderate/high stiffness (pp.3.5), moderate plasticity; wet, glauconite present	
25		24.4'-27.8': Dark green/gray fine grained sand, well sorted; wet; glauconite present	
		27.8'-30.0': Red and orange fine grained sand, well sorted, with iron ore; wet	
30			
		Samples collected at 6-8'; 18-20'; 28-30'	
		TD at 30' bgs; refusal	
		*PID readings not collected	
35			

Drill Rig Geoprobe 3230 DT
 Drilling Contractor: _____ C&S
 Driller: _____ DJ Diduch

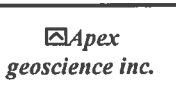
Geosyntec Consultants

ATTACHMENT E
AD-22 Boring Log and Well Installation Diagram

BORING MONITOR WELL
 APEX PROJECT NO.: 110-089 BORING NUMBER: _____ MONITOR WELL NUMBER: AD-22
 FACILITY NAME: AEP- Pirkey Power Plant FACILITY ID NO.: N/A
 FACILITY ADDRESS: Hallsville, Texas
 DRILLING COMPANY/METHOD/RIG: Apex Geoscience Inc. / Hollow-stem Augers/ CME-55 Track Rig
 DRILLER: Ed Wilson, Apex Geoscience Inc. COMPLETION DATE: 12/16/2010
 PREPARED BY: David Bedford LOGGED BY: David Bedford
 LATITUDE: N 32°27'03.3" Datum: WGS-84 WELL LOCATION: Triangle- South side Quansit Hut
 LONGITUDE: W94°29'41.3"

DEPTH (FEET)	PID (PPM)	SAMPLE INTERVAL	WELL LOG AND COMPLETION DETAILS	USCS CODE	SOIL DESCRIPTION AND COMMENTS	Odor	Moisture	
1				0-0.5	SC	Clayey sand, light brown, very fine grained	None	Moist
2				0.5-12	CL	Lean clay, light brown mottled with light gray	None	Slightly Moist
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13				12-20	SC	Clayey sand, grayish brown with orangish brown streaks, very fine grained	None	Slightly Wet
14								
15								
16								
17								
18								
19								
20								
21				20-25	SC	(Dense crystalline rock 21-21.1'), light brown clayey sand, greenish black, mica, black clay streaks, very fine grained, wet @ 20'	None	Wet
22								
23								
24								
25								
26				25-30	SM	Sand, greenish brown (1') grading to orangish brown, silty, very fine grained	None	Wet
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

 Cement
  Bentonite
  Filter Sand
  Water Level



Total Depth: 30 feet Riser Interval: +3 (ags)-10'
 Filter Sand (Size/Interval): 8-30' Screen Interval: 10-30'
 Grout (Type/Interval): Grout from 0-2'; Bentonite from 2-8' Water level: 12.5'
 Surface Completion Flush Above Ground 3'

Note: This log is not to be used separate from this report.

ATTACHMENT F

FGD Sludge Materials Analytical Report



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

02004
502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101
	Phone: (318) 673-2721	Fax: (318) 673-3960
AEP Sample ID : 227040	Collected Date: 07/17/2019	By: RF
Cust Sample ID: Dirt/Sludge	Location: H.W. Pirkey Power Plant	Matrix: Solid
Sample Desc.: Pirkey Sludge FGD Total		

Metals (227040)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	20500	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Antimony	0.993	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Arsenic	28.3	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Barium	142	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Beryllium	2.12	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Boron	845	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18	M4	JDB
Cadmium	1.68	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Calcium	77500	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Chromium	30.6	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Cobalt	24.8	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Copper	30.2	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Dry Weight, Percent	94.7	%	0.001	1		07/22/2019 15:30	T5	JDB
Iron	36300	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:18	M4	JDB
Lead	5.31	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Lithium	11.5	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47	T5	JDB
Magnesium	7150	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Manganese	498	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Mercury	0.653	mg/Kg	0.000025	1	EPA 7471B 1998	07/24/2019 14:37		LNM
Molybdenum	8.45	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Nickel	28.8	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Potassium	1370	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Selenium	36.4	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Silver	0.208	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Sodium	1230	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Strontium	382	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18		JDB
Thallium	0.503	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

02004

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143		Company: SEP - Flint Creek (TW)			Address: 502 North Allen Avenue			
Date Received: 07/18/2019		Contact: Terry Wehling			Shreveport, LA 71101			
		Phone: (318) 673-2721			Fax: (318) 673-3960			
Tin	1.28	mg/Kg	0.2	1:50	EPA 6010B 1996	07/26/2019 0:47	T5	JDB
Titanium	1360	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:18	M4	JDB
Vanadium	77.5	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Zinc	26	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 0:47		JDB
Waste Characterization (227040)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
pH, Soil	8.44	pH		1	EPA 9045D 2002	07/25/2019 12:30		GB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



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Analysis Report

02004
 502 North Allen Ave.
 Shreveport, LA 71101
 Phone: (318) 673-3802
 Fax: (318) 673-3960

Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101
	Phone: (318) 673-2721	Fax: (318) 673-3960
AEP Sample ID : 227041	Collected Date: 07/17/2019	By: RF
Cust Sample ID: Dirt/Sludge	Location: H.W. Pirkey Power Plant	Matrix: Solid
Sample Desc.: Pirkey Sludge FGD SPLP		

SPLP (227041)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	14.2	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Antimony	0.018	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Arsenic	0.015	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Barium	3.46	mg/L	0.05	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Beryllium	0.012	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Boron	22.3	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Cadmium	0.002	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Calcium	2090	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Chromium	0.005	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Cobalt	0.051	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Copper	0.009	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Iron	52.4	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Lithium	0.146	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Magnesium	62.3	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Manganese	2.83	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Mercury	0.002272	mg/L	0.000025	1	EPA 7470A 1994	07/24/2019 14:05		LNLM
Molybdenum	0.229	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Nickel	0.054	mg/L	0.025	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Potassium	9.61	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Selenium	0.93	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Sodium	35.6	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Strontium	12.7	mg/L	0.05	1:50	EPA 1312/6010B 1996	07/25/2019 20:58		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09		JDB

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Analysis Report

02004
502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143 Date Received: 07/18/2019	Company: SEP - Flint Creek (TW) Contact: Terry Wehling Phone: (318) 673-2721	Address: 502 North Allen Avenue Shreveport, LA 71101 Fax: (318) 673-3960				
Titanium	0.041 mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09	JDB
Vanadium	0.269 mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:09	JDB
Zinc	0.299 mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:09	JDB

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Report ID : 40143	Company: SEP - Flint Creek (TW)	Address: 502 North Allen Avenue
Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101
	Phone: (318) 673-2721	Fax: (318) 673-3960
AEP Sample ID : 227042	Collected Date: 07/17/2019	By: RF
Cust Sample ID: Dirt/Sludge	Location: H.W. Pirkey Power Plant	Matrix: Solid
Sample Desc.: Pirkey Sludge FGD 7 Day Leachate		

7-Day Leachate (227042)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	0.563	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Antimony	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Arsenic	0.011	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Barium	0.134	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Beryllium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Boron	8.44	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:43		JDB
Cadmium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Calcium	252	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:43		JDB
Chromium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Cobalt	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Copper	0.002	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Iron	0.211	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Lithium	0.069	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Magnesium	6.73	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Manganese	0.008	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Mercury	< 0.005	mg/L	0.005	1:200	EPA 7470A 1994	07/30/2019 10:19		LNLM
Molybdenum	0.18	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Nickel	< 0.025	mg/L	0.025	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Potassium	4.82	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Selenium	0.208	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Sodium	19.8	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:43		JDB
Strontium	1.6	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35		JDB

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Report ID : 40143	Company: SEP - Flint Creek (TW)			Address: 502 North Allen Avenue			
Date Received: 07/18/2019	Contact: Terry Wehling			Shreveport, LA 71101			
	Phone: (318) 673-2721			Fax: (318) 673-3960			
Titanium	0.015	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35	JDB
Vanadium	0.03	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:35	JDB
Zinc	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:35	JDB



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Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101
	Phone: (318) 673-2721	Fax: (318) 673-3960
AEP Sample ID : 227043	Collected Date: 07/17/2019	By: RF
Cust Sample ID: Dirt/Sludge 2	Location: H.W. Pirkey Power Plant	Matrix: Solid
Sample Desc.: Pirkey Sludge FGD 2 Total		

Metals (227043)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	19600	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Antimony	0.919	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Arsenic	22.8	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Barium	121	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Beryllium	1.66	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Boron	891	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25	T5	JDB
Cadmium	1.37	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Calcium	84500	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Chromium	28.5	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Cobalt	20.3	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Copper	26.9	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Dry Weight, Percent	97.2	%	0.001	1		07/22/2019 15:30	T5	JDB
Iron	28800	mg/Kg	12.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Lead	5.78	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Lithium	12	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26	T5	JDB
Magnesium	7070	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Manganese	388	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Mercury	0.606	mg/Kg	0.000025	1	EPA 7471B 1998	07/24/2019 14:27		LNM
Molybdenum	11	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Nickel	25.7	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Potassium	1460	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Selenium	30.4	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Silver	0.19	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Sodium	1780	mg/Kg	25	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Strontium	451	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Thallium	0.562	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB

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Report ID : 40143		Company: SEP - Flint Creek (TW)			Address: 502 North Allen Avenue			
Date Received: 07/18/2019		Contact: Terry Wehling			Shreveport, LA 71101			
		Phone: (318) 673-2721			Fax: (318) 673-3960			
Tin	1.06	mg/Kg	0.2	1:50	EPA 6010B 1996	07/26/2019 1:26	T5	JDB
Titanium	1280	mg/Kg	2.5	1:2500	EPA 6010B 1996	07/26/2019 0:25		JDB
Vanadium	68.3	mg/Kg	0.05	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Zinc	33.8	mg/Kg	0.25	1:50	EPA 6010B 1996	07/26/2019 1:26		JDB
Waste Characterization (227043)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
pH, Soil	8.71	pH		1	EPA 9045D 2002	07/25/2019 12:30		GB

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Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101
	Phone: (318) 673-2721	Fax: (318) 673-3960
AEP Sample ID : 227044	Collected Date: 07/17/2019	By: RF
Cust Sample ID: Dirt/Sludge 2	Location: H.W. Pirkey Power Plant	Matrix: Solid
Sample Desc.: Pirkey Sludge FGD 2 SPLP		

SPLP (227044)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	10.5	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Antimony	0.017	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Arsenic	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Barium	2.57	mg/L	0.05	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Beryllium	0.009	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Boron	26.7	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Cadmium	0.002	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Calcium	1960	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Chromium	0.004	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Cobalt	0.051	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Copper	0.003	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Iron	47.7	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Lithium	0.136	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Magnesium	70.2	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Manganese	2.87	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Mercury	< 0.000025	mg/L	0.000025	1	EPA 7470A 1994	07/24/2019 14:21		LNLM
Molybdenum	0.288	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Nickel	0.071	mg/L	0.025	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Potassium	11.4	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Selenium	0.775	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Sodium	56.7	mg/L	0.5	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Strontium	13.2	mg/L	0.05	1:50	EPA 1312/6010B 1996	07/25/2019 21:06		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55		JDB

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Report ID : 40143 Date Received: 07/18/2019	Company: SEP - Flint Creek (TW) Contact: Terry Wehling Phone: (318) 673-2721	Address: 502 North Allen Avenue Shreveport, LA 71101 Fax: (318) 673-3960				
Titanium	0.037 mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55	JDB
Vanadium	0.194 mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 23:55	JDB
Zinc	0.338 mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 23:55	JDB



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Date Received: 07/18/2019	Contact: Terry Wehling	Shreveport, LA 71101
	Phone: (318) 673-2721	Fax: (318) 673-3960
AEP Sample ID : 227045	Collected Date: 07/17/2019	By: RF
Cust Sample ID: Dirt/Sludge 2	Location: H.W. Pirkey Power Plant	Matrix: Solid
Sample Desc.: Pirkey Sludge FGD 2 7 Day Leachate		

7-Day Leachate (227045)								
Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	0.994	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Antimony	0.006	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Arsenic	0.031	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Barium	0.121	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Beryllium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Boron	16.4	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Cadmium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Calcium	633	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Chromium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Cobalt	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Copper	0.003	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Iron	0.225	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Lithium	0.1	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Magnesium	9.54	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Manganese	0.015	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Mercury	< 0.005	mg/L	0.005	1:200	EPA 7470A 1994	07/30/2019 10:36		LNLM
Molybdenum	0.448	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Nickel	< 0.025	mg/L	0.025	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Potassium	9.02	mg/L	0.01	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Selenium	0.201	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Sodium	48.3	mg/L	0.5	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Strontium	3.79	mg/L	0.05	1:50	EPA 6010B 1996	08/04/2019 17:53		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45		JDB

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Report ID : 40143 Date Received: 07/18/2019	Company: SEP - Flint Creek (TW) Contact: Terry Wehling Phone: (318) 673-2721	Address: 502 North Allen Avenue Shreveport, LA 71101 Fax: (318) 673-3960					
Titanium	0.02	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45	JDB
Vanadium	0.087	mg/L	0.001	1	EPA 6010B 1996	08/04/2019 19:45	JDB
Zinc	< 0.005	mg/L	0.005	1	EPA 6010B 1996	08/04/2019 19:45	JDB



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Company: SEP - Flint Creek (TW)
Contact: Terry Wehling
Phone: (318) 673-2721

Address: 502 North Allen Avenue
 Shreveport, LA 71101
Fax: (318) 673-3960

Quality Control Data

* Quality control units are the same as reported analytical results

Date	Parameter	Sample ID	Blank Value *	Standard			Spike			Surrogate % Recovery	Duplicate % Difference	Tech
				Value *	Recovery*	%	Value *	Recovery*	%			
7/25/2019	Aluminum	226939.1	<0.005	2	2.0229733	101.1	2	2.071639	103.6		0.4	JDB
7/25/2019	Aluminum	227041.1	<0.005	2	2.0229733	101.1	2	2.2242	111.2		0.0	JDB
7/26/2019	Aluminum	227040.1	<12.5	2	2.0358232	101.8	100	132.38333	132.4		1.2	JDB
7/25/2019	Antimony	226939.1	<0.005	0.8	0.8092462	101.2	0.8	0.8159776	102.0		0.2	JDB
7/25/2019	Antimony	227041.1	<0.005	0.8	0.8092462	101.2	0.8	0.7671843	95.9		0.5	JDB
7/26/2019	Antimony	227040.1	<0.25	0.8	0.8071122	100.9	40	32.643192	81.6		1.8	JDB
7/25/2019	Arsenic	227041.1	<0.005	0.8	0.8086795	101.1	0.8	0.7758421	97.0		0.0	JDB
7/25/2019	Arsenic	226939.1	<0.005	0.8	0.8086795	101.1	0.8	0.8086275	101.1		0.1	JDB
7/26/2019	Arsenic	226915.1	<0.25	0.8	0.7906797	98.8	40	40.306278	100.8		0.8	JDB
7/26/2019	Arsenic	227040.1	<0.25	0.8	0.7940238	99.3	40	34.433917	86.1		2.3	JDB
7/25/2019	Barium	226939.1	<0.001	0.2	0.2080557	104.0	0.2	0.209543	104.8		0.1	JDB
7/25/2019	Barium	227041.1	<0.05	0.2	0.2080557	104.0	0.2	0.1829767	91.5		0.4	JDB
7/26/2019	Barium	227040.1	<2.5	0.2	0.2112650	105.6	500	543.5715	108.7		7.2	JDB
7/25/2019	Beryllium	226939.1	<0.001	0.2	0.2122779	106.1	0.2	0.2142832	107.1		0.3	JDB
7/25/2019	Beryllium	227041.1	<0.001	0.2	0.2122779	106.1	0.2	0.1992329	99.6		0.4	JDB
7/26/2019	Beryllium	227040.1	<0.05	0.2	0.2131235	106.6	10	9.40679	94.1		0.2	JDB
7/25/2019	Boron	226939.1	<0.01	0.3	0.2995651	99.9	0.3	0.2984183	99.5		0.7	JDB
7/25/2019	Boron	227041.1	<0.5	0.3	0.2995651	99.9	0.3	0.2855333	95.2		0.5	JDB
7/25/2019	Cadmium	227041.1	<0.001	0.2	0.2069934	103.5	0.2	0.1836838	91.8		0.6	JDB
7/25/2019	Cadmium	226939.1	<0.001	0.2	0.2069934	103.5	0.2	0.2061243	103.1		0.5	JDB
7/26/2019	Cadmium	226915.1	<0.05	0.2	0.1973571	98.7	10	10.058007	100.6		1.8	JDB
7/26/2019	Cadmium	227040.1	<0.05	0.2	0.2013293	100.7	10	8.0453767	80.5		1.6	JDB
7/25/2019	Calcium	226939.1	<0.01	1	1.0087505	100.9	1	1.0243667	102.4		0.9	JDB
7/26/2019	Calcium	227040.1	<25	1	0.8616568	86.2	50	113.63333	227.3		0.8	JDB
7/25/2019	Chromium	226939.1	<0.001	0.4	0.4116387	102.9	0.4	0.4125529	103.1		0.4	JDB
7/25/2019	Chromium	227041.1	<0.001	0.4	0.4116387	102.9	0.4	0.3867339	96.7		0.3	JDB
7/26/2019	Chromium	227040.1	<0.05	0.4	0.40798	102.0	20	17.692233	88.5		1.6	JDB
7/26/2019	Chromium	226915.1	<0.05	0.4	0.4059509	101.5	20	20.758823	103.8		0.8	JDB
7/25/2019	Cobalt	227041.1	<0.005	0.2	0.2043482	102.2	0.2	0.1839347	92.0		0.4	JDB
7/25/2019	Cobalt	226939.1	<0.005	0.2	0.2043482	102.2	0.2	0.2054714	102.7		0.4	JDB
7/26/2019	Cobalt	227040.1	<0.05	0.2	0.2032547	101.6	10	7.7614833	77.6		1.8	JDB
7/25/2019	Copper	227041.1	<0.001	0.3	0.3066399	102.2	0.3	0.2963301	98.8		0.1	JDB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

02004

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143		Company: SEP - Flint Creek (TW)				Address: 502 North Allen Avenue						
Date Received: 07/18/2019		Contact: Terry Wehling				Shreveport, LA 71101						
		Phone: (318) 673-2721				Fax: (318) 673-3960						
7/25/2019	Copper	226939.1	<0.001	0.3	0.3066399	102.2	0.3	0.3109092	103.6		0.1	JDB
7/26/2019	Copper	227040.1	<0.05	0.3	0.3124104	104.1	15	15.003017	100.0		1.9	JDB
7/25/2019	Iron	226939.1	<0.01	3	3.1158893	103.9	3	3.1231158	104.1		1.0	JDB
7/25/2019	Iron	227041.1	<0.5	3	3.1158893	103.9	150	159.28837	106.2		0.8	JDB
7/26/2019	Iron	227040.1	<12.5	3	3.0861005	102.9					3.1	JDB
7/25/2019	Lead	227041.1	<0.005	1	1.0430644	104.3	1	0.9320653	93.2		0.6	JDB
7/25/2019	Lead	226939.1	<0.005	1	1.0430644	104.3	1	1.0416574	104.2		0.4	JDB
7/26/2019	Lead	226915.1	<0.25	1	1.0147827	101.5	50	51.881956	103.8		1.4	JDB
7/26/2019	Lead	227040.1	<0.25	1	1.0194305	101.9	50	41.227533	82.5		1.1	JDB
7/25/2019	Lithium	227041.1	<0.001	0.2	0.2119096	106.0	0.2	0.2353987	117.7		0.1	JDB
7/25/2019	Lithium	226939.1	<0.001	0.2	0.2119096	106.0	0.2	0.2163799	108.2		0.4	JDB
7/26/2019	Lithium	227040.1	<0.05	0.2	0.211291	105.6	10	11.698417	117.0		2.8	JDB
7/25/2019	Magnesium	226939.1	<0.01	2	2.0868175	104.3	2	2.0877567	104.4		0.2	JDB
7/25/2019	Magnesium	227041.1	<0.5	2	2.0868175	104.3	2	1.9791333	99.0		0.6	JDB
7/26/2019	Magnesium	227040.1	<25	2	2.0570549	102.9	100	76.916667	76.9		1.4	JDB
7/25/2019	Manganese	226939.1	<0.001	0.2	0.2072869	103.6	0.2	0.2077536	103.9		0.2	JDB
7/25/2019	Manganese	227041.1	<0.001	0.2	0.2072869	103.6	0.2	0.16684	83.4		0.7	JDB
7/26/2019	Manganese	227040.1	<2.5	0.2	0.2066368	103.3	500	572.398	114.5		1.1	JDB
7/24/2019	Mercury	227041.1	<0.00002	0.001	0.00097	97.0	0.2	0.16373	81.9		7.0	LNLM
7/24/2019	Mercury	227040.1	<0.00002	0.001	0.00097	97.0	0.04	0.0496	124.0		4.4	LNLM
7/30/2019	Mercury	227042.1	<0.005	0.001	0.0009	90.0	0.2	0.156162	78.1		4.0	LNLM
7/25/2019	Molybdenum	227041.1	<0.005	0.2	0.2067657	103.4	0.2	0.197727	98.9		0.5	JDB
7/25/2019	Molybdenum	226939.1	<0.005	0.2	0.2067657	103.4	0.2	0.2076129	103.8		0.4	JDB
7/26/2019	Molybdenum	227040.1	<0.05	0.2	0.2073308	103.7	10	9.2486833	92.5		0.4	JDB
7/25/2019	Nickel	227041.1	<0.025	0.5	0.5192594	103.9	0.5	0.46183	92.4		0.6	JDB
7/25/2019	Nickel	226939.1	<0.025	0.5	0.5192594	103.9	0.5	0.5209379	104.2		0.6	JDB
7/26/2019	Nickel	227040.1	<0.05	0.5	0.5228273	104.6	25	19.992767	80.0		1.9	JDB
7/25/2019	Potassium	227041.1	<0.01	10	9.3692109	93.7	10	11.11754	111.2		0.3	JDB
7/25/2019	Potassium	226939.1	<0.01	10	9.3692109	93.7	10	9.4631223	94.6		0.2	JDB
7/26/2019	Potassium	227040.1	<25	10	9.1397018	91.4	500	428.035	85.6		2.9	JDB
7/25/2019	Selenium	226939.1	<0.005	2	1.9998495	100.0	2	1.9816300	99.1		0.8	JDB
7/25/2019	Selenium	227041.1	<0.005	2	1.9998495	100.0	2	1.991203	99.6		0.7	JDB
7/26/2019	Selenium	227040.1	<0.25	2	1.9551138	97.8	100	89.733067	89.7		3.0	JDB
7/25/2019	Silver	227041.1	<0.001	0.075	0.0712930	95.1	0.075	0.0708639	94.5		0.2	JDB
7/25/2019	Silver	226939.1	<0.001	0.075	0.0712930	95.1	0.075	0.0714285	95.2		0.1	JDB
7/26/2019	Silver	227040.1	<0.05	0.075	0.0712215	95.0	3.75	3.6188628	96.5		0.5	JDB

The results apply only to the samples as received in the laboratory. The analyses used to obtain the results meet NELAC requirement, if applicable. No part of this work may be altered in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems - without written permission of AEP Analytical Chemistry Services.



AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

02004
502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

Report ID : 40143		Company: SEP - Flint Creek (TW)				Address: 502 North Allen Avenue						
Date Received: 07/18/2019		Contact: Terry Wehling				Shreveport, LA 71101						
		Phone: (318) 673-2721				Fax: (318) 673-3960						
7/25/2019	Sodium	227041.1	<0.5	3	3.1384831	104.6	3	2.3746333	79.2		0.0	JDB
7/25/2019	Sodium	226939.1	<0.01	3	3.1384831	104.6	3	2.4693667	82.3		0.1	JDB
7/26/2019	Sodium	227040.1	<25	3	3.1256605	104.2	150	120.525	80.4		1.9	JDB
7/25/2019	Strontium	226939.1	<0.001	0.2	0.2059899	103.0	0.2	0.2081687	104.1		0.4	JDB
7/26/2019	Strontium	227040.1	<2.5	0.2	0.2078256	103.9	500	577.76733	115.6		17.9	JDB
7/25/2019	Thallium	227041.1	<0.005	0.4	0.4152040	103.8	0.4	0.3682771	92.1		1.2	JDB
7/25/2019	Thallium	226939.1	<0.005	0.4	0.4152040	103.8	0.4	0.4171124	104.3		0.0	JDB
7/26/2019	Thallium	227040.1	<0.25	0.4	0.4155052	103.9	20	15.947380	79.7		1.2	JDB
7/25/2019	Tin	226939.1	<0.005	0.7	0.6995446	99.9	0.7	0.6930628	99.0		0.2	JDB
7/25/2019	Tin	227041.1	<0.005	0.7	0.6995446	99.9	0.7	0.644164	92.0		0.2	JDB
7/26/2019	Tin	227040.1	<0.2	0.7	0.6896072	98.5	35	28.438362	81.3		0.8	JDB
7/25/2019	Titanium	227041.1	<0.005	0.2	0.2109341	105.5	0.2	0.2098874	104.9		0.2	JDB
7/25/2019	Titanium	226939.1	<0.005	0.2	0.2109341	105.5	0.2	0.2124567	106.2		0.1	JDB
7/26/2019	Titanium	227040.1	<2.5	0.2	0.2121079	106.1					1.6	JDB
7/25/2019	Vanadium	226939.1	<0.001	0.3	0.3076519	102.6	0.3	0.3104754	103.5		0.4	JDB
7/25/2019	Vanadium	227041.1	<0.001	0.3	0.3076519	102.6	0.3	0.2997157	99.9		0.6	JDB
7/26/2019	Vanadium	227040.1	<0.05	0.3	0.30789	102.6	15	15.291667	101.9		0.0	JDB
7/25/2019	Zinc	226939.1	<0.005	0.2	0.2091679	104.6	0.2	0.2081374	104.1		0.3	JDB
7/25/2019	Zinc	227041.1	<0.005	0.2	0.2091679	104.6	0.2	0.1851907	92.6		0.1	JDB
7/26/2019	Zinc	227040.1	<0.25	0.2	0.2074233	103.7	10	8.4881167	84.9		0.5	JDB

Code Code Description

- M4 The analysis of the spiked sample required a dilution such that the spike recovery calculation does not provide useful information. The associated blank spike recovery was acceptable.
- T5 This parameter is not included in the Laboratory's LELAP Laboratory Scope of Accreditation.



 Quality Assurance Officer

05-Aug-19
Report Date

Figure 1 - Chain of Custody

American Electric Power
Analytical Chemistry Services

CHAIN OF CUSTODY

COC 40143

OPCO/PROJECT NAME H.W. Pirkey		FAX NO.		ANALYSIS REQUESTED			
Power Plant		(903) 927-5840		Metals to analyze for each (Total SPL, Deionized) Bi, Ca, Sb, As, Ba, Be, Cd, Cr Co, Pb, Li, Hg, Ni, Se, Te and any other metals in calibration.			
CONTACT PERSON (Please Print) Ron Franklin, Randy Rountree, Ben House		PHONE NO. (903) 927-5889					
SAMPLE SIGNATURE <i>Ron Franklin</i>							
DATE	TIME	SAMPLE SOURCE & DESCRIPTION	SAMPLE ID	C G O R M A P B	NUMBER OF CONTAINERS	Lab Number	REMARKS
7-17-19	1800	Pirkey Sludge FGD	Dirt Sludge	✓	✓	927040-42	Tony Wehling
11 " "	1800	" "	Dirt Sludge	✓	✓	227043-45	
REINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY	REINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY
REINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY	REINQUISHED BY (SIGN)		DATE/TIME	RECEIVED BY
RECEIVED FOR LABORATORY		RECEIVED BY		COMMENTS			
<i>Jonathan Bandillo</i>		7-18-19 1036					



SHREVEPORT CHEMICAL LABORATORY

502 N. Allen Ave.
Shreveport, LA 71101
Phone 318-673-3802
FAX 318-673-3960

PROJECT RECEIPT FORM

Container Type				Delivery Type					
Ice Chest	<u>Bag</u>	Action Pak	PCB Mailer	Bottle	UPS	FEDEX	US Mail	<u>Walk in</u>	Shuttle
Other _____				Other _____					
Tracking # _____									

Client Terry Wehling
Received By JOB
Received Date 7-18-19
Open Date 7-18-19

Sample Matrix
DGA PCB Oil Water Oil Soil
Solid Liquid Other _____

Container Temp Read NA
Thermometer Serial #F04103
Correction Factor _____
Corrected Temp _____

Project I.D. _____
Were samples received on ice? YES NO

- Did container arrive in good condition? YES NO
- Was sample documentation received? YES NO
- Was documentation filled out properly? YES NO
- Were samples labeled properly? YES NO
- Were correct containers used? YES NO
- Were the pH's of samples appropriately checked? YES NO
- Total number of sample containers 2

Was any corrective action taken? NO Person Contacted _____
Date & Time _____

Comments _____

ATTACHMENT G
AD-33 Soil Samples Analytical Report

Client: Burns & McDonnell

Date: 08-Jun-18

Project: 106665 PIRKEY

Work Order: 1805081

Sample ID: AD-33 (11')

Lab ID: 1805081-15

Legal Location:

Matrix: SOIL

Collection Date: 4/30/2018 16:05

Percent Moisture: 18.1

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Gamma Spectroscopy Results						
			SOP 713		Prep Date: 5/17/2018	PrepBy: MRL
Ra-226	1.29 (+/- 0.3)	G	0.47	pCi/g	NA	6/7/2018 08:54
Ra-228	1.36 (+/- 0.47)	G,TI	0.7	pCi/g	NA	6/7/2018 08:54
ICPMS Metals						
			SW6020		Prep Date: 5/14/2018	PrepBy: JML
ARSENIC	4.9		0.23	MG/KG	10	5/17/2018 01:02
BARIUM	20		0.57	MG/KG	10	5/17/2018 01:02
BERYLLIUM	0.15		0.057	MG/KG	10	5/17/2018 01:02
CADMIUM	ND		0.23	MG/KG	10	5/17/2018 01:02
COBALT	0.61		0.57	MG/KG	10	5/17/2018 01:02
CHROMIUM	9.5		1.1	MG/KG	10	5/17/2018 01:02
LITHIUM	0.25	J	2.3	MG/KG	10	5/17/2018 01:02
MOLYBDENUM	0.18	J	0.23	MG/KG	10	5/17/2018 01:02
LEAD	3.2		0.23	MG/KG	10	5/17/2018 01:02
ANTIMONY	0.086	J	0.11	MG/KG	10	5/17/2018 01:02
SELENIUM	0.81	J	1.1	MG/KG	10	5/17/2018 01:02
THALLIUM	0.044		0.011	MG/KG	10	5/17/2018 01:02
Ion Chromatography						
			EPA300.0		Prep Date: 5/10/2018	PrepBy: HMA
FLUORIDE	ND		1	MG/KG	1	5/11/2018 21:43
Mercury						
			SW7471		Prep Date: 5/11/2018	PrepBy: AJL2
MERCURY	0.0026	J	0.039	MG/KG	1	5/11/2018 16:07

Client: Burns & McDonnell

Date: 08-Jun-18

Project: 106665 PIRKEY

Work Order: 1805081

Sample ID: AD-33 (21')

Lab ID: 1805081-16

Legal Location:

Matrix: SOIL

Collection Date: 4/30/2018 16:05

Percent Moisture: 20.0

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Gamma Spectroscopy Results						
			SOP 713		Prep Date: 5/17/2018	PrepBy: MRL
Ra-226	0.7 (+/- 0.22)	LT	0.37	pCi/g	NA	6/7/2018 08:16
Ra-228	0.72 (+/- 0.5)	NQ	0.67	pCi/g	NA	6/7/2018 08:16
ICPMS Metals						
			SW6020		Prep Date: 5/14/2018	PrepBy: JML
ARSENIC	12		0.25	MG/KG	10	5/17/2018 01:05
BARIUM	9.1		0.62	MG/KG	10	5/17/2018 01:05
BERYLLIUM	0.09		0.062	MG/KG	10	5/17/2018 01:05
CADMIUM	ND		0.25	MG/KG	10	5/17/2018 01:05
COBALT	0.64		0.62	MG/KG	10	5/17/2018 01:05
CHROMIUM	4.6		1.2	MG/KG	10	5/17/2018 01:05
LITHIUM	0.24	J	2.5	MG/KG	10	5/17/2018 01:05
MOLYBDENUM	0.061	J	0.25	MG/KG	10	5/17/2018 01:05
LEAD	1.5		0.25	MG/KG	10	5/17/2018 01:05
ANTIMONY	0.19		0.12	MG/KG	10	5/17/2018 01:05
SELENIUM	0.42	J	1.2	MG/KG	10	5/17/2018 01:05
THALLIUM	0.03		0.012	MG/KG	10	5/17/2018 01:05
Ion Chromatography						
			EPA300.0		Prep Date: 5/10/2018	PrepBy: HMA
FLUORIDE	ND		1	MG/KG	1	5/11/2018 22:29
Mercury						
			SW7471		Prep Date: 5/11/2018	PrepBy: AJL2
MERCURY	0.0038	J	0.04	MG/KG	1	5/11/2018 16:09

ATTACHMENT H
AD-33 Boring Log and Well Installation Diagram



Monitor Well

Monitor Well No.: AD-33



PROJECT INFORMATION

PROJECT: Pirkey Power Plant
 PROJECT NO.: I-04-1021
 LOGGED BY: Jeffrey D. Sammons, P.G.
 SUPERVISING PG: Jeffrey D. Sammons, P.G.
 COMPLETION: 12/11/2016
 DEVELOPMENT: 12/16/2016
 SITE LOCATION: 2400 FM 3281, Hallsville, Texas
 WELL OWNER: AEP

DRILLING INFORMATION

DRILLER: Buford Collier
 DRILLER'S LICENSE NO.: 60088
 RIG TYPE: Geoprobe 3230DT
 METHOD OF DRILLING: Hollow Stem Auger
 SAMPLING METHODS: Split Core
 SURFACE ELEVATION: 382.37 (Top of Casing)
 HOLE DIAMETER: 8.25"
 LATITUDE 32 27' 38.70" LONGITUDE 94 28' 16.82"

Water Level Upon Installation
 Water Level at Time of Drilling
 Geotechnical Lab Sample
 TBPB No. 50027

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	WATER LEVEL	SAMPLE	% MOISTURE	% FINES	LL	PL	PI	WELL CONSTRUCTION
			4								Locking Well Casing Cover Locking Well Cap Protective Well Casing Concrete Pad Ground Surface Cement Bentonite 2" Sch. 40 PVC Riser 20/40 Silica Sand 0.010" Slotted Sch. 40 PVC Well Screen PVC Bottom Cap
CLAYEY SAND: very fine to fine sand, some silt, dark brownish black and brown, very moist	SC	[Symbol]	0								
FAT CLAY: trace sand and silt, reddish brown and light gray - some iron ore gravel at 2.0' - some silt and ironstone in thin seams at 2.5', light gray, yellowish brown, and reddish brown,	CH	[Symbol]	2		29	93	74	32	42		
CLAYEY SAND: interbedded clays and fine to very fine sand and silt, some iron ore gravel, light reddish brown and light gray - some clay and trace of iron ore gravel at 11', light gray and reddish brown, moist - trace clay at 13', thin saturated ironstone and gravel seams at 13' to 16', reddish brown, light reddish brown, and light gray - dark reddish brown at 15' - clay lense at 15.5' to 16.5', light reddish brown and light gray	SC	[Symbol]	8		21	35	35	23	12		
SILTY CLAYEY SAND: very fine to fine sand, reddish brown, very moist to saturated - some clay lenses and iron ore gravel at 20' - clayey at 20.5' to 21' - trace clay at 21', light gray, saturated	SM-SC	[Symbol]	17		23	19	27	18	9		
CLAYEY SAND: very fine to fine sand, dark gray and gray, moist	SC	[Symbol]	28		23	30	25	18	7		

ATTACHMENT I
Certification by a Qualified Professional Engineer

CERTIFICATION BY A QUALIFIED PROFESSIONAL ENGINEER

I certify that the above described alternative source demonstration is appropriate for evaluating the groundwater monitoring data for the Pirkey FGD Stackout Area CCR management area and that the requirements of 30 TAC §352.951(e) have been met.

Beth Ann Gross
Printed Name of Licensed Professional Engineer

Beth Ann Gross

Signature



Geosyntec Consultants
2039 Centre Pointe Blvd, Suite 103
Tallahassee, Florida 32308

Texas Registered Engineering Firm
No. F-1182

79864
License Number

Texas
Licensing State

January 12, 2024
Date

APPENDIX 4- Field Reports

CCR Groundwater Monitoring Well Inspection Form

Facility: Pillvey

Sampling Period: 2-2023

Sampling Contractor: E.glc

Signature: [Signature]

Well No.	Well Locked	Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Housing, and Pad in Good Shape	Well Properly Labeled	Well cap present	Comments
B-2				✓	✓		✓	no lock no label
AD-12	✓	✓	✓	✓	✓		✓	labeled as MW-12
AD-32	✓	✓	✓	✓	✓	✓	✓	
AD-31	✓	✓	✓	✓	✓	✓	✓	
AD-26	✓	✓	✓	✓	✓	✓	✓	
AD-25	✓	✓	✓	✓	✓	✓	✓	
AD-36	✓	✓	✓	✓	✓	✓	✓	
AD-23	✓	✓	✓	✓	✓	✓	✓	

Instructions: Complete form and submit to AEP Environmental Services with Field Data. Place check mark for items that are satisfactory. Unsatisfactory items should be left blank with a note in the comments section on what needs to be remedied.

CCR Groundwater Monitoring Well Inspection Form

Facility: AEP PIRAM PP

Sampling Period: FEBRUARY 27-28, 2023

Sampling Contractor: EAGLE

Signature: [Signature]

Well No.	Well Locked	Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Housing, and Pad in Good Shape	Well Properly Labeled	Well cap present	Comments
AD-13	✓	✓	✓	✓	✓	✓	✓	
AD-22	✓	✓	✓	✓	✓	✓	✓	
AD-33	✓	✓	✓	✓	✓	✓	✓	
AD-2	✓	✓	✓	✓	✓	✓	✓	
B-3				✓	✓		✓	NO LOCK NO LABEL
AD-18	✓	✓	✓	✓	✓	✓	✓	
AD-4					✓	✓	✓	NO LOCK, NEEDS BETTER ACCESS
AD-7	✓	✓	✓	✓		✓	✓	HOUSING SEVERELY RUSTED HARD TO OPEN
AD-34	✓	✓	✓	✓		✓	✓	HINGE RUSTED & BROKEN

ACCESS IS ALONG
STEEP SLOPE ON ACROSS
DITCH SOMETIMES WATER

WELL HOUSING CAN
BE OPENED WITHOUT
UNLOCKING

Instructions: Complete form and submit to AEP Environmental Services with Field Data. Place check mark for items that are satisfactory. Unsatisfactory items should be left blank with a note in the comments section on what needs to be remedied.

Facility Name	HEP PIRAKRY PP
Sample by	KERRY McDonald

Sample Location ID	AD-2
--------------------	------

Depth to water, feet (TOC)	15.92
Measured Total Depth, feet (TOC)	40.36

Depth to water date	02/27/23
---------------------	----------

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1038	15.98	200	3.86	722	1.2	2.13	399	20.76		
1043	16.21	200	3.81	751	0.0	1.97	398	20.69		
1048	16.28	200	3.78	752	0.0	1.98	398	20.68		
1053	16.30	200	3.78	752	0.0	1.84	397	20.72		

Total volume purged	
Sample appearance	clear
Sample time	1055
Sample date	02/27/23

Facility Name	AED PIAHON PP
Sample by	KERRY McDONALD

Sample Location ID	A0-4
--------------------	------

Depth to water, feet (TOC)	10.75
Measured Total Depth, feet (TOC)	47.29

Depth to water date	02/28/23
---------------------	----------

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0856	10.79	180	4.84	84	18.3	4.21	414	18.80		
0901	10.82	180	4.87	84	16.8	2.89	408	19.63		
0906	10.86	180	4.87	84	16.5	2.85	402	19.87		
0910	10.90	180	4.89	84	17.2	2.81	396	19.91		

Total volume purged	
Sample appearance	CLM
Sample time	0913
Sample date	02/28/23

DUP-2 W&D METALS
1300

Facility Name
 Sample by *P. V. Kay
 MHA/ Hamilton*

Depth to water, feet (TOC) *13.25*
 Measured Total Depth, feet (TOC) *52.00*

Sample Location ID *AD-12*

Depth to water date *2-27-23*

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)
<i>939</i>	<i>13.64</i>	<i>300</i>	<i>3.68</i>	<i>57</i>	<i>0</i>	<i>6.42</i>	<i>208</i>	<i>19.80</i>
<i>944</i>	<i>14.03</i>	<i>300</i>	<i>3.96</i>	<i>50</i>	<i>0</i>	<i>5.38</i>	<i>241</i>	<i>20.64</i>
<i>945</i>	<i>14.06</i>	<i>300</i>	<i>3.80</i>	<i>50</i>	<i>3.8</i>	<i>5.33</i>	<i>264</i>	<i>20.84</i>
<i>954</i>	<i>14.14</i>	<i>300</i>	<i>3.77</i>	<i>50</i>	<i>2.1</i>	<i>5.27</i>	<i>273</i>	<i>20.83</i>

Total volume purged
 Sample appearance *clear*
 Sample time *956*
 Sample date *2-27-23*

*Dup-1
 922*

Facility Name	ACP Pinnock PP
Sample by	Kenneth McDonald

Sample Location ID	AD-13
--------------------	-------

Depth to water, feet (TOC)	11.40
Measured Total Depth, feet (TOC)	40.70

Depth to water date	02/27/23
---------------------	----------

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0755	12.02	200	5.30	426	202	6.24	301	20.31		
0800	12.15	200	4.91	423	178	2.49	284	20.25		
0805	12.23	200	4.83	421	101	2.42	242	20.19		
0810	12.33	200	4.80	419	97.4	2.39	238	20.12		
0815	12.41	200	4.78	419	89.1	2.34	231	20.26		

Total volume purged	
Sample appearance	
Sample time	0817
Sample date	02/27/23

Facility Name	APP PIAKONAPP
Sample by	Kenny McDonald

Sample Location ID	AD-22
--------------------	-------

Depth to water, feet (TOC)	9.04
Measured Total Depth, feet (TOC)	32.70

Depth to water date	02/27/23
---------------------	----------

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0850	9.10	180	4.05	949	8.2	3.16	335	20.20		
0855	9.11	180	4.05	969	4.1	1.47	334	20.34		
0900	9.15	180	4.05	974	1.3	1.42	328	20.38		
0905	9.17	180	4.06	977	1.6	1.38	325	20.41		

Total volume purged	
Sample appearance	CLM
Sample time	0907
Sample date	02/27/23

Facility Name	
Sample by	P. V. New 11-17 / Hamilton
Depth to water, feet (TOC)	30.54
Measured Total Depth, feet (TOC)	38.50

Sample Location ID	AD-23
Depth to water date	2-28-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)
1039	30.72	220	4.07	72	0	2.86	239	21.88
1043	30.72	220	4.17	71	0	3.15	230	21.76
1048	30.73	220	4.25	71	2.1	3.25	227	21.64
1053	30.74	220	4.33	70	3.9	3.32	228	21.65
1058	30.74	220	4.39	69	4.5	3.33	227	21.63
1103	30.74	220	4.42	70	4.4	3.34	226	21.64

Total volume purged	
Sample appearance	Clear
Sample time	1105
Sample date	2-28-23

Facility Name	
Sample by	P. Kelley Mett Hamilton
Depth to water, feet (TOC)	8.83
Measured Total Depth, feet (TOC)	27.38

Sample Location ID	AD-25
Depth to water date	2-28-23

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
916	9.03	120	4.71	1190	29.7	1.76	184	20.35		
921	9.15	120	3.85	1170	33.3	0.72	221	20.64		
926	9.23	120	3.51	1160	23.7	0.58	234	20.34		
931	9.30	120	3.50	1170	21.6	0.47	237	20.51		
936	9.37	120	3.41	1170	21.5	0.43	236	20.92		

Total volume purged	
Sample appearance	Clear
Sample time	938
Sample date	2-28-23

Facility Name	Pirley
Sample by	Matt Hamill
Depth to water, feet (TOC)	15.95
Measured Total Depth, feet (TOC)	42.79

Sample Location ID	AD-26
Depth to water date	2-28-23

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
823	16.24	300	5.76	2.130	24.1	2.17	145	17.56		
828	16.59	300	4.27	2.080	69.8	0.90	221	14.24		
833	16.65	300	3.50	2.100	84.6	0.94	276	14.64		
838	16.71	300	3.10	2.280	68.5	1.14	306	14.73		
843	16.78	300	2.97	2.080	46.4	1.20	312	14.75		
848	16.84	300	2.97	2.070	31.5	1.11	307	14.96		
853	16.90	300	2.94	2.080	27.7	1.02	303	20.08		
858	16.95	300	3.00	2.080	27.5	1.00	302	20.06		

Total volume purged	
Sample appearance	clear
Sample time	9:00
Sample date	2-28-23

Landfill duplicate

1104

Facility Name	
Sample by	P:1/KW Mick Hamilton
Depth to water, feet (TOC)	16.41
Measured Total Depth, feet (TOC)	37.32

Sample Location ID	AD-3
Depth to water date	2-27-23

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1125	16.76	220	3.88	247	69.7	1.71	291	23.18		
1130	16.80	220	3.58	290	41.0	0.55	316	23.28		
1135	16.83	220	3.50	296	24.4	0.37	325	23.34		
1140	16.84	220	3.48	299	18.7	0.35	329	23.46		
1145	16.85	220	3.48	301	18.5	0.34	330	23.52		

Total volume purged	
Sample appearance	clear
Sample time	1147
Sample date	2-27-23

Facility Name	
Sample by	P. Kelly M. Hamilton

Sample Location ID	AD-32
--------------------	-------

Depth to water, feet (TOC)	9.70
Measured Total Depth, feet (TOC)	34.61

Depth to water date	2-27-23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1041	0.22	220								
1046	0.27	220	3.21	421	65.6	1.53	318	21.31		
1051	0.31	220	3.23	425	43.5	0.78	334	21.82		
1056	0.33	220	3.22	435	27.6	0.55	345	22.15		
1101	0.34	220	3.28	434	9.5	0.49	347	22.34		
			3.32	433	9.4	0.46	348	22.42		

Total volume purged	
Sample appearance	clear
Sample time	1103
Sample date	2-27-23

Facility Name	PIRROM PP
Sample by	Kenny McDonald

Sample Location ID	AD-33
--------------------	-------

Depth to water, feet (TOC)	12.19
Measured Total Depth, feet (TOC)	32.50

Depth to water date	02/27/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0941	12.24	200	3.95	264	1.3	2.13	365	20.97		
0946	12.21	200	4.07	252	4.6	1.50	356	21.33		
0951	12.21	200	4.07	250	2.8	1.49	354	21.40		
0956	12.22	200	4.07	248	2.2	1.46	353	21.48		

Total volume purged	
Sample appearance	Clear
Sample time	0958
Sample date	02/27/23

Facility Name	AEPP Peak Energy
Sample by	Kenny McDonald

Sample Location ID	AO-34
--------------------	-------

Depth to water, feet (TOC)	TOC
Measured Total Depth, feet (TOC)	26.05

Depth to water date	02/28/23
---------------------	----------

Purge Stabilization Data									
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)	
1056	0.74	120	3.87	1610	2.6	2.87	373	24.40	
1101	0.81	120	3.82	1610	3.4	1.36	364	24.42	
1106	0.90	120	3.81	1610	5.7	1.28	358	24.46	
1111	0.95	120	3.78	1630	7.2	1.24	353	24.46	

Total volume purged	
Sample appearance	clear
Sample time	1113
Sample date	02/28/23

Facility Name
Sample by P. Hkey
Matt Hamilton

Depth to water, feet (TOC) 16.55
Measured Total Depth, feet (TOC) 51.44

Sample Location ID B-2

Depth to water date 2-27-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond ($\mu\text{S}/\text{cm}$)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}\text{C}$)		
839	16.91	300	4.46	230	0	1.70	123	19.52		
844	17.03	300	5.08	145	0	0.65	57	19.66		
849	17.16	300	5.01	134	0	0.59	53	19.59		

Total volume purged
Sample appearance clear
Sample time 852
Sample date 2-27-23

Dup-B
1159

Facility Name	
Sample by	P. Pierce 170111 Hamilton
Depth to water, feet (TOC)	—
Measured Total Depth, feet (TOC)	—

Sample Location ID	EBAP
Depth to water date	2-28-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond ($\mu\text{S}/\text{cm}$)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}\text{C}$)		
1123	—	—	4.47	457.0	6.7	5.30	235	24.69		

Total volume purged	
Sample appearance	Clear
Sample time	1123
Sample date	2-28-23

CCR Groundwater Monitoring Well Inspection Form

Facility: Pirkey

Sampling Period: June 2023

Sampling Contractor: Eagle

Signature: [Signature]

Well No.	Well Locked	Fastener and Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Protective Cover, Barriers and Pad in Good Shape	Well Properly Labeled	Well Cap Present and Vented*	Comments
B-2				✓	✓		✓	no label, top won't close
AD-31	✓	✓	—	—	—		—	no label
AD-30	✓	✓	✓	—	✓	✓	✓	
AD-17	✓	✓	✓		✓	✓	✓	overgrown
AD-27	✓	✓	✓		✓	✓	✓	overgrown
AD-28	—	✓	✓	✓	✓	✓	✓	
AD-23	✓	✓	✓	—	✓	✓	✓	
AD-3	✓	✓	✓		✓	✓	✓	overgrown

*Not all wells will be vented, especially flush mounted wells. If that is the case, please note "flush mount well" in the comments.

CCR Groundwater Monitoring Well Inspection Form

Facility: AEP P,AKM PP
 Sampling Contractor: EAGLE

Sampling Period: JUNE 2023
 Signature: [Handwritten Signature]

Well No.	Well Locked	Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Housing, and Pad in Good Shape	Well Properly Labeled	Well cap present	Comments
AD-13	✓	✓	✓	✓	✓	✓	✓	
AD-22	✓	✓	✓	✓	✓	✓	✓	
AD-33	✓	✓	✓	✓	✓	✓	✓	
AD-7R	✓	✓	✓	✓	✓		✓	NO LABEL
B-3	✓	✓	✓	✓	✓		✓	NO LABEL
AD-18	✓	✓	✓		✓	✓	✓	TRAIL TO WELL + AREA AROUND WELL NEEDS CLEANING
AD-16	✓		✓		✓	✓	✓	TRAIL TO WELL NEEDS CLEANING NEEDS NEW LOCK
AD-07	✓	✓	✓	✓	✓	✓	✓	
AD-04					✓	✓	✓	NEEDS LOCK NEEDS WEED PATH LIMITED ACCESS TO WELL

Instructions: Complete form and submit to AEP Environmental Services with Field Data. Place check mark for items that are satisfactory. Unsatisfactory items should be left blank with a note in the comments section on what needs to be remedied.

CCR Groundwater Monitoring Well Inspection Form

Facility: Pirkey

Sampling Period: June 2023

Sampling Contractor: Engle

Signature: 

Well No.	Well Locked	Fastener and Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Protective Cover, Barriers and Pad in Good Shape	Well Properly Labeled	Well Cap Present and Vented*	Comments
AD-12	S	S	S	S	S	S	S	
AD-32	S	S	S	S	S	S	S	
AD-2	S	S	S	S	S	S	S	
AD-28	S	S	S	S	S	S	S	
AD-26	S	S	S	S	S	S	S	
AD-34	S	S	S	S	4	S	S	Hinge Broken
AD-8	S	S	S	S	S	S	S	
AD-36	S	S	S	S	S	S	S	

*Not all wells will be vented, especially flush mounted wells. If that is the case, please note "flush mount well" in the comments.

Facility Name	AEF Parkway
Sample by	BEB

Sample Location ID	AD-2
--------------------	------

Depth to water, feet (TOC)	16.49
Measured Total Depth, feet (TOC)	40-36

Depth to water date	6/26/23
---------------------	---------

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1024	17.03	210	3.69	256						
1029	17.06	210	3.24	214	2.8	9.10	382	26.36		
1034	17.10	210	3.25	216	1.6	1.29	384	24.93		
1039	17.13	210	3.25	218	1.4	1.25	380	24.92		
					1.3	1.24	379	24.86		

Total volume purged	
Sample appearance	clear
Sample time	1042
Sample date	6/26/23

Facility Name
 Sample by

P. Key
 Mist Hamilton

Sample Location ID

AD-3

Depth to water, feet (TOC)
 Measured Total Depth, feet (TOC)

33.48
 57.49

Depth to water date

6-27-23

Purge Stabilization Data

Time	Water-Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)
1044	33.72	220	6.01	206	34.8	1.53	197	26.55
1046	33.86	220	5.99	185	12.1	1.11	186	25.98
1054	33.95	220	5.92	173	6.9	1.01	173	25.61
1059	34.07	220	5.84	171	6.8	1.02	170	25.55

Total volume purged
 Sample appearance
 Sample time
 Sample date

clear
 11:01
 6-27-23

Facility Name	APP PARKWAY PD
Sample by	Kenny McDonald

Sample Location ID	A1-04
--------------------	-------

Depth to water, feet (TOC)	14.13
Measured Total Depth, feet (TOC)	47.29

Depth to water date	06/27/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1053	14.19	164	4.47	98	42.3	4.28	377	24.68		
1058	14.23	164	4.51	98	37.6	3.74	362	24.59		
1103	14.25	164	4.53	95	36.5	3.69	360	24.55		
1108	14.41	164	4.53	92	34.9	3.63	366	24.51		

Total volume purged	
Sample appearance	TURBID
Sample time	1110
Sample date	06/27/23

Facility Name	APP Pirkeypp
Sample by	Kerry McDonald

Sample Location ID	AD-07
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Depth to water, feet (TOC)	14.96
Measured Total Depth, feet (TOC)	41.98

Depth to water date	06/27/23
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Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0934	15.13	174	3.84	316	1.1	2.13	321	24.91		
0939	15.20	174	3.80	321	0	1.84	321	24.83		
0944	15.24	174	3.77	334	0.8	1.80	321	24.77		
0949	15.26	174	3.76	338	0.4	1.77	322	24.75		

Total volume purged	
Sample appearance	Clear
Sample time	0951
Sample date	06/27/23

Facility Name	AEP Pirkey
Sample by	BE3

Sample Location ID	AD-8
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Depth to water, feet (TOC)	12.56
Measured Total Depth, feet (TOC)	31.33

Depth to water date	6/27/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
1005	13.28	168	5.68	565	14.0	2.42	120	26.20		
1010	13.33	168	5.73	578	7.6	2.11	166	26.11		
1015	13.35	168	5.72	582	7.2	2.08	167	26.10		
1020	13.38	168	5.79	583	7.1	2.04	158	26.04		

Total volume purged	
Sample appearance	clear
Sample time	1024
Sample date	6/27/23

Duplicate
900

Facility Name	AEP Pharmacy PP
Sample by	Kenny McDonald

Sample Location ID	AD-7R
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Depth to water, feet (TOC)	8.48
Measured Total Depth, feet (TOC)	33.03

Depth to water date	06/26/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
1025	8.48	120	4.67	241	6.4	2.04	273	28.92		
1030	8.50	120	4.76	240	2.1	1.98	265	28.08		
1035	8.50	120	4.81	246	1.7	1.94	257	27.13		
1040	8.51	120	4.83	247	1.5	1.91	253	27.04		
1045	8.50	120	4.88	250	1.3	1.87	249	26.92		

Total volume purged	
Sample appearance	CLEAR
Sample time	1047
Sample date	06/26/23

Facility Name
 Sample by *AEP Purkey
 BES*

Sample Location ID *AD-12*

Depth to water, feet (TOC) *12.82*
 Measured Total Depth, feet (TOC) *52.00*

Depth to water date *6/26/23*

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
<i>0732</i>	<i>13.21</i>	<i>300</i>	<i>4.36</i>	<i>55</i>	<i>12.0</i>	<i>2.36</i>	<i>288</i>	<i>26.63</i>		
<i>0743</i>	<i>13.55</i>	<i>300</i>	<i>4.44</i>	<i>40</i>	<i>8.6</i>	<i>1.94</i>	<i>320</i>	<i>24.93</i>		
<i>0748</i>	<i>13.58</i>	<i>300</i>	<i>4.56</i>	<i>40</i>	<i>8.4</i>	<i>1.90</i>	<i>324</i>	<i>24.84</i>		
<i>0753</i>	<i>13.59</i>	<i>300</i>	<i>4.60</i>	<i>42</i>	<i>8.0</i>	<i>1.88</i>	<i>322</i>	<i>24.86</i>		

Total volume purged
 Sample appearance *clear*
 Sample time *0755*
 Sample date *6/26/23*

Facility Name	APP Pinnacle PD
Sample by	Kenny McDowell

Sample Location ID	AD-13
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Depth to water, feet (TOC)	12.29
Measured Total Depth, feet (TOC)	40.70

Depth to water date	06/26/23
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Purge Stabilization Data									
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)	
0711	12.36	174	5.52	702	128	5.27	194	25.49	
0716	12.40	174	5.50	580	40.3	4.14	182	25.57	
0721	12.45	174	5.48	571	36.8	4.10	173	25.61	
0726	12.48	174	5.47	564	31.2	4.07	170	25.65	

Total volume purged	
Sample appearance	SLIGHTLY TURBID
Sample time	0728
Sample date	06/26/23

DUPLICATE - 1200

Facility Name	A P P I N A M Y P P
Sample by	KERRY McDONALD

Sample Location ID	A0-16
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Depth to water, feet (TOC)	17.61
Measured Total Depth, feet (TOC)	38.24

Depth to water date	06/27/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0837	17.65	192	4.30	159	41.2	1.47	308	25.21		
0842	17.67	192	4.33	159	33.6	1.15	316	25.07		
0847	17.72	192	4.37	160	35.7	1.12	319	24.93		
0852	17.76	192	4.38	159	37.9	1.09	322	24.91		
0857	17.77	192	4.38	159	38.2	1.06	325	24.88		

Total volume purged	
Sample appearance	CLEAR
Sample time	0859
Sample date	06/27/23

Facility Name _____
 Sample by P. Riley
Myrt Hamilton

Depth to water, feet (TOC) _____
 Measured Total Depth, feet (TOC) 20.56
33.05

Sample Location ID AD-17

Depth to water date 6-26-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)
1130	21.11	200	4.06	151	1.9	3.78	375	25.18
1135	21.12	200	4.35	92	39.3	3.56	391	25.90
1140	21.12	200	4.46	80	4.9	3.32	414	25.22
1145	21.12	200	4.48	76	4.3	3.27	422	24.96

Total volume purged _____
 Sample appearance Clear
 Sample time 1147
 Sample date 6-26-23

Facility Name	AEP Pinnacle PP
Sample by	Kenny McDonald

Sample Location ID	AD-22
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Depth to water, feet (TOC)	10.22
Measured Total Depth, feet (TOC)	32.70

Depth to water date	06/26/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0826	10.42	164	4.28	810	8.4	4.12	226	25.23		
0831	10.44	164	4.13	852	0	2.37	224	25.18		
0836	10.47	164	4.09	857	1.1	2.31	218	25.07		
0841	10.50	164	4.07	861	0	2.26	216	24.91		

Total volume purged	
Sample appearance	Clear
Sample time	0843
Sample date	06/26/23

Facility Name	
Sample by	P. York M. H. Hamilton
Depth to water, feet (TOC)	8.46
Measured Total Depth, feet (TOC)	27.38

Sample Location ID	AD-25
Depth to water date	6-27-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
8:55	8.77	120	4.42	875						
9:00	8.85	120	4.59	575	37.2	2.24	275	29.35		
9:05	8.93	120	4.73	1060	37.1	1.63	226	27.45		
9:10	9.00	120	4.78	1024	37.5	1.45	193	27.05		
					37.3	1.38	184	26.82		

Total volume purged	
Sample appearance	clear
Sample time	9:12
Sample date	6-27-23

Facility Name	AEP Purlace
Sample by	BS

Sample Location ID	AD-26
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Depth to water, feet (TOC)	15.42
Measured Total Depth, feet (TOC)	42.73

Depth to water date	6/27/23
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Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
0730	15.88	300	4.76	2030	75.4	15.6	156	24.67		
0735	16.18	300	3.56	2080	48.0	2.4	243	24.14		
0740	16.25	300	3.36	2070	27.7	1.8	249	24.59		
0745	16.27	300	3.32	2060	26.8	1.7	250	24.62		

Total volume purged	
Sample appearance	clear
Sample time	0743
Sample date	6/27/23

Facility Name
 Sample by

AEP D. W. Key
 BCS

Depth to water, feet (TOC)
 Measured Total Depth, feet (TOC)

12.95
 32.59

Sample Location ID

AD-28

Depth to water date

6/26/23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)
11:02	17.28	200	4.43	119	7.3	10.69	337	26.51
11:03	17.44	200	4.32	119	7.3	10.69	337	26.51
11:07	17.56	200	4.25	111	5.1	2.53	345	24.61
11:23	17.52	200	4.23	111	3.7	3.45	350	24.55
					3.6	3.20	355	24.53

Total volume purged
 Sample appearance
 Sample time
 Sample date

clear
 11:26
 6/26/23

Facility Name	
Sample by	P. Kelly Matt Hamilla
Depth to water, feet (TOC)	19.95
Measured Total Depth, feet (TOC)	27.15

Sample Location ID	AD-30
Depth to water date	6-26-23

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1041	20.10	220	4.43	473	46.3	0.55	334	25.10		
1046	20.15	220	4.85	428	34.5	0.86	301	27.85		
1051	20.16	220	4.95	425	13.3	0.82	300	27.02		
1056	20.16	220	4.97	424	8.5	0.81	298	26.85		
1101	20.16	220	4.98	423	8.3	0.79	298	26.75		

Total volume purged	
Sample appearance	clear
Sample time	11-3
Sample date	6-26-23

Facility Name	P. ricey
Sample by	Matt Hamilton
Depth to water, feet (TOC)	20.29
Measured Total Depth, feet (TOC)	37.30

Sample Location ID	AD-31
Depth to water date	6-26-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)
939	20.60	220	3.64	255	50.7	5.43	274	26.57
944	20.66	220	4.01	208	34.3	3.42	256	25.62
945	20.71	220	4.12	291	15.5	4.90	307	25.30
954	20.73	220	4.19	296	16.2	4.75	313	25.15
959	20.74	220	4.20	299	16.2	4.71	316	25.13

Total volume purged	
Sample appearance	clear
Sample time	1001
Sample date	6-26-23

Facility Name	AEP Pirkey
Sample by	Brad Bates

Sample Location ID	AD-3a
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Depth to water, feet (TOC)	15-8a
Measured Total Depth, feet (TOC)	34.65

Depth to water date	6/26/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0906	16.38	220	3.82	295	112	6.17	307	26.65		
0911	16.49	220	3.71	302	69.5	1.87	281	25.53		
0916	16.53	220	3.74	305	71.0	1.14	256	25.40		
0921	16.55	220	3.81	306	9.9	0.85	243	25.34		
0926	16.56	220	3.79	304	9.8	0.83	240	25.32		

Total volume purged	
Sample appearance	clear
Sample time	0930
Sample date	6/26/23

Facility Name	HEP PINKOY PP
Sample by	Kerry McDonald

Sample Location ID	HPD-33
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Depth to water, feet (TOC)	12.56
Measured Total Depth, feet (TOC)	32.50

Depth to water date	06/26/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
0917	12.60	180	4.15	245	2.6	3.26	276	24.21		
0922	12.61	180	4.11	206	2.4	2.95	264	24.16		
0927	12.61	180	4.80	204	2.4	2.91	260	24.08		
0932	12.63	180	4.08	201	2.4	2.87	258	24.02		

Total volume purged	
Sample appearance	CLMPL
Sample time	0934
Sample date	06/26/23

Facility Name	AEP Pirkey
Sample by	BEV

Sample Location ID	A0-36
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Depth to water, feet (TOC)	9.21
Measured Total Depth, feet (TOC)	17.10

Depth to water date	6/27/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
0918	9.72	150	3.94	84	30.4	9.56	207	28.07		
0923	9.80	150	3.92	74	8.9	1.53	217	26.91		
0928	9.84	150	4.00	73	2.8	0.78	223	26.91		
0933	9.86	150	4.01	74	2.7	0.70	225	26.90		

Total volume purged	
Sample appearance	clear
Sample time	0936
Sample date	6/27/23

Facility Name
Sample by Pitney
Mott Hamilton

Depth to water, feet (TOC) 18.05
Measured Total Depth, feet (TOC) 51.44

Sample Location ID B-2

Depth to water date 6-26-23

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
821	18.51	3cc	5.26	94	1.8	6.16	330	24.58		
826	18.62	3cc	5.58	93	0	5.30	327	23.53		
831	18.66	3cc	5.63	93	0	5.24	315	23.57		

Total volume purged
Sample appearance Clear
Sample time 833
Sample date 6-26-23

Duplicate
1245

CCR Groundwater Monitoring Well Inspection Form

Facility: P. Hkey
 Sampling Contractor: Esgk

Sampling Period: Oct 2023
 Signature: [Signature]

Well No.	Well Locked	Fastener and Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Protective Cover, Barriers and Pad in Good Shape	Well Properly Labeled	Well Cap Present and Vented*	Comments
B-2	✓	✓	✓	✓	✓	✓	✓	
AD-12	✓	✓	✓	✓	✓	✓	✓	
AD-32	✓	✓	✓	✓	✓	✓	✓	
AD-28	✓	✓	✓	✓	✓	✓	✓	
AD-17	✓	✓	✓	✓	✓	✓	✓	
AD-23	✓	✓	✓	✓	✓	✓	✓	
AD-20	✓	✓	✓	✓	✓	✓	✓	
AD-26	✓	✓	✓	✓	✓	✓	✓	
AD-27	✓	✓	✓	✓	✓	✓	✓	
AD-3	✓	✓	✓	✓	✓	✓	✓	

*Not all wells will be vented, especially flush mounted wells. If that is the case, please note "flush mount well" in the comments.



CCR Groundwater Monitoring Well Inspection Form

Facility: APP Pinnon PP

Sampling Period: OCTOBER 2023

Sampling Contractor: EAGLE

Signature: [Signature]

Well No.	Well Locked	Lock Functioning	Well Locked After Sampling	Access to Well Maintained	Well Casing, Housing, and Pad in Good Shape	Well Properly Labeled	Well cap present	Comments
AD-13	✓	✓	✓	✓	✓	✓	✓	
AD-7R	✓	✓	✓	✓	✓		✓	NO LABEL
AD-22	✓	✓	✓	✓	✓	✓	✓	
AD-33	✓	✓	✓	✓	✓	✓	✓	
AD-18	✓	✓	✓	✓	✓	✓	✓	
B-3	✓	✓	✓	✓	✓		✓	NO LABEL
AD-34	✓	✓	✓	✓	✓	✓	✓	
AD-36	✓	✓	✓	✓	✓	✓	✓	
AD-8	✓	✓	✓	✓	✓	✓	✓	
AD-16	✓	✓	✓	✓	✓	✓	✓	

Instructions: Complete form and submit to AEP Environmental Services with Field Data. Place check mark for items that are satisfactory. Unsatisfactory items should be left blank with a note in the comments section on what needs to be remedied.

Facility Name	APP Pinkney PP
Sample by	Kenny McDonald

Sample Location ID	AD-7R
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Depth to water, feet (TOC)	12.00
Measured Total Depth, feet (TOC)	33.03

Depth to water date	10/17/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
0851	12.55	240	5.59	128	3.7	2.27	178	16.84		
0856	12.58	240	5.60	107	1.2	1.53	158			
0901	12.60	240	5.61	104	0.7	1.48	164	17.16		
0906	12.61	240	5.61	105	0.9	1.46	174	17.21		

Total volume purged	
Sample appearance	Clear
Sample time	0908
Sample date	10/17/23

Duplicate A 1406

Facility Name	AFP Plant PP
Sample by	Kenny McDonald

Sample Location ID	A0-8
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Depth to water, feet (TOC)	14.77
Measured Total Depth, feet (TOC)	31.33

Depth to water date	10/18/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1037	14.91	200	4.34	312	16.3	4.16	290	23.13		
1042	14.92	200	4.26	319	5.4	2.23	286	23.50		
1047	14.92	200	4.24	323	6.2	2.18	280	23.49		
1052	14.94	200	4.21	326	5.7	2.09	277	23.49		

Total volume purged	
Sample appearance	Clear
Sample time	1054
Sample date	10/18/23

Facility Name	Piller
Sample by	Matt Hamiltz

Sample Location ID	AD-12
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Depth to water, feet (TOC)	21.70
Measured Total Depth, feet (TOC)	57.00

Depth to water date	10-17-23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
924	22.01	300	3.64	53	48.5	7.06	294	18.91		
929	22.05	300	3.77	54	11.2	218	305	20.94		
934	22.11	300	3.82	54	5.3	210	310	21.17		
939	22.28	300	3.84	55	5.3	2.07	313	21.26		

Total volume purged	
Sample appearance	Clear
Sample time	941
Sample date	10-17-23

Facility Name	ACP PRIORITY PP
Sample by	KERRY McBRIDE

Sample Location ID	AD-13
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Depth to water, feet (TOC)	15.91
Measured Total Depth, feet (TOC)	40.70

Depth to water date	10/17/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
0749	16.03	170	5.22	434	57.2	3.68	78	15.21		
0754	16.10	170	5.42	436	32.6	2.17	72	18.36		
0759	16.14	170	5.45	430	31.5	2.11	71	19.45		
0804	16.19	170	5.47	439	24.8	2.08	69	19.71		
0809	16.21	170	5.47	439	27.3	2.05	68	19.79		

Total volume purged	
Sample appearance	CLEAR
Sample time	0811
Sample date	10/17/23

Facility Name	APP Plant
Sample by	Kenny McDonald

Sample Location ID	AD-16
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Depth to water, feet (TOC)	20.60
Measured Total Depth, feet (TOC)	38.24

Depth to water date	10/18/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity - (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1125	20.97	192	4.20	125	5.3	3.24	282	21.49		
1130	21.03	192	4.24	121	5.9	2.71	276	21.62		
1135	21.15	192	4.21	121	5.1	2.68	274	21.62		
1140	21.35	192	4.20	121	5.5	2.63	273	21.60		

Total volume purged	
Sample appearance	Clear
Sample time	1142
Sample date	10/18/23

Facility Name	
Sample by	P. Key Matt Hamill

Sample Location ID	A10-17
--------------------	--------

Depth to water, feet (TOC)	23.16
Measured Total Depth, feet (TOC)	33.05

Depth to water date	10-17-23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1154	23.28	200	3.76	114	17.7	5.52	412	23.14		
1155	23.34	200	3.24	135	9.8	1.33	415	24.00		
1204	23.37	200	3.16	145	5.9	1.37	417	23.96		
1209	23.40	200	3.14	149	6.0	1.42	418	23.99		

Total volume purged	
Sample appearance	clear
Sample time	1211
Sample date	10-17-23

Facility Name	APP PIAKUMP
Sample by	KERRY McNEAL

Sample Location ID	AD-18
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Depth to water, feet (TOC)	10.62
Measured Total Depth, feet (TOC)	28.42

Depth to water date	10/17/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1148	12.06	110	3.83	55	3.8	1.83	356	21.29		
1153	13.13	110	3.86	64	2.4	1.64	368	21.34		

Total volume purged	
Sample appearance	Clear
Sample time	0747
Sample date	10/18/23

Facility Name	ALP PIRKOP PP
Sample by	KERRY McDONALD

Sample Location ID	AD-22
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Depth to water, feet (TOC)	13.81
Measured Total Depth, feet (TOC)	32.70

Depth to water date	10/17/23
---------------------	----------

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
0958	11.57	150	3.96	737	2.4	4.02	272	21.36		
1003	11.57	150	4.00	740	0.0	3.56	272	21.32		
1008	11.58	150	4.01	743	0.0	3.54	274	21.30		
1013	11.60	150	4.00	750	0.0	3.53	267	21.29		

Total volume purged	
Sample appearance	Clear
Sample time	1015
Sample date	10/17/23

Facility Name	Pikey
Sample by	Matt Hamble

Sample Location ID	AD-23
--------------------	-------

Depth to water, feet (TOC)	29.75
Measured Total Depth, feet (TOC)	38.20

Depth to water date	10-18-23
---------------------	----------

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
828	30.01	220	4.34	82	18.2	9.34	436	14.18		
833	30.01	220	3.84	74	77.7	4.02	481	17.33		
836	30.01	220	3.96	73	28.2	2.72	457	18.60		
843	30.01	220	3.65	74	29.1	2.69	455	18.72		

Total volume purged	
Sample appearance	clear
Sample time	845
Sample date	10-18-23

Facility Name	Pitney
Sample by	M.H. Jonh

Sample Location ID	AD-25
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Depth to water, feet (TOC)	11.16
Measured Total Depth, feet (TOC)	27.38

Depth to water date	10-18-23
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Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
918	11.52	125	3.60	909	54.3	5.87	286	19.11		
921	11.61	125	3.63	923	46.9	1.02	211	22.02		
926	11.68	125	4.25	944	35.2	1.05	202	22.48		
931	11.75	125	4.29	957	35.9	1.13	195	22.73		
936	11.82	125	4.31	968	34.9	1.16	190	22.86		

Total volume purged	
Sample appearance	clear
Sample time	938
Sample date	10-18-23

Facility Name	
Sample by	P. Kelly Mett / Hamill

Sample Location ID	AD-26
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Depth to water, feet (TOC)	16.30
Measured Total Depth, feet (TOC)	42.73

Depth to water date	10-18-23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
1002	16.61	300	3.30	2.060	77.3	2.42	278	21.35		
1007	16.97	300	3.31	2.180	47.9	0.79	263	21.54		
1012	17.11	300	3.33	2.100	33.6	0.55	254	22.11		
1017	17.19	300	3.34	2.110	33.6	0.51	251	22.15		

Total volume purged	
Sample appearance	clear
Sample time	1019
Sample date	10-18-23

Facility Name	
Sample by	Pailuey Misty Hamiltu

Sample Location ID	AD-27
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Depth to water, feet (TOC)	24.19
Measured Total Depth, feet (TOC)	4 6.07

Depth to water date	10-18-23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
1044	24.47	300	3.45	219	18.5	5.88	268	22.51		
1045	24.55	300	3.45	238	10.2	0.13	287	22.36		
1054	24.61	300	3.44	236	7.4	0.85	303	22.37		
1055	24.69	300	3.43	234	7.2	0.81	310	22.39		

Total volume purged	
Sample appearance	Clear
Sample time	1101
Sample date	10-18-23

Facility Name	
Sample by	Pirkey Matt Hamilton
Depth to water, feet (TOC)	19.63
Measured Total Depth, feet (TOC)	38.54

Sample Location ID	AD-28
Depth to water date	10-17-23

Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)		
1102	19.96	220	3.81	400 101	43.5	6.37	380	22.40		
1107	20.11	220	3.50	96	9.1	2.15	358	21.52		
1112	20.18	220	3.53	97	9.2	2.14	361	21.32		

Total volume purged	
Sample appearance	clear
Sample time	1114
Sample date	10-17-23

Facility Name
 Sample by *P. Kelly
 Matt Hamilton*

Sample Location ID *AD-30*

Depth to water, feet (TOC) *20.74*
 Measured Total Depth, feet (TOC) *27.15*

Depth to water date *10-17-23*

Purge Stabilization Data

Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°C)
1017	21.22	220	5.21	330	29.5	6.51	220	21.65
1020	21.32	220	4.39	428	10	1.20	178	23.20
1027	21.42	220	4.23	443	9.2	0.95	215	23.63
1032	21.46	220	4.18	446	9.4	0.95	226	23.81

Total volume purged
 Sample appearance *clear*
 Sample time *1034*
 Sample date *10-17-23*

Facility Name	APP PINKY PP
Sample by	KIRBY McDONALD

Sample Location ID	A0-33
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Depth to water, feet (TOC)	15.44
Measured Total Depth, feet (TOC)	32.50

Depth to water date	10/17/23
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Purge Stabilization Data									
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)	
1048	15.56	220	4.27	217	1.8	3.28	282	22.10	
1053	15.56	220	4.20	171	0.9	2.24	302	22.18	
1058	15.57	220	4.04	170	1.1	2.15	309	22.22	
1103	15.57	220	3.97	172	1.0	2.15	312	22.24	
1109	15.58	220	3.95	177	0.6	2.13	315	22.29	

Total volume purged	
Sample appearance	CLAR
Sample time	1110
Sample date	10/17/23

Facility Name	A FT PIAHM PP
Sample by	KRISTY MCDONALD

Sample Location ID	AD-34
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Depth to water, feet (TOC)	TOC
Measured Total Depth, feet (TOC)	

Depth to water date	10/18/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond ($\mu\text{S}/\text{cm}$)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}\text{C}$)		
0904	0.64	120	3.30	1590	7.8	2.41	333	19.63		
0909	0.70	120	3.27	1640	8.7	2.30	331	20.03		
0914	0.73	120	3.27	1660	9.1	2.28	321	20.35		
0919	0.74	120	3.27	1660	8.2	2.28	315	20.38		

Total volume purged	
Sample appearance	Clear
Sample time	0921
Sample date	10/18/23

DUPLICATE-C 1400

Facility Name	APP PIAKOM PP
Sample by	Kenny McDonald

Sample Location ID	AD-36
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Depth to water, feet (TOC)	8.72
Measured Total Depth, feet (TOC)	17.10

Depth to water date	10/18/23
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Purge Stabilization Data										
Time	Water Depth (from TOC)	Flow Rate (mL/min)	pH (S.U.)	Spec Cond ($\mu\text{S}/\text{cm}$)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}\text{C}$)		
0951	8.91	110	4.16	119	7.2	6.21	288	20.87		
0956	8.89	110	4.18	87	3.6	4.86	279	20.68		
1001	8.88	110	4.19	81	2.9	4.83	273	20.20		
1006	8.89	110	4.19	80	3.1	4.80	270	20.71		

Total volume purged	
Sample appearance	clear
Sample time	1008
Sample date	10/18/23

APPENDIX 5- Analytical Laboratory Reports



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Customer Sample ID: AD-2

Customer Description: TG-32

Lab Number: 230658-001

Preparation:

Date Collected: 02/27/2023 11:55 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.35	mg/L	2	0.10	0.02		CRJ	03/15/2023 17:25	EPA 300.1 -1997, Rev. 1.0
Chloride	31.4	mg/L	2	0.04	0.02		CRJ	03/15/2023 17:25	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.22	mg/L	2	0.06	0.02		CRJ	03/15/2023 17:25	EPA 300.1 -1997, Rev. 1.0
Sulfate	268	mg/L	10	2.0	0.3		CRJ	03/15/2023 16:52	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	510	mg/L	1	50	20		SDW	03/03/2023 11:13	SM 2540C-2015

Customer Sample ID: AD-4

Customer Description: TG-32

Lab Number: 230658-002

Preparation:

Date Collected: 02/28/2023 10:13 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.14	mg/L	2	0.10	0.02		CRJ	03/15/2023 16:19	EPA 300.1 -1997, Rev. 1.0
Chloride	4.08	mg/L	2	0.04	0.02		CRJ	03/15/2023 16:19	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.05	mg/L	2	0.06	0.02	J1	CRJ	03/15/2023 16:19	EPA 300.1 -1997, Rev. 1.0
Sulfate	19.9	mg/L	2	0.40	0.06		CRJ	03/15/2023 16:19	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	140	mg/L	1	50	20		SDW	03/03/2023 11:13	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Customer Sample ID: AD-7

Customer Description: TG-32

Lab Number: 230658-003

Preparation:

Date Collected: 02/28/2023 11:18 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	2.49	mg/L	2	0.10	0.02		CRJ	03/15/2023 19:04	EPA 300.1 -1997, Rev. 1.0
Chloride	30.9	mg/L	2	0.04	0.02		CRJ	03/15/2023 19:04	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.53	mg/L	2	0.06	0.02		CRJ	03/15/2023 19:04	EPA 300.1 -1997, Rev. 1.0
Sulfate	77.5	mg/L	2	0.40	0.06		CRJ	03/15/2023 19:04	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	270	mg/L	1	50	20		SDW	03/03/2023 11:20	SM 2540C-2015

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 230658-004

Preparation:

Date Collected: 02/27/2023 10:56 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.08	mg/L	2	0.10	0.02	J1	CRJ	03/15/2023 20:09	EPA 300.1 -1997, Rev. 1.0
Chloride	6.51	mg/L	2	0.04	0.02		CRJ	03/15/2023 20:09	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.07	mg/L	2	0.06	0.02		CRJ	03/15/2023 20:09	EPA 300.1 -1997, Rev. 1.0
Sulfate	3.90	mg/L	2	0.40	0.06		CRJ	03/15/2023 20:09	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	70	mg/L	1	50	20		SDW	03/03/2023 11:20	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 230658-005

Preparation:

Date Collected: 02/27/2023 09:17 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.24	mg/L	2	0.10	0.02		CRJ	03/16/2023 00:33	EPA 300.1 -1997, Rev. 1.0
Chloride	51.8	mg/L	10	0.2	0.1		CRJ	03/16/2023 00:00	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.26	mg/L	2	0.06	0.02		CRJ	03/16/2023 00:33	EPA 300.1 -1997, Rev. 1.0
Sulfate	98.5	mg/L	10	2.0	0.3		CRJ	03/16/2023 00:00	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	250	mg/L	1	50	20		SDW	03/03/2023 11:20	SM 2540C-2015

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 230658-006

Preparation:

Date Collected: 02/28/2023 09:25 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.04	mg/L	2	0.10	0.02	J1	CRJ	03/15/2023 23:27	EPA 300.1 -1997, Rev. 1.0
Chloride	5.49	mg/L	2	0.04	0.02		CRJ	03/15/2023 23:27	EPA 300.1 -1997, Rev. 1.0
Fluoride	<0.02	mg/L	2	0.06	0.02	U1	CRJ	03/15/2023 23:27	EPA 300.1 -1997, Rev. 1.0
Sulfate	7.52	mg/L	2	0.40	0.06		CRJ	03/15/2023 23:27	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	100	mg/L	1	50	20		SDW	03/03/2023 11:26	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Customer Sample ID: AD-31

Customer Description: TG-32

Lab Number: 230658-008

Preparation:

Date Collected: 02/27/2023 12:47 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.29	mg/L	2	0.10	0.02		CRJ	03/16/2023 02:12	EPA 300.1 -1997, Rev. 1.0
Chloride	23.4	mg/L	2	0.04	0.02		CRJ	03/16/2023 02:12	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.13	mg/L	2	0.06	0.02		CRJ	03/16/2023 02:12	EPA 300.1 -1997, Rev. 1.0
Sulfate	82.2	mg/L	2	0.40	0.06		CRJ	03/16/2023 02:12	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	260	mg/L	1	50	20		SDW	03/03/2023 11:26	SM 2540C-2015

Customer Sample ID: AD-32

Customer Description: TG-32

Lab Number: 230658-009

Preparation:

Date Collected: 02/27/2023 12:03 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	4.44	mg/L	2	0.10	0.02		CRJ	03/16/2023 02:44	EPA 300.1 -1997, Rev. 1.0
Chloride	25.1	mg/L	2	0.04	0.02		CRJ	03/16/2023 02:44	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.44	mg/L	2	0.06	0.02		CRJ	03/16/2023 02:44	EPA 300.1 -1997, Rev. 1.0
Sulfate	151	mg/L	10	2.0	0.3		CRJ	03/16/2023 03:50	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	340	mg/L	1	50	20		SDW	03/03/2023 11:26	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 230658-010

Preparation:

Date Collected: 02/27/2023 10:58 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.34	mg/L	2	0.10	0.02		CRJ	03/16/2023 04:23	EPA 300.1 -1997, Rev. 1.0
Chloride	10.9	mg/L	2	0.04	0.02		CRJ	03/16/2023 04:23	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.34	mg/L	2	0.06	0.02		CRJ	03/16/2023 04:23	EPA 300.1 -1997, Rev. 1.0
Sulfate	74.5	mg/L	2	0.40	0.06		CRJ	03/16/2023 04:23	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	190	mg/L	1	50	20		SDW	03/03/2023 11:33	SM 2540C-2015

Customer Sample ID: DUPLICATE 1

Customer Description: TG-32

Lab Number: 230658-011

Preparation:

Date Collected: 02/27/2023 10:22 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.08	mg/L	2	0.10	0.02	J1	CRJ	03/15/2023 14:40	EPA 300.1 -1997, Rev. 1.0
Chloride	6.47	mg/L	2	0.04	0.02		CRJ	03/15/2023 14:40	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.07	mg/L	2	0.06	0.02		CRJ	03/15/2023 14:40	EPA 300.1 -1997, Rev. 1.0
Sulfate	4.08	mg/L	2	0.40	0.06		CRJ	03/15/2023 14:40	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	70	mg/L	1	50	20		SDW	03/03/2023 11:33	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Customer Sample ID: DUPLICATE 2

Customer Description: TG-32

Lab Number: 230658-012

Preparation:

Date Collected: 02/28/2023 14:00 EST

Date Received: 03/02/2023 10:30 EST

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.15	mg/L	2	0.10	0.02		CRJ	03/15/2023 15:13	EPA 300.1 -1997, Rev. 1.0
Chloride	3.92	mg/L	2	0.04	0.02		CRJ	03/15/2023 15:13	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.05	mg/L	2	0.06	0.02	J1	CRJ	03/15/2023 15:13	EPA 300.1 -1997, Rev. 1.0
Sulfate	20.1	mg/L	2	0.40	0.06		CRJ	03/15/2023 15:13	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/03/2023 11:26	SM 2320B-2011
TDS, Filterable Residue	130	mg/L	1	50	20		SDW	03/03/2023 11:33	SM 2540C-2015

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230658

Customer: Pirkey Power Station

Date Reported: 03/31/2023

Data Qualifier Legend

U1 - Not detected at or above method detection limit (MDL).

J1 - Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Jonathan Barnhill (318-673-3803)
 Contacts: Michael Ohlinger (614-836-4184)

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Project Name: Pirkey - CCR Contact Name: Leslie Fuerschbach Contact Phone: 318-423-3805 Sampler(s): Matt Hamilton Kenny McDonald Analysis Turnaround Time (in Calendar Days)						Site Contact:			Date:			For Lab Use Only:										
						250 mL bottle, pH<2, HNO ₃			Field-filter 250 mL bottle, then pH<2, HNO ₃			1 L bottle, Cool, 0-6°C			Three (six every 10th*) L bottles, pH<2, HNO ₃			40 mL Glass vial or 250 mL PTFE lined bottle, HCL ⁺⁺ , pH<2			40 mL Glass vial or 250 mL PTFE lined bottle, HCL ⁺⁺ , pH<2	
Sample Identification																						
AD-2						2/27/2023	1055	G	GW	1												
AD-4						2/28/2023	913	G	GW	1												
AD-7						2/28/2023	1018	G	GW	1												
AD-12						2/27/2023	956	G	GW	1												
AD-13						2/27/2023	817	G	GW	1												
AD-18						2/28/2023	825	G	GW	1												
AD-22						2/27/2023	907	G	GW	1												
AD-31						2/27/2023	1147	G	GW	1												
AD-32						2/27/2022	1103	G	GW	1												
AD-33						2/27/2023	958	G	GW	1												
DUPLICATE 1						2/27/2023	922	G	GW	1												
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field												4	F4	1	4	2	2					
* Six 1L Bottles must be collected for Radium for every 10th sample.																						
Special Instructions/QC Requirements & Comments: <div style="text-align: center; font-size: 1.2em; font-weight: bold;">TG-32</div>																						
Relinquished by: <i>John Barnhill</i>			Company: <i>Engle</i>			Date/Time: <i>3-1-23 1500</i>			Received by:			Date/Time:										
Relinquished by:			Company:			Date/Time:			Received by:			Date/Time:										
Relinquished by:			Company:			Date/Time:			Received in Laboratory by: <i>Michael Ohlinger</i>			Date/Time: <i>3/2/23 10:30 AM</i>										

AEP WATER & WASTE SAMPLE RECEIPT FORM

<u>Package Type</u>			<u>Delivery Type</u>				
<input checked="" type="radio"/> Cooler	<input type="radio"/> Box	<input type="radio"/> Bag	<input type="radio"/> Envelope	<input type="radio"/> PONY	<input type="radio"/> UPS	<input checked="" type="radio"/> FedEX	<input type="radio"/> USPS
				Other _____			
Plant/Customer <u>Pitts Power Station</u>			Number of Plastic Containers: <u>12</u>				
Opened By <u>Michael</u>			Number of Glass Containers: _____				
Date/Time <u>03/02/23 10:30am</u>			Number of Mercury Containers: _____				
Were all temperatures within 0-6°C? <input checked="" type="radio"/> Y / <input type="radio"/> N or N/A Initial: <u>MBK</u> <input checked="" type="radio"/> on ice / <input type="radio"/> no ice (IR Gun Ser# <u>2213689000</u> , Expir. <u>03/24/2024</u>) - If No, specify each deviation: _____							
Was container in good condition? <input checked="" type="radio"/> Y / <input type="radio"/> N Comments _____							
Was Chain of Custody received? <input checked="" type="radio"/> Y / <input type="radio"/> N Comments _____							
Requested turnaround: <u>28 days</u> If RUSH, who was notified? _____							
pH (15 min)	Cr ⁺⁶ (pres) (24 hr)	NO ₂ or NO ₃ (48 hr)	ortho-PO ₄ (48 hr)	Hg-diss (pres) (48 hr)			

Was COC filled out properly? Y / N Comments _____

Were samples labeled properly? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: MBK 03/02/23

pH paper (circle one): MQuant,PN1.09535.0001,LOT# _____ (OR) Lab Rat,PN4801,LOT# X000RWDG21

- Was Add'l Preservative needed? Y / N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 230658 Initial & Date & Time : _____

Logged by MSO Comments: Bottle AD-22 was spilled inside cooler. MBK

Reviewed by MBK AD-22 (230658-007) is canceled from list. need resampled. MBK

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Ion Chromatography Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Timothy Arnold

Name (printed)


Signature

Chemist Principal

Official Title

3/16/2023

Date

Ion Chromatography Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Timothy Arnold
LRC Date: 3/16/2023
Laboratory Job Number: 230658
Prep Batch Number(s): QC2303119

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	Yes	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	Yes	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	Yes	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey CCR

Reviewer Name: Timothy Arnold

LRC Date: 3/16/2023

Laboratory Job Number: 230658

Prep Batch Number(s): QC2303119

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey CCR

Reviewer Name: Timothy Arnold

LRC Date: 3/16/2023

Laboratory Job Number: 230658

Prep Batch Number(s): QC2303119

Exception Report No.	Description
ER1	CCB acceptance criteria is CCB<MQL.

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).
³ NA - Not applicable; NR - Not reviewed.
⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

Alkalinity Laboratory Review Checklist


Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

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 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Michael Ohlinger		Chemist	3/31/2023
Name (printed)	Signature	Official Title	Date

Alkalinity Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 3/31/2023
Laboratory Job Number: 230658
Prep Batch Number(s): QC2303029

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Alkalinity Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 3/31/2023
Laboratory Job Number: 230658
Prep Batch Number(s): QC2303029

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Alkalinity Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 3/31/2023
Laboratory Job Number: 230658
Prep Batch Number(s): QC2303029

Exception Report No.	Description
ER1	CCB acceptance criteria is $CCB < 0.5 * MQL$.

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).
³ NA - Not applicable; NR - Not reviewed.
⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

TDS Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Michael Ohlinger		Chemist	3/31/2023
Name (printed)	Signature	Official Title	Date

TDS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 3/31/2023
Laboratory Job Number: 230658
Prep Batch Number(s): QC2303072

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	NA	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

TDS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 3/31/2023
Laboratory Job Number: 230658
Prep Batch Number(s): QC2303072

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

TDS Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey - CCR

Reviewer Name: Michael Ohlinger

LRC Date: 3/31/2023

Laboratory Job Number: 230658

Prep Batch Number(s): QC2303072

Exception Report No.	Description

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.

² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).

³ NA - Not applicable; NR - Not reviewed.

⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-2

Customer Description:

Lab Number: 230698-001

Preparation:

Date Collected: 02/27/2023 11:55 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Arsenic	0.90	µg/L	1	0.10	0.03		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Barium	15.9	µg/L	1	0.20	0.05		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Beryllium	0.787	µg/L	1	0.050	0.007		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Boron	3.22	mg/L	1	0.050	0.009		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Cadmium	0.128	µg/L	1	0.020	0.004		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Calcium	3.53	mg/L	1	0.05	0.02		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Chromium	0.52	µg/L	1	0.20	0.04		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Cobalt	28.9	µg/L	1	0.020	0.003		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Lead	0.68	µg/L	1	0.20	0.05		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Lithium	0.0636	mg/L	1	0.00020	0.00005		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Magnesium	7.63	mg/L	1	0.10	0.02		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Mercury	51	ng/L	2	10	4		JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Potassium	1.45	mg/L	1	0.10	0.02		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Selenium	2.65	µg/L	1	0.50	0.09		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Sodium	113	mg/L	1	0.20	0.05	M1	GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Strontium	0.0551	mg/L	1	0.0020	0.0004		GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4
Thallium	0.12	µg/L	1	0.20	0.04	J1	GES	03/08/2023 15:26	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.03	pCi/L	0.24	0.36		ST	03/09/2023 15:06	SW-846 9315-1986, Rev. 0
Carrier Recovery	84.6	%						
Radium-228	-1.43	pCi/L	0.19	0.72		TTP	03/10/2023 15:27	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	70.7	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-2

Customer Description:

Lab Number: 230698-001-01

Preparation: Dissolved

Date Collected: 02/27/2023 12:55 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Arsenic	0.91	µg/L	1	0.10	0.03		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Barium	15.4	µg/L	1	0.20	0.05		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Beryllium	0.778	µg/L	1	0.050	0.007		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Boron	3.16	mg/L	1	0.050	0.009		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Cadmium	0.111	µg/L	1	0.020	0.004		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Calcium	3.45	mg/L	1	0.05	0.02		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Chromium	0.40	µg/L	1	0.20	0.04		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Cobalt	28.2	µg/L	1	0.020	0.003		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Iron	0.171	mg/L	1	0.020	0.006		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Lead	0.67	µg/L	1	0.20	0.05		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Lithium	0.0628	mg/L	1	0.00020	0.00005		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Magnesium	7.52	mg/L	1	0.10	0.02		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Manganese	0.103	mg/L	1	0.0010	0.0002		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Potassium	1.42	mg/L	1	0.10	0.02		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Selenium	2.67	µg/L	1	0.50	0.09		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Sodium	111	mg/L	1	0.20	0.05		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Strontium	0.0533	mg/L	1	0.0020	0.0004		GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4
Thallium	0.14	µg/L	1	0.20	0.04	J1	GES	03/08/2023 15:42	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
 4001 Bixby Road
 Groveport, OH 43125
 Phone: 614-836-4221
 Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-4

Customer Description:

Lab Number: 230698-002

Preparation:

Date Collected: 02/28/2023 10:13 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Arsenic	0.26	µg/L	1	0.10	0.03		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Barium	115	µg/L	1	0.20	0.05		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Beryllium	0.594	µg/L	1	0.050	0.007		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Boron	0.028	mg/L	1	0.050	0.009	J1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Cadmium	0.015	µg/L	1	0.020	0.004	J1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Calcium	2.22	mg/L	1	0.05	0.02		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Chromium	0.41	µg/L	1	0.20	0.04		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Cobalt	5.60	µg/L	1	0.020	0.003		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Lithium	0.0311	mg/L	1	0.00020	0.00005		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Magnesium	1.02	mg/L	1	0.10	0.02		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Mercury	4	ng/L	1	5	2	J1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Potassium	2.43	mg/L	1	0.10	0.02		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Sodium	8.15	mg/L	1	0.20	0.05		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Strontium	0.0187	mg/L	1	0.0020	0.0004		GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.04	J1	GES	03/08/2023 15:47	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.66	pCi/L	0.22	0.46		ST	03/09/2023 15:06	SW-846 9315-1986, Rev. 0
Carrier Recovery	71.9	%						
Radium-228	1.24	pCi/L	0.25	0.79		TTP	03/10/2023 15:27	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	63.4	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-4

Customer Description:

Lab Number: 230698-002-01

Preparation: Dissolved

Date Collected: 02/28/2023 11:13 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Arsenic	0.03	µg/L	1	0.10	0.03	J1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Barium	121	µg/L	1	0.20	0.05		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Beryllium	0.571	µg/L	1	0.050	0.007		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Boron	0.023	mg/L	1	0.050	0.009	J1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Cadmium	0.019	µg/L	1	0.020	0.004	J1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Calcium	2.36	mg/L	1	0.05	0.02		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Chromium	0.22	µg/L	1	0.20	0.04		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Cobalt	5.75	µg/L	1	0.020	0.003		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Iron	0.043	mg/L	1	0.020	0.006		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Lithium	0.0310	mg/L	1	0.00020	0.00005		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Magnesium	1.07	mg/L	1	0.10	0.02		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Manganese	0.0507	mg/L	1	0.0010	0.0002		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Potassium	2.50	mg/L	1	0.10	0.02		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Sodium	8.23	mg/L	1	0.20	0.05		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Strontium	0.0197	mg/L	1	0.0020	0.0004		GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.04	J1	GES	03/08/2023 15:52	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-7

Customer Description:

Lab Number: 230698-003

Preparation:

Date Collected: 02/28/2023 11:18 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Arsenic	1.09	µg/L	1	0.10	0.03		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Barium	44.6	µg/L	1	0.20	0.05		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Beryllium	5.41	µg/L	1	0.050	0.007		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Boron	1.90	mg/L	1	0.050	0.009		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Cadmium	0.704	µg/L	1	0.020	0.004		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Calcium	5.06	mg/L	1	0.05	0.02		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Chromium	0.37	µg/L	1	0.20	0.04		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Cobalt	41.1	µg/L	1	0.020	0.003		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Lead	0.85	µg/L	1	0.20	0.05		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Lithium	0.0804	mg/L	1	0.00020	0.00005		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Magnesium	9.64	mg/L	1	0.10	0.02		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Mercury	1520	ng/L	50	250	90		JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Potassium	1.96	mg/L	1	0.10	0.02		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Selenium	3.46	µg/L	1	0.50	0.09		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Sodium	17.1	mg/L	1	0.20	0.05		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Strontium	0.0723	mg/L	1	0.0020	0.0004		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4
Thallium	0.20	µg/L	1	0.20	0.04		GES	03/08/2023 15:57	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.32	pCi/L	0.19	0.19		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	88.0	%						
Radium-228	3.61	pCi/L	0.23	0.59		TTP	03/10/2023 15:27	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	70.4	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-7

Customer Description:

Lab Number: 230698-003-01

Preparation: Dissolved

Date Collected: 02/28/2023 12:18 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Arsenic	1.03	µg/L	1	0.10	0.03		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Barium	43.3	µg/L	1	0.20	0.05		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Beryllium	5.25	µg/L	1	0.050	0.007		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Boron	1.82	mg/L	1	0.050	0.009		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Cadmium	0.679	µg/L	1	0.020	0.004		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Calcium	5.00	mg/L	1	0.05	0.02		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Chromium	0.39	µg/L	1	0.20	0.04		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Cobalt	39.8	µg/L	1	0.020	0.003		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Iron	0.113	mg/L	1	0.020	0.006		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Lead	0.85	µg/L	1	0.20	0.05		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Lithium	0.0791	mg/L	1	0.00020	0.00005		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Magnesium	9.22	mg/L	1	0.10	0.02		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Manganese	0.0701	mg/L	1	0.0010	0.0002		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Mercury	<7	ng/L	4	20	7	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Potassium	1.91	mg/L	1	0.10	0.02		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Selenium	3.33	µg/L	1	0.50	0.09		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Sodium	16.6	mg/L	1	0.20	0.05		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Strontium	0.0700	mg/L	1	0.0020	0.0004		GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4
Thallium	0.18	µg/L	1	0.20	0.04	J1	GES	03/08/2023 16:02	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-12

Customer Description:

Lab Number: 230698-004

Preparation:

Date Collected: 02/27/2023 10:56 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Arsenic	0.07	µg/L	1	0.10	0.03	J1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Barium	27.5	µg/L	1	0.20	0.05		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Beryllium	0.155	µg/L	1	0.050	0.007		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Boron	0.021	mg/L	1	0.050	0.009	J1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Cadmium	0.013	µg/L	1	0.020	0.004	J1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Calcium	0.34	mg/L	1	0.05	0.02		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Chromium	0.36	µg/L	1	0.20	0.04		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Cobalt	1.50	µg/L	1	0.020	0.003		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Lead	0.1	µg/L	1	0.20	0.05	J1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Lithium	0.00885	mg/L	1	0.00020	0.00005		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Magnesium	0.49	mg/L	1	0.10	0.02		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Potassium	0.59	mg/L	1	0.10	0.02		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Selenium	0.35	µg/L	1	0.50	0.09	J1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Sodium	4.89	mg/L	1	0.20	0.05		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Strontium	0.0032	mg/L	1	0.0020	0.0004		GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 16:07	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.63	pCi/L	0.13	0.16	P1	ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	95.5	%						
Radium-228	0.54	pCi/L	0.17	0.56	P3	TTP	03/16/2023 15:39	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	83.6	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-12

Customer Description:

Lab Number: 230698-004-01

Preparation: Dissolved

Date Collected: 02/27/2023 11:56 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Arsenic	0.06	µg/L	1	0.10	0.03	J1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Barium	28.2	µg/L	1	0.20	0.05		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Beryllium	0.162	µg/L	1	0.050	0.007		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Boron	0.018	mg/L	1	0.050	0.009	J1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Cadmium	0.01	µg/L	1	0.020	0.004	J1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Calcium	0.37	mg/L	1	0.05	0.02		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Chromium	0.25	µg/L	1	0.20	0.04		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Cobalt	1.55	µg/L	1	0.020	0.003		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Iron	0.011	mg/L	1	0.020	0.006	J1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Lead	0.08	µg/L	1	0.20	0.05	J1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Lithium	0.00878	mg/L	1	0.00020	0.00005		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Magnesium	0.49	mg/L	1	0.10	0.02		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Manganese	0.0053	mg/L	1	0.0010	0.0002		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Potassium	0.60	mg/L	1	0.10	0.02		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Selenium	0.30	µg/L	1	0.50	0.09	J1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Sodium	5.18	mg/L	1	0.20	0.05		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Strontium	0.0033	mg/L	1	0.0020	0.0004		GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 16:12	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audin: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-13

Customer Description:

Lab Number: 230698-005

Preparation:

Date Collected: 02/27/2023 09:17 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Arsenic	0.39	µg/L	1	0.10	0.03		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Barium	66.8	µg/L	1	0.20	0.05		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Beryllium	1.23	µg/L	1	0.050	0.007		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Boron	0.080	mg/L	1	0.050	0.009		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Calcium	15.1	mg/L	1	0.05	0.02		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Chromium	0.26	µg/L	1	0.20	0.04		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Cobalt	60.0	µg/L	1	0.020	0.003		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Lithium	0.161	mg/L	1	0.00020	0.00005		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Magnesium	15.9	mg/L	1	0.10	0.02		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Mercury	<20	ng/L	10	50	20	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Potassium	5.54	mg/L	1	0.10	0.02		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Sodium	21.9	mg/L	1	0.20	0.05		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Strontium	0.133	mg/L	1	0.0020	0.0004		GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 16:18	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.73	pCi/L	0.24	0.24		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	72.1	%						
Radium-228	2.03	pCi/L	0.19	0.55		TTP	03/16/2023 15:39	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	70.2	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-13

Customer Description:

Lab Number: 230698-005-01

Preparation: Dissolved

Date Collected: 02/27/2023 10:17 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Arsenic	0.11	µg/L	1	0.10	0.03		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Barium	64.0	µg/L	1	0.20	0.05		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Beryllium	1.18	µg/L	1	0.050	0.007		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Boron	0.076	mg/L	1	0.050	0.009		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Calcium	14.6	mg/L	1	0.05	0.02		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Chromium	0.29	µg/L	1	0.20	0.04		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Cobalt	57.9	µg/L	1	0.020	0.003		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Iron	7.92	mg/L	1	0.020	0.006		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Lithium	0.156	mg/L	1	0.00020	0.00005		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Magnesium	15.4	mg/L	1	0.10	0.02		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Manganese	0.559	mg/L	1	0.0010	0.0002		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Potassium	5.34	mg/L	1	0.10	0.02		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Sodium	21.1	mg/L	1	0.20	0.05		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Strontium	0.127	mg/L	1	0.0020	0.0004		GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 16:23	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-18

Customer Description:

Lab Number: 230698-006

Preparation:

Date Collected: 02/28/2023 09:25 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Arsenic	0.26	µg/L	1	0.10	0.03		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Barium	77.9	µg/L	1	0.20	0.05		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Beryllium	0.085	µg/L	1	0.050	0.007		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Boron	<0.009	mg/L	1	0.050	0.009	U1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Cadmium	0.01	µg/L	1	0.020	0.004	J1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Calcium	0.18	mg/L	1	0.05	0.02		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Chromium	0.38	µg/L	1	0.20	0.04		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Cobalt	0.750	µg/L	1	0.020	0.003		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Lead	0.18	µg/L	1	0.20	0.05	J1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Lithium	0.0123	mg/L	1	0.00020	0.00005		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Magnesium	0.27	mg/L	1	0.10	0.02		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Mercury	6	ng/L	1	5	2		JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Potassium	0.69	mg/L	1	0.10	0.02		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Sodium	5.15	mg/L	1	0.20	0.05		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Strontium	0.0039	mg/L	1	0.0020	0.0004		GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 17:19	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.68	pCi/L	0.13	0.19		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	95.1	%						
Radium-228	0.42	pCi/L	0.18	0.59		TTP	03/16/2023 15:39	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	75.2	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-18

Customer Description:

Lab Number: 230698-006-01

Preparation: Dissolved

Date Collected: 02/28/2023 10:25 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Arsenic	0.05	µg/L	1	0.10	0.03	J1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Barium	80.7	µg/L	1	0.20	0.05		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Beryllium	0.079	µg/L	1	0.050	0.007		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Boron	0.010	mg/L	1	0.050	0.009	J1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Cadmium	0.01	µg/L	1	0.020	0.004	J1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Calcium	0.23	mg/L	1	0.05	0.02		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Chromium	0.22	µg/L	1	0.20	0.04		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Cobalt	0.774	µg/L	1	0.020	0.003		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Iron	0.028	mg/L	1	0.020	0.006		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Lithium	0.0128	mg/L	1	0.00020	0.00005		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Magnesium	0.28	mg/L	1	0.10	0.02		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Manganese	0.0029	mg/L	1	0.0010	0.0002		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Potassium	0.74	mg/L	1	0.10	0.02		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Sodium	5.35	mg/L	1	0.20	0.05		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Strontium	0.0040	mg/L	1	0.0020	0.0004		GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4
Thallium	0.06	µg/L	1	0.20	0.04	J1	GES	03/08/2023 17:34	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Reissued

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-22

Customer Description:

Lab Number: 230698-007

Preparation:

Date Collected: 02/27/2023 10:07 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Arsenic	3.66	µg/L	1	0.10	0.03		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Barium	18.0	µg/L	1	0.20	0.05		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Beryllium	10.2	µg/L	1	0.050	0.007		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Boron	0.068	mg/L	1	0.050	0.009		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Cadmium	1.37	µg/L	1	0.020	0.004		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Calcium	14.9	mg/L	1	0.05	0.02		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Chromium	0.46	µg/L	1	0.20	0.04		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Cobalt	113	µg/L	1	0.020	0.003		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Lead	0.21	µg/L	1	0.20	0.05		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Lithium	0.194	mg/L	1	0.00020	0.00005		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Magnesium	21.1	mg/L	1	0.10	0.02		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Mercury	40	ng/L	10	50	20	J1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Potassium	4.48	mg/L	1	0.10	0.02		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Selenium	7.39	µg/L	1	0.50	0.09		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Sodium	86.9	mg/L	1	0.20	0.05		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Strontium	0.140	mg/L	1	0.0020	0.0004		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4
Thallium	0.24	µg/L	1	0.20	0.04		GES	03/08/2023 17:40	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.41	pCi/L	0.20	0.21		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	77.0	%						
Radium-228	3.45	pCi/L	0.25	0.70		TTP	03/16/2023 15:39	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	69.3	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-22

Customer Description:

Lab Number: 230698-007-01

Preparation: Dissolved

Date Collected: 02/27/2023 11:07 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Arsenic	3.64	µg/L	1	0.10	0.03		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Barium	18.3	µg/L	1	0.20	0.05		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Beryllium	9.74	µg/L	1	0.050	0.007		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Boron	0.069	mg/L	1	0.050	0.009		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Cadmium	1.36	µg/L	1	0.020	0.004		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Calcium	15.5	mg/L	1	0.05	0.02		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Chromium	0.57	µg/L	1	0.20	0.04		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Cobalt	115	µg/L	1	0.020	0.003		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Iron	25.8	mg/L	1	0.020	0.006		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Lead	0.69	µg/L	1	0.20	0.05		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Lithium	0.186	mg/L	1	0.00020	0.00005		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Magnesium	21.8	mg/L	1	0.10	0.02		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Manganese	0.400	mg/L	1	0.0010	0.0002		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Mercury	9	ng/L	1	5	2		JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Potassium	4.60	mg/L	1	0.10	0.02		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Selenium	7.50	µg/L	1	0.50	0.09		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Sodium	90.4	mg/L	1	0.20	0.05		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Strontium	0.143	mg/L	1	0.0020	0.0004		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4
Thallium	0.24	µg/L	1	0.20	0.04		GES	03/08/2023 17:45	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-31

Customer Description:

Lab Number: 230698-008

Preparation:

Date Collected: 02/27/2023 12:47 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Arsenic	0.30	µg/L	1	0.10	0.03		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Barium	35.6	µg/L	1	0.20	0.05		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Beryllium	0.935	µg/L	1	0.050	0.007		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Boron	0.017	mg/L	1	0.050	0.009	J1	GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Cadmium	0.079	µg/L	1	0.020	0.004		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Calcium	2.70	mg/L	1	0.05	0.02		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Chromium	0.62	µg/L	1	0.20	0.04		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Cobalt	10.5	µg/L	1	0.020	0.003		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Lead	0.31	µg/L	1	0.20	0.05		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Lithium	0.0737	mg/L	1	0.00020	0.00005		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Magnesium	4.10	mg/L	1	0.10	0.02		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Mercury	130	ng/L	50	250	90	J1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Potassium	1.60	mg/L	1	0.10	0.02		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Selenium	0.27	µg/L	1	0.50	0.09	J1	GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Sodium	31.4	mg/L	1	0.20	0.05		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Strontium	0.0413	mg/L	1	0.0020	0.0004		GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.04	J1	GES	03/08/2023 17:50	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.58	pCi/L	0.20	0.19		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	88.2	%						
Radium-228	2.47	pCi/L	0.19	0.52		TTP	03/16/2023 15:39	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	73.1	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-31

Customer Description:

Lab Number: 230698-008-01

Preparation: Dissolved

Date Collected: 02/27/2023 13:47 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Arsenic	0.19	µg/L	1	0.10	0.03		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Barium	34.3	µg/L	1	0.20	0.05		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Beryllium	0.956	µg/L	1	0.050	0.007		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Boron	0.018	mg/L	1	0.050	0.009	J1	GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Cadmium	0.078	µg/L	1	0.020	0.004		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Calcium	2.84	mg/L	1	0.05	0.02		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Chromium	0.29	µg/L	1	0.20	0.04		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Cobalt	10.5	µg/L	1	0.020	0.003		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Iron	0.121	mg/L	1	0.020	0.006		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Lead	0.24	µg/L	1	0.20	0.05		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Lithium	0.0746	mg/L	1	0.00020	0.00005		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Magnesium	4.15	mg/L	1	0.10	0.02		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Manganese	0.0276	mg/L	1	0.0010	0.0002		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Mercury	<7	ng/L	4	20	7	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Potassium	1.60	mg/L	1	0.10	0.02		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Selenium	0.28	µg/L	1	0.50	0.09	J1	GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Sodium	31.8	mg/L	1	0.20	0.05		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Strontium	0.0418	mg/L	1	0.0020	0.0004		GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.04	J1	GES	03/08/2023 17:55	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-32

Customer Description:

Lab Number: 230698-009

Preparation:

Date Collected: 02/27/2023 12:03 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Arsenic	0.89	µg/L	1	0.10	0.03		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Barium	26.3	µg/L	1	0.20	0.05		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Beryllium	3.19	µg/L	1	0.050	0.007		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Boron	0.767	mg/L	1	0.050	0.009		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Cadmium	0.360	µg/L	1	0.020	0.004		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Calcium	7.69	mg/L	1	0.05	0.02		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Chromium	0.44	µg/L	1	0.20	0.04		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Cobalt	29.4	µg/L	1	0.020	0.003		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Lead	0.40	µg/L	1	0.20	0.05		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Lithium	0.0837	mg/L	1	0.00020	0.00005		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Magnesium	9.85	mg/L	1	0.10	0.02		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Mercury	2210	ng/L	100	500	200		JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Potassium	3.00	mg/L	1	0.10	0.02		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Selenium	2.68	µg/L	1	0.50	0.09		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Sodium	32.8	mg/L	1	0.20	0.05		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Strontium	0.143	mg/L	1	0.0020	0.0004		GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4
Thallium	0.18	µg/L	1	0.20	0.04	J1	GES	03/08/2023 18:00	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	2.29	pCi/L	0.24	0.17		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	89.7	%						
Radium-228	3.54	pCi/L	0.21	0.58		TTP	03/16/2023 15:50	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	71.2	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-32

Customer Description:

Lab Number: 230698-009-01

Preparation: Dissolved

Date Collected: 02/27/2023 13:03 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Arsenic	0.93	µg/L	1	0.10	0.03		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Barium	26.0	µg/L	1	0.20	0.05		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Beryllium	3.11	µg/L	1	0.050	0.007		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Boron	0.754	mg/L	1	0.050	0.009		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Cadmium	0.373	µg/L	1	0.020	0.004		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Calcium	7.37	mg/L	1	0.05	0.02		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Chromium	0.55	µg/L	1	0.20	0.04		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Cobalt	28.6	µg/L	1	0.020	0.003		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Iron	1.44	mg/L	1	0.020	0.006		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Lead	0.52	µg/L	1	0.20	0.05		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Lithium	0.0829	mg/L	1	0.00020	0.00005		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Magnesium	9.52	mg/L	1	0.10	0.02		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Manganese	0.0503	mg/L	1	0.0010	0.0002		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Mercury	<4	ng/L	2	10	4	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Potassium	2.96	mg/L	1	0.10	0.02		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Selenium	2.69	µg/L	1	0.50	0.09		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Sodium	32.1	mg/L	1	0.20	0.05		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Strontium	0.139	mg/L	1	0.0020	0.0004		GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4
Thallium	0.18	µg/L	1	0.20	0.04	J1	GES	03/08/2023 18:05	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-33

Customer Description:

Lab Number: 230698-010

Preparation:

Date Collected: 02/27/2023 10:58 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Arsenic	0.76	µg/L	1	0.10	0.03		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Barium	44.4	µg/L	1	0.20	0.05		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Beryllium	1.50	µg/L	1	0.050	0.007		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Boron	0.179	mg/L	1	0.050	0.009		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Cadmium	0.064	µg/L	1	0.020	0.004		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Calcium	2.48	mg/L	1	0.05	0.02		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Chromium	0.31	µg/L	1	0.20	0.04		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Cobalt	12.4	µg/L	1	0.020	0.003		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Lead	0.32	µg/L	1	0.20	0.05		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Lithium	0.0233	mg/L	1	0.00020	0.00005		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Magnesium	4.71	mg/L	1	0.10	0.02		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Mercury	5980	ng/L	100	500	200		JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Potassium	0.32	mg/L	1	0.10	0.02		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Selenium	2.54	µg/L	1	0.50	0.09		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Sodium	19.4	mg/L	1	0.20	0.05		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Strontium	0.0397	mg/L	1	0.0020	0.0004		GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.04	J1	GES	03/08/2023 18:10	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.18	pCi/L	0.18	0.20		ST	03/16/2023 08:55	SW-846 9315-1986, Rev. 0
Carrier Recovery	87.3	%						
Radium-228	1.67	pCi/L	0.17	0.50		TTP	03/16/2023 15:50	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	79.5	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: AD-33

Customer Description:

Lab Number: 230698-010-01

Preparation: Dissolved

Date Collected: 02/27/2023 11:58 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Arsenic	0.79	µg/L	1	0.10	0.03		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Barium	45.1	µg/L	1	0.20	0.05		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Beryllium	1.55	µg/L	1	0.050	0.007		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Boron	0.181	mg/L	1	0.050	0.009		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Cadmium	0.069	µg/L	1	0.020	0.004		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Calcium	2.42	mg/L	1	0.05	0.02		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Chromium	0.29	µg/L	1	0.20	0.04		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Cobalt	12.6	µg/L	1	0.020	0.003		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Iron	0.040	mg/L	1	0.020	0.006		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Lead	0.31	µg/L	1	0.20	0.05		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Lithium	0.0234	mg/L	1	0.00020	0.00005		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Magnesium	4.81	mg/L	1	0.10	0.02		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Manganese	0.0085	mg/L	1	0.0010	0.0002		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Mercury	1180	ng/L	20	100	40		JAB	03/27/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Potassium	0.31	mg/L	1	0.10	0.02		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Selenium	2.41	µg/L	1	0.50	0.09		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Sodium	19.7	mg/L	1	0.20	0.05		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Strontium	0.0401	mg/L	1	0.0020	0.0004		GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.04	J1	GES	03/08/2023 18:15	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: DUPLICATE 1

Customer Description:

Lab Number: 230698-011

Preparation:

Date Collected: 02/27/2023 10:22 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Arsenic	0.08	µg/L	1	0.10	0.03	J1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Barium	27.9	µg/L	1	0.20	0.05		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Beryllium	0.155	µg/L	1	0.050	0.007		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Boron	0.012	mg/L	1	0.050	0.009	J1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Cadmium	0.011	µg/L	1	0.020	0.004	J1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Calcium	0.34	mg/L	1	0.05	0.02		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Chromium	0.36	µg/L	1	0.20	0.04		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Cobalt	1.52	µg/L	1	0.020	0.003		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Lead	0.10	µg/L	1	0.20	0.05	J1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Lithium	0.00892	mg/L	1	0.00020	0.00005		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Magnesium	0.49	mg/L	1	0.10	0.02		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Potassium	0.59	mg/L	1	0.10	0.02		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Selenium	0.28	µg/L	1	0.50	0.09	J1	GES	03/15/2023 16:43	EPA 200.8-1994, Rev. 5.4
Sodium	5.26	mg/L	1	0.20	0.05		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Strontium	0.0033	mg/L	1	0.0020	0.0004		GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 10:57	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: DUPLICATE 1

Customer Description:

Lab Number: 230698-011-01

Preparation: Dissolved

Date Collected: 02/27/2023 11:22 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Arsenic	0.06	µg/L	1	0.10	0.03	J1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Barium	26.7	µg/L	1	0.20	0.05		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Beryllium	0.149	µg/L	1	0.050	0.007		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Boron	0.012	mg/L	1	0.050	0.009	J1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Cadmium	0.010	µg/L	1	0.020	0.004	J1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Calcium	0.37	mg/L	1	0.05	0.02		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Chromium	0.27	µg/L	1	0.20	0.04		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Cobalt	1.48	µg/L	1	0.020	0.003		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Iron	0.012	mg/L	1	0.020	0.006	J1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Lead	0.15	µg/L	1	0.20	0.05	J1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Lithium	0.00881	mg/L	1	0.00020	0.00005		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Magnesium	0.48	mg/L	1	0.10	0.02		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Manganese	0.0051	mg/L	1	0.0010	0.0002		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Potassium	0.58	mg/L	1	0.10	0.02		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Selenium	0.33	µg/L	1	0.50	0.09	J1	GES	03/15/2023 16:58	EPA 200.8-1994, Rev. 5.4
Sodium	5.13	mg/L	1	0.20	0.05		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Strontium	0.0032	mg/L	1	0.0020	0.0004		GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 11:02	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: DUPLICATE 2

Customer Description:

Lab Number: 230698-012

Preparation:

Date Collected: 02/28/2023 14:00 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Arsenic	0.27	µg/L	1	0.10	0.03		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Barium	119	µg/L	1	0.20	0.05		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Beryllium	0.567	µg/L	1	0.050	0.007		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Boron	0.017	mg/L	1	0.050	0.009	J1	GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Cadmium	0.018	µg/L	1	0.020	0.004	J1	GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Calcium	2.26	mg/L	1	0.05	0.02		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Chromium	0.24	µg/L	1	0.20	0.04		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Cobalt	5.79	µg/L	1	0.020	0.003		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Lithium	0.0305	mg/L	1	0.00020	0.00005		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Magnesium	1.08	mg/L	1	0.10	0.02		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Mercury	3	ng/L	1	5	2	J1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Potassium	2.49	mg/L	1	0.10	0.02		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/15/2023 17:03	EPA 200.8-1994, Rev. 5.4
Sodium	8.34	mg/L	1	0.20	0.05		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Strontium	0.0195	mg/L	1	0.0020	0.0004		GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4
Thallium	0.11	µg/L	1	0.20	0.04	J1	GES	03/08/2023 11:18	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: DUPLICATE 2

Customer Description:

Lab Number: 230698-012-01

Preparation: Dissolved

Date Collected: 02/28/2023 15:00 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Arsenic	0.04	µg/L	1	0.10	0.03	J1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Barium	118	µg/L	1	0.20	0.05		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Beryllium	0.579	µg/L	1	0.050	0.007		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Boron	0.016	mg/L	1	0.050	0.009	J1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Cadmium	0.018	µg/L	1	0.020	0.004	J1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Calcium	2.28	mg/L	1	0.05	0.02		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Chromium	0.24	µg/L	1	0.20	0.04		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Cobalt	5.76	µg/L	1	0.020	0.003		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Iron	0.046	mg/L	1	0.020	0.006		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Lithium	0.0309	mg/L	1	0.00020	0.00005		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Magnesium	1.05	mg/L	1	0.10	0.02		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Manganese	0.0509	mg/L	1	0.0010	0.0002		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Potassium	2.49	mg/L	1	0.10	0.02		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/15/2023 17:08	EPA 200.8-1994, Rev. 5.4
Sodium	8.23	mg/L	1	0.20	0.05		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Strontium	0.0192	mg/L	1	0.0020	0.0004		GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.04	J1	GES	03/08/2023 11:23	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: EQUIPMENT BLANK

Customer Description:

Lab Number: 230698-013

Preparation:

Date Collected: 02/27/2023 12:18 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.02	µg/L	1	0.10	0.02	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Arsenic	<0.03	µg/L	1	0.10	0.03	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Barium	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Beryllium	0.034	µg/L	1	0.050	0.007	J1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Boron	<0.009	mg/L	1	0.050	0.009	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Calcium	<0.02	mg/L	1	0.05	0.02	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Chromium	0.44	µg/L	1	0.20	0.04		GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Cobalt	0.014	µg/L	1	0.020	0.003	J1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Lead	0.38	µg/L	1	0.20	0.05		GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Lithium	<0.00005	mg/L	1	0.00020	0.00005	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Magnesium	<0.02	mg/L	1	0.10	0.02	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Potassium	<0.02	mg/L	1	0.10	0.02	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/15/2023 17:14	EPA 200.8-1994, Rev. 5.4
Sodium	<0.05	mg/L	1	0.20	0.05	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Strontium	<0.0004	mg/L	1	0.0020	0.0004	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 11:28	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Customer Sample ID: FIELD BLANK

Customer Description:

Lab Number: 230698-014

Preparation:

Date Collected: 02/27/2023 12:21 EST

Date Received: 03/06/2023 14:20 EST

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.03	µg/L	1	0.10	0.02	J1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Arsenic	<0.03	µg/L	1	0.10	0.03	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Barium	<0.05	µg/L	1	0.20	0.05	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Beryllium	0.033	µg/L	1	0.050	0.007	J1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Boron	<0.009	mg/L	1	0.050	0.009	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Calcium	<0.02	mg/L	1	0.05	0.02	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Chromium	0.23	µg/L	1	0.20	0.04		GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Cobalt	0.015	µg/L	1	0.020	0.003	J1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Lead	2.57	µg/L	1	0.20	0.05		GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Lithium	<0.00005	mg/L	1	0.00020	0.00005	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Magnesium	<0.02	mg/L	1	0.10	0.02	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	JAB	03/21/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Potassium	<0.02	mg/L	1	0.10	0.02	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Selenium	<0.09	µg/L	1	0.50	0.09	U1	GES	03/15/2023 17:19	EPA 200.8-1994, Rev. 5.4
Sodium	<0.05	mg/L	1	0.20	0.05	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Strontium	<0.0004	mg/L	1	0.0020	0.0004	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4
Thallium	<0.04	µg/L	1	0.20	0.04	U1	GES	03/08/2023 11:33	EPA 200.8-1994, Rev. 5.4

230698

Job Comments:

Report originally issued 4/10/23. Report reissued 10/28/23 to correct rounding errors on report and EDD.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 230698

Customer: Pirkey Power Station

Date Reported: 10/28/2023

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.

Data Qualifier Legend

- U1 - Not detected at or above method detection limit (MDL).
- M1 - The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.
- J1 - Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
- P1 - The precision between duplicate results was above acceptance limits.
- P3 - The precision on the matrix spike duplicate (MSD) was above acceptance limits.

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Jonathan Barnhill (318-673-3803)
 Contacts: Michael Ohlinger (614-836-4184)

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Project Name: Pirkey - CCR	Analysis Turnaround Time (in Calendar Days)	Site Contact:	Date:	For Lab Use Only:		
Contact Name: Leslie Fuerschbach		Sampler(s): Matt Hamilton Kenny McDonald	250 mL bottle, pH<2, HNO₃	Field-filter 250 mL bottle, then pH<2, HNO₃	COC/Order #: 230698	
Contact Phone: 318-423-3805			1 L bottle, Cool, 0-6°C	Three (six every 10th*) L bottles, pH<2, HNO₃		Field-Filter 250 mL PTFE lined bottle, HCL**, pH<2
Sampler(s): Matt Hamilton Kenny McDonald			Field-Filter 250 mL PTFE lined bottle, HCL**, pH<2	250 mL PTFE lined bottle, HCL**, pH<2		

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, TL and Na, K, Mg, Sr	B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Fe, Mn, Mo, Pb, Se, TL and Na, K, Mg, Sr	TDS, F, Cl, SO ₄ , and Br, Alkalinity	Ra-226, Ra-228	Hg	Hg	Sample Specific Notes
AD-2	2/27/2023	1055	G	GW	7		X	X		X	X	X	
AD-4	2/28/2023	913	G	GW	7		X	X		X	X	X	
AD-7	2/28/2023	1018	G	GW	7		X	X		X	X	X	
AD-12	2/27/2023	956	G	GW	10		X	X		X	X	X	
AD-13	2/27/2023	817	G	GW	7		X	X		X	X	X	
AD-18	2/28/2023	825	G	GW	7		X	X		X	X	X	
AD-22	2/27/2023	907	G	GW	7		X	X		X	X	X	
AD-31	2/27/2023	1147	G	GW	7		X	X		X	X	X	
AD-32	2/27/2022	1103	G	GW	7		X	X		X	X	X	
AD-33	2/27/2023	958	G	GW	7		X	X		X	X	X	
DUPLICATE 1	2/27/2023	922	G	GW	4		X	X		X	X	X	
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4	2	2	

* Six 1L Bottles must be collected for Radium for every 10th sample.

Special Instructions/QC Requirements & Comments:
TG-32

Relinquished by: <i>[Signature]</i>	Company: Eagle	Date/Time: 3-1-23 15 ⁰⁰	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: <i>[Signature]</i>	Date/Time: 3/6/23 2:20PM

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Contacts: Jonathan Barnhill (318-673-3803)
 Michael Ohlinger (614-836-4184)

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Project Name: Pirkey - CCR
 Contact Name: Leslie Fuerschbach
 Contact Phone: 318-423-3805
 Sampler(s): Matt Hamilton Kenny McDonald

Analysis Turnaround Time (in Calendar Days)

Site Contact: _____ Date: _____
 For Lab Use Only:
 COC/Order #: _____

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, TL and Na, K, Mg, Sr	Field-filter 250 mL bottle, then pH<2, HNO ₃	1 L bottle, Cool, 0-6°C	Three (six every 10th*) L bottles, pH<2, HNO ₃	Field-Filter 250 mL PTFE lined bottle, HCL*, pH<2	250 mL PTFE lined bottle, HCL*, pH<2		Sample Specific Notes:
DUPLICATE 2	2/28/2023	1300	G	GW	4		X	X			X	X		
EQUIPMENT BLANK	2/27/2023	1118	G	GW	2		X					X		
FIELD BLANK	2/27/2023	1121	G	GW	2		X					X		
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4	2	2		

* Six 1L Bottles must be collected for Radium for every 10th sample.

Special Instructions/QC Requirements & Comments:
TG-32

Relinquished by: <i>Matt Hamilton</i>	Company: <i>Es&k</i>	Date/Time: <i>3-1-23 1500</i>	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: <i>Michael Ohlinger</i>	Date/Time: <i>3/6/23 2:20pm</i>

AEP WATER & WASTE SAMPLE RECEIPT FORM

<u>Package Type</u>			<u>Delivery Type</u>		
<input checked="" type="radio"/> Cooler	<input type="radio"/> Box	<input type="radio"/> Bag	<input type="radio"/> Envelope	<input type="radio"/> PONY	<input type="radio"/> UPS
				<input checked="" type="radio"/> FedEX	<input type="radio"/> USPS
				Other _____	

Plant/Customer <u>Pirkey</u>	Number of Plastic Containers: <u>59</u>
Opened By <u>WLS/TTP/MSD</u>	Number of Glass Containers: <u>26</u>
Date/Time <u>3/6/23 2:20pm</u>	Number of Mercury Containers: <u>-</u>

Were all temperatures within 0-6°C? Y / N or N/A Initial: _____ on ice / no ice
(IR Gun Ser# 2213689000, Expir. 03/24/2024) - If No, specify each deviation: _____

Was container in good condition? Y / N Comments _____

Was Chain of Custody received? Y / N Comments _____

Requested turnaround: Routine If **RUSH**, who was notified? _____

pH (15 min) Cr⁶ (pres) (24 hr) NO₂ or NO₃ (48 hr) ortho-PO₄ (48 hr) Hg-diss (pres) (48 hr)

Was COC filled out properly? Y / N Comments _____

Were samples labeled properly? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: WLS/MSD/TTP

pH paper (circle one): MQuant.PN1.09535.0001, LOT# _____ [OR] Lab Rat, PN4801, LOT# X000RWDG21

- Was Add'l Preservative needed? Y / N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 230698 Initial & Date & Time : _____

Logged by MSD Comments: _____

Reviewed by TTP _____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

ICP-MS Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Jonathan Barnhill

Name (printed)

Signature of the official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Signature

Lab Supervisor

Official Title

3/28/2023

Date

ICP-MS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Jonathan Barnhill
LRC Date: 3/28/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030703 PB23030710 PB23031501 QC2303103 QC2303137

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	No	ER1
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

ICP-MS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	No	ER3
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

ICP-MS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Jonathan Barnhill
LRC Date: 3/28/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030703 PB23030710 PB23031501 QC2303103 QC2303137

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER2
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	Yes	
	I	Were ion abundance data within the method-required QC limits?	Yes	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	Yes	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

ICP-MS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

ICP-MS Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Jonathan Barnhill
LRC Date: 3/28/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030703 PB23030710 PB23031501 QC2303103 QC2303137

Exception Report No.	Description
ER1	Linear Dynamic Range (LDR) study used to determine upper limit of analyte calibration.
ER2	CCB acceptance criteria is $CCB < 2.2 * MDL$.
ER3	Matrix Spike Failed for Na on sample 230698-001

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.

² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).

³ NA - Not applicable; NR - Not reviewed.

⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

Radium Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Sunita Timsina

Name (printed)


Signature

Chemist Associate

Official Title

03/21/2023

Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power Station
Reviewer Name: Sunita Timsina
LRC Date: 03/21/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030704, PB23030705

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	NO	ER1
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power Station
Reviewer Name: Sunita Timsina
LRC Date: 03/21/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030704, PB23030705

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	NA	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	NA	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Radium Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power Station
Reviewer Name: Sunita Timsina
LRC Date: 03/21/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030704, PB23030705

Exception Report No.	Description
ER1	For PB23030705, RPD between the sample and duplicate sample has exceeds the laboratory QC Limit.

¹ Items identified by the letter “R” must be available as a hard copy or as a .pdf file. Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period.

² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).

³ NA - Not applicable; NR - Not reviewed.

⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is “No” or “NR.”

Radium Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

<u>Sunita Timsina</u>		<u>Chemist Associate</u>	<u>04/10/2023</u>
Name (printed)	Signature	Official Title	Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power Station
Reviewer Name: Sunita Timsina
LRC Date: 04/10/2023
Laboratory Job Number: 230698
Prep Batch Number(s): PB23030706, PB23031302

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?		
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	No	ER1
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	N/A	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey Power Station

Reviewer Name: Sunita Timsina

LRC Date: 04/10/2023

Laboratory Job Number: 230698

Prep Batch Number(s): PB23030706, PB23031302

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	NA	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	NA	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230895

Customer: Pirkey Power Station

Date Reported: 04/11/2023

Customer Sample ID: AD-22

Customer Description:

Lab Number: 230895-001

Preparation:

Date Collected: 03/22/2023 10:59 EDT

Date Received: 03/24/2023 11:25 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.32	mg/L	2	0.10	0.02		CRJ	03/28/2023 04:04	EPA 300.1 -1997, Rev. 1.0
Chloride	72.4	mg/L	10	0.2	0.1		CRJ	03/28/2023 02:25	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.90	mg/L	2	0.06	0.02		CRJ	03/28/2023 04:04	EPA 300.1 -1997, Rev. 1.0
Sulfate	357	mg/L	10	2.0	0.3		CRJ	03/28/2023 02:25	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	03/27/2023 18:08	SM 2320B-2011
TDS, Filterable Residue	680	mg/L	1	50	20	S7	ELT	03/28/2023 08:32	SM 2540C-2015

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 230895

Customer: Pirkey Power Station

Date Reported: 04/11/2023

Data Qualifier Legend

U1 - Not detected at or above method detection limit (MDL).

S7 - Sample did not achieve constant weight.

230895

Chain of Custody Record

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Jonathan Barnhill (318-673-3803)
 Contacts: Michael Ohlinger (614-836-4184)

Program: Coal Combustion Residuals (CCR)

Project Name: Pirkey - CCR		Analysis Turnaround Time (in Calendar Days)		Site Contact:		Date:		For Lab Use Only:					
Contact Name: Leslie Fuerschbach								COC/Order #:					
Contact Phone: 318-423-3805													
Sampler(s): Matt Hamilton													
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	250 mL bottle, pH<2, HNO ₃	Field-filter 250 mL bottle, then pH<2, HNO ₃	1 L bottle, Cool, 0-6°C	Three (six every 10th*) L bottles, pH<2, HNO ₃	40 mL Glass vial or 250 mL PTFE lined bottle, HCL**, pH<2	40 mL Glass vial or 250 mL PTFE lined bottle, HCL**, pH<2	Sample Specific Notes
AD-22	3/22/2023	959	G	GW	1				X				
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4	2	2	
* Six 1L Bottles must be collected for Radium for every 10th sample.													
Special Instructions/QC Requirements & Comments: TG-32													
Relinquished by: <i>Art Zambon</i>	Company: <i>Eagle</i>	Date/Time: <i>3/23/23</i>	<i>1500</i>	Received by:	Date/Time:								
Relinquished by:	Company:	Date/Time:		Received by:	Date/Time:								
Relinquished by:	Company:	Date/Time:		Received in Laboratory by: <i>Misyan / 1/5/23</i>	Date/Time: <i>03/24/23 11:25</i>								

AEP WATER & WASTE SAMPLE RECEIPT FORM

<u>Package Type</u> <input checked="" type="radio"/> Cooler <input type="radio"/> Box <input type="radio"/> Bag <input type="radio"/> Envelope		<u>Delivery Type</u> PONY UPS <input checked="" type="radio"/> FedEx USPS Other _____	
Plant/Customer <u>Pittkey P.S</u>	Number of Plastic Containers: <u>1</u>		
Opened By <u>Misgna</u>	Number of Glass Containers: _____		
Date/Time <u>03/24/23 11:25</u>	Number of Mercury Containers: _____		
Were all temperatures within 0-6°C? <input checked="" type="radio"/> Y / <input type="radio"/> N or N/A Initial: <u>mbc</u> <input checked="" type="radio"/> on ice / <input type="radio"/> no ice (IR Gun Ser# <u>2213689000</u> , Expir. <u>3/24/2024</u> - If No, specify each deviation: _____)			
Was container in good condition? <input checked="" type="radio"/> Y / <input type="radio"/> N Comments _____			
Was Chain of Custody received? <input checked="" type="radio"/> Y / <input type="radio"/> N Comments _____			
Requested turnaround: <u>28 days</u> If RUSH, who was notified? _____			
pH (15 min)	Cr ⁶ (pres) (24 hr)	NO ₂ or NO ₃ (48 hr)	ortho-PO ₄ (48 hr) Hg-diss (pres) (48 hr)

Was COC filled out properly? Y / N Comments _____

Were samples labeled properly? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: mbc 03/24/23

pH paper (circle one): MQuant,PN1.09535.0001,LOT# _____ [OR] Lab Rat,PN4801,LOT# X000RWDG21 EXP 11/15/2024

- Was Add'l Preservative needed? Y / N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 230895 Initial & Date & Time: _____

Logged by mbc Comments: _____

Reviewed by JAB _____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Alkalinity Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

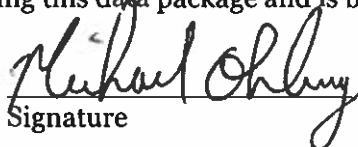
- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Michael Ohlinger

Name (printed)

 Chemist

Signature

Official Title

4/10/23 MJS
~~12/22/2022~~

Date

Alkalinity Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP CCR
Reviewer Name: Michael Ohlinger
LRC Date: 4/10/23
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303194

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Alkalinity Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP CCR
Reviewer Name: Michael Ohlinger
LRC Date: 4/10/23
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303194

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Alkalinity Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP CCR
Reviewer Name: Michael Ohlinger
LRC Date: 4/10/23
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303194

Exception Report No.	Description
ER1	CCB acceptance criteria is CCB<0.5*MQL.

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).
³ NA - Not applicable; NR - Not reviewed.
⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

Ion Chromatography Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Tim Arnold		Chemist Principle	4/11/2023
Name (printed)	Signature	Official Title	Date

Ion Chromatography Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Tim Arnold
LRC Date: 4/11/2023
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303198

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	Yes	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	Yes	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	Yes	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Tim Arnold
LRC Date: 4/11/2023
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303198

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Tim Arnold
LRC Date: 4/11/2023
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303198

Exception Report No.	Description
ER1	CCB acceptance criteria is CCB<MQL.

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).
³ NA - Not applicable; NR - Not reviewed.
⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

TDS Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

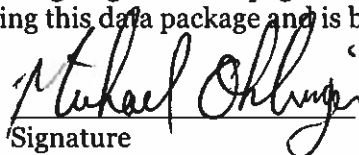
This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Michael Ohlinger
Name (printed)


Signature

Chemist
Official Title

4/11/23
Date

TDS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 4/11/23
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303232

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	NA	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	ER1
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

TDS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: _____
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303232

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

TDS Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey - CCR
Reviewer Name: Michael Ohlinger
LRC Date: 4/11/23
Laboratory Job Number: 230895
Prep Batch Number(s): QC2303232

Exception Report No.	Description
ER1	Sample did not achieve constant weight.

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).
³ NA - Not applicable; NR - Not reviewed.
⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-2

Customer Description: TG-32

Lab Number: 231960-001

Preparation:

Date Collected: 06/26/2023 11:42 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.35	mg/L	2	0.10	0.02		CRJ	07/12/2023 11:48	EPA 300.1 -1997, Rev. 1.0
Chloride	30.8	mg/L	2	0.04	0.01		CRJ	07/12/2023 11:48	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.19	mg/L	2	0.06	0.02		CRJ	07/12/2023 11:48	EPA 300.1 -1997, Rev. 1.0
Sulfate	271	mg/L	10	3.0	0.6		CRJ	07/12/2023 11:16	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	530	mg/L	1	50	20		JAB	06/30/2023 10:53	SM 2540C-2015

Customer Sample ID: AD-3

Customer Description: TG-32

Lab Number: 231960-002

Preparation:

Date Collected: 06/27/2023 12:01 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.06	mg/L	2	0.10	0.02	J1	CRJ	07/12/2023 14:33	EPA 300.1 -1997, Rev. 1.0
Chloride	5.67	mg/L	2	0.04	0.01		CRJ	07/12/2023 14:33	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.03	mg/L	2	0.06	0.02	J1	CRJ	07/12/2023 14:33	EPA 300.1 -1997, Rev. 1.0
Sulfate	22.4	mg/L	2	0.6	0.1		CRJ	07/12/2023 14:33	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	150	mg/L	1	50	20		JAB	06/30/2023 10:56	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-4

Customer Description: TG-32

Lab Number: 231960-003

Preparation:

Date Collected: 06/27/2023 12:10 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.30	mg/L	2	0.10	0.02		CRJ	07/12/2023 15:06	EPA 300.1 -1997, Rev. 1.0
Chloride	3.97	mg/L	2	0.04	0.01		CRJ	07/12/2023 15:06	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.02	mg/L	2	0.06	0.02	J1	CRJ	07/12/2023 15:06	EPA 300.1 -1997, Rev. 1.0
Sulfate	18.9	mg/L	2	0.6	0.1		CRJ	07/12/2023 15:06	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	150	mg/L	1	50	20		JAB	06/30/2023 11:02	SM 2540C-2015

Customer Sample ID: AD-7

Customer Description: TG-32

Lab Number: 231960-004

Preparation:

Date Collected: 06/27/2023 10:51 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	2.85	mg/L	2	0.10	0.02		CRJ	07/12/2023 19:29	EPA 300.1 -1997, Rev. 1.0
Chloride	31.2	mg/L	2	0.04	0.01		CRJ	07/12/2023 19:29	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.40	mg/L	2	0.06	0.02		CRJ	07/12/2023 19:29	EPA 300.1 -1997, Rev. 1.0
Sulfate	74.6	mg/L	2	0.6	0.1		CRJ	07/12/2023 19:29	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	290	mg/L	1	50	20		JAB	06/30/2023 11:01	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 231960-005

Preparation:

Date Collected: 06/26/2023 08:55 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.05	mg/L	2	0.10	0.02	J1	CRJ	07/12/2023 18:23	EPA 300.1 -1997, Rev. 1.0
Chloride	4.68	mg/L	2	0.04	0.01		CRJ	07/12/2023 18:23	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.06	mg/L	2	0.06	0.02		CRJ	07/12/2023 18:23	EPA 300.1 -1997, Rev. 1.0
Sulfate	2.9	mg/L	2	0.6	0.1		CRJ	07/12/2023 18:23	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	80	mg/L	1	50	20		JAB	06/30/2023 11:07	SM 2540C-2015

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 231960-006

Preparation:

Date Collected: 06/26/2023 08:28 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.25	mg/L	2	0.10	0.02		CRJ	07/12/2023 21:41	EPA 300.1 -1997, Rev. 1.0
Chloride	48.7	mg/L	10	0.20	0.05		CRJ	07/12/2023 21:08	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.23	mg/L	2	0.06	0.02		CRJ	07/12/2023 21:41	EPA 300.1 -1997, Rev. 1.0
Sulfate	112	mg/L	10	3.0	0.6		CRJ	07/12/2023 21:08	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	280	mg/L	1	50	20		JAB	06/30/2023 11:09	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-17

Customer Description: TG-32

Lab Number: 231960-007

Preparation:

Date Collected: 06/26/2023 12:47 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.16	mg/L	2	0.10	0.02		CRJ	07/12/2023 20:35	EPA 300.1 -1997, Rev. 1.0
Chloride	15.4	mg/L	2	0.04	0.01		CRJ	07/12/2023 20:35	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.19	mg/L	2	0.06	0.02		CRJ	07/12/2023 20:35	EPA 300.1 -1997, Rev. 1.0
Sulfate	2.4	mg/L	2	0.6	0.1		CRJ	07/12/2023 20:35	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	60	mg/L	1	50	20		JAB	06/30/2023 11:14	SM 2540C-2015

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 231960-008

Preparation:

Date Collected: 06/27/2023 08:42 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.04	mg/L	2	0.10	0.02	J1	CRJ	07/12/2023 22:47	EPA 300.1 -1997, Rev. 1.0
Chloride	5.28	mg/L	2	0.04	0.01		CRJ	07/12/2023 22:47	EPA 300.1 -1997, Rev. 1.0
Fluoride	<0.02	mg/L	2	0.06	0.02	U1	CRJ	07/12/2023 22:47	EPA 300.1 -1997, Rev. 1.0
Sulfate	8.2	mg/L	2	0.6	0.1		CRJ	07/12/2023 22:47	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	110	mg/L	1	50	20		JAB	06/30/2023 11:16	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-22

Customer Description: TG-32

Lab Number: 231960-009

Preparation:

Date Collected: 06/26/2023 09:43 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.48	mg/L	2	0.10	0.02		CRJ	07/13/2023 03:10	EPA 300.1 -1997, Rev. 1.0
Chloride	93.9	mg/L	25	0.5	0.1		CRJ	07/13/2023 02:37	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.63	mg/L	2	0.06	0.02		CRJ	07/13/2023 03:10	EPA 300.1 -1997, Rev. 1.0
Sulfate	350	mg/L	25	8	2		CRJ	07/13/2023 02:37	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	680	mg/L	1	50	20		JAB	06/30/2023 11:23	SM 2540C-2015

Customer Sample ID: AD-28

Customer Description: TG-32

Lab Number: 231960-010

Preparation:

Date Collected: 06/26/2023 12:26 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.06	mg/L	2	0.10	0.02	J1	CRJ	07/12/2023 23:20	EPA 300.1 -1997, Rev. 1.0
Chloride	4.14	mg/L	2	0.04	0.01		CRJ	07/12/2023 23:20	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.54	mg/L	2	0.06	0.02		CRJ	07/12/2023 23:20	EPA 300.1 -1997, Rev. 1.0
Sulfate	25.9	mg/L	2	0.6	0.1		CRJ	07/12/2023 23:20	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	120	mg/L	1	50	20		JAB	06/30/2023 11:24	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-30

Customer Description: TG-32

Lab Number: 231960-011

Preparation:

Date Collected: 06/26/2023 12:03 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.20	mg/L	2	0.10	0.02		CRJ	07/13/2023 05:22	EPA 300.1 -1997, Rev. 1.0
Chloride	18.2	mg/L	2	0.04	0.01		CRJ	07/13/2023 05:22	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.04	mg/L	2	0.06	0.02	J1	CRJ	07/13/2023 05:22	EPA 300.1 -1997, Rev. 1.0
Sulfate	147	mg/L	10	3.0	0.6		CRJ	07/13/2023 04:49	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	300	mg/L	1	50	20		JAB	06/30/2023 11:31	SM 2540C-2015

Customer Sample ID: AD-31

Customer Description: TG-32

Lab Number: 231960-012

Preparation:

Date Collected: 06/26/2023 11:01 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.26	mg/L	2	0.10	0.02		CRJ	07/13/2023 04:16	EPA 300.1 -1997, Rev. 1.0
Chloride	21.2	mg/L	2	0.04	0.01		CRJ	07/13/2023 04:16	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.1	mg/L	2	0.06	0.02		CRJ	07/13/2023 04:16	EPA 300.1 -1997, Rev. 1.0
Sulfate	82.1	mg/L	2	0.6	0.1		CRJ	07/13/2023 04:16	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	280	mg/L	1	50	20		JAB	06/30/2023 11:32	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: AD-32

Customer Description: TG-32

Lab Number: 231960-013

Preparation:

Date Collected: 06/26/2023 09:30 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	1.17	mg/L	2	0.10	0.02		CRJ	07/13/2023 07:01	EPA 300.1 -1997, Rev. 1.0
Chloride	14.5	mg/L	2	0.04	0.01		CRJ	07/13/2023 07:01	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.13	mg/L	2	0.06	0.02		CRJ	07/13/2023 07:01	EPA 300.1 -1997, Rev. 1.0
Sulfate	119	mg/L	25	8	2		CRJ	07/13/2023 06:28	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	260	mg/L	1	50	20		JAB	06/30/2023 11:37	SM 2540C-2015

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 231960-014

Preparation:

Date Collected: 06/26/2023 11:34 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.28	mg/L	2	0.10	0.02		CRJ	07/13/2023 08:07	EPA 300.1 -1997, Rev. 1.0
Chloride	9.50	mg/L	2	0.04	0.01		CRJ	07/13/2023 08:07	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.21	mg/L	2	0.06	0.02		CRJ	07/13/2023 08:07	EPA 300.1 -1997, Rev. 1.0
Sulfate	58.4	mg/L	2	0.6	0.1		CRJ	07/13/2023 08:07	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	200	mg/L	1	50	20		JAB	06/30/2023 11:38	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Customer Sample ID: Duplicate - 1

Customer Description: TG-32

Lab Number: 231960-015

Preparation:

Date Collected: 06/26/2023 13:00 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.25	mg/L	2	0.10	0.02		CRJ	07/12/2023 12:54	EPA 300.1 -1997, Rev. 1.0
Chloride	48.3	mg/L	10	0.20	0.05		CRJ	07/12/2023 10:43	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.22	mg/L	2	0.06	0.02		CRJ	07/12/2023 12:54	EPA 300.1 -1997, Rev. 1.0
Sulfate	112	mg/L	10	3.0	0.6		CRJ	07/12/2023 10:43	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	300	mg/L	1	50	20		JAB	06/30/2023 11:51	SM 2540C-2015

Customer Sample ID: Field Blank

Customer Description: TG-32

Lab Number: 231960-016

Preparation:

Date Collected: 06/26/2023 12:25 EDT

Date Received: 06/29/2023 10:45 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	<0.02	mg/L	2	0.10	0.02	U1	CRJ	07/12/2023 10:10	EPA 300.1 -1997, Rev. 1.0
Chloride	0.27	mg/L	2	0.04	0.01		CRJ	07/12/2023 10:10	EPA 300.1 -1997, Rev. 1.0
Fluoride	<0.02	mg/L	2	0.06	0.02	U1	CRJ	07/12/2023 10:10	EPA 300.1 -1997, Rev. 1.0
Sulfate	<0.1	mg/L	2	0.6	0.1	U1	CRJ	07/12/2023 10:10	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	06/29/2023 14:54	SM 2320B-2011
TDS, Filterable Residue	<20	mg/L	1	50	20	U1	JAB	06/30/2023 11:52	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231960

Customer: Pirkey Power Station

Date Reported: 08/01/2023

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.

Data Qualifier Legend

U1 - Not detected at or above method detection limit (MDL).

J1 - Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Site Contact:

For Lab Use Only:

COC/Order #:

Date:

Project Name: Pirkey PP CCR

Contact Name: Leslie Fuerschbach

Contact Phone: 319-673-2744

Sampler(s): Matt Hamilton, Kenny McDonald

Analysis Turnaround Time (in Calendar Days)

☉ Routine (28 days for Monitoring Wells)

Sampler(s) Initials

250 mL bottle, pH<2, HNO3

Field-filter 250 mL bottle, then pH<2, HNO3

1 L bottle, Cool, 0-6C

Three (six every 10th*) L bottles, pH<2, HNO3

Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.
6/26/2023	830	G	GW	1
6/23/2023	934	G	GW	1
6/26/2023	1200	G	GW	1
6/26/2023	1125	G	GW	1

Mercury

Dissolved Mercury

F, Cl, SO4, Br, TDS, Alkalinity

Ra-226, Ra-228

Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ; F= filter in field

* Six 1L Bottles must be collected for Radium for every 10th sample.

Special Instructions/QC Requirements & Comments:

TG-32 needed

Company:

Date/Time: 6-28-23 1600

Received by:

Date/Time:

Company:

Date/Time:

Received by:

Date/Time:

Company:

Date/Time:

Received in Laboratory by:

Date/Time:

AEP WATER & WASTE SAMPLE RECEIPT FORM

<u>Package Type</u>				<u>Delivery Type</u>			
<input checked="" type="radio"/> Cooler	<input type="radio"/> Box	<input type="radio"/> Bag	<input type="radio"/> Envelope	<input type="radio"/> PONY	<input type="radio"/> UPS	<input checked="" type="radio"/> FedEX	<input type="radio"/> USPS
				Other _____			
Plant/Customer <u>Pitkey PP</u>				Number of Plastic Containers: <u>16</u>			
Opened By <u>Misgna/Michael</u>				Number of Glass Containers: _____			
Date/Time <u>06/29/23 10:45 AM</u>				Number of Mercury Containers: _____			
Were all temperatures within 0-6°C? <input checked="" type="radio"/> Y / <input type="radio"/> N or N/A Initial: <u>MBK</u> <input checked="" type="radio"/> on ice / <input type="radio"/> no ice (IR Gun Ser# <u>2213689000</u> , Expir. <u>03/24/2024</u>) - If No, specify each deviation: _____							
Was container in good condition? <input checked="" type="radio"/> Y / <input type="radio"/> N Comments _____							
Was Chain of Custody received? <input checked="" type="radio"/> Y / <input type="radio"/> N Comments _____							
Requested turnaround: <u>Routine</u> If RUSH, who was notified? _____							
pH (15 min)	Cr ⁺⁶ (pres) (24 hr)	NO ₂ or NO ₃ (48 hr)	ortho-PO ₄ (48 hr)	Hg-diss (pres) (48 hr)			

Was COC filled out properly? Y / N Comments _____

Were samples labeled property? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: MBK 06/29/23

pH paper (circle one): MQuant,PN1.09535.0001,LOT# _____ [OR] Lab Rat,PN4801,LOT# X008RWDG21 Exp 11/15/2024

- Was Add'l Preservative needed? Y / N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 231960 Initial & Date & Time : _____

Logged by MSO Comments: AD-33 listed as taken on 6/23 @ 9:34 on COC while on bottle as 6/26 @ 9:34. Went with bottle due to all other samples being taken 6/26 & 6/27.

Reviewed by [Signature] MSO 6/29/23

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Alkalinity Laboratory Review Checklist

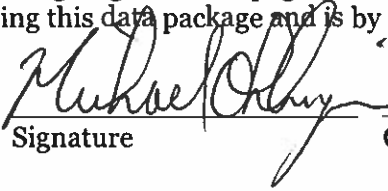
Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Michael Ohlinger  Chemist 8/1/2023
Name (printed) Signature Official Title Date

Alkalinity Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP Semi-Annual CCR
Reviewer Name: Michael Ohlinger
LRC Date: 8/1/2023
Laboratory Job Number: 231960
Prep Batch Number(s): QC2306250

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Alkalinity Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP Semi-Annual CCR
Reviewer Name: Michael Ohlinger
LRC Date: 8/1/2023
Laboratory Job Number: 231960
Prep Batch Number(s): QC2306250

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Ion Chromatography Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Tim Arnold		Principle Chemist	07/13/23
Name (printed)	Signature	Official Title	Date

Ion Chromatography Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey PP Semi-Annual CCR

Reviewer Name: Tim Arnold

LRC Date: 7/13/23

Laboratory Job Number: 231960

Prep Batch Number(s): QC2307086

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	Yes	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	Yes	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	Yes	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey PP Semi-Annual CCR

Reviewer Name: Tim Arnold

LRC Date: 7/13/23

Laboratory Job Number: 231960

Prep Batch Number(s): QC2307086

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey PP Semi-Annual CCR

Reviewer Name: Tim Arnold

LRC Date: 7/13/23

Laboratory Job Number: 231960

Prep Batch Number(s): QC2307086

Exception Report No.	Description
ER1	CCB acceptance criteria is CCB<MQL.

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.

² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).

³ NA - Not applicable; NR - Not reviewed.

⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

TDS Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Michael Ohlinger _____ Chemist _____ 8/1/2023
Name (printed) Signature Official Title Date

TDS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP Semi-Annual
Reviewer Name: Michael Ohlinger
LRC Date: 8/1/2023
Laboratory Job Number: 231960
Prep Batch Number(s): QC2306244

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	NA	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

TDS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey PP Semi-Annual
Reviewer Name: Michael Ohlinger
LRC Date: 8/1/2023
Laboratory Job Number: 231960
Prep Batch Number(s): QC2306244

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

TDS Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey PP Semi-Annual

Reviewer Name: Michael Ohlinger

LRC Date: 8/1/2023

Laboratory Job Number: 231960

Prep Batch Number(s): QC2306244

Exception Report No.	Description

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.

² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).

³ NA - Not applicable; NR - Not reviewed.

⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-2

Customer Description: TG-32

Lab Number: 231985-001

Preparation:

Date Collected: 06/26/2023 11:42 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Arsenic	1.14	µg/L	1	0.10	0.03		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Barium	13.5	µg/L	1	0.20	0.05		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Beryllium	0.744	µg/L	1	0.050	0.007		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Boron	3.06	mg/L	1	0.050	0.007		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Cadmium	0.119	µg/L	1	0.020	0.004		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Calcium	3.53	mg/L	1	0.05	0.01		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Chromium	0.49	µg/L	1	0.30	0.07		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Cobalt	27.3	µg/L	1	0.020	0.005		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Lead	0.60	µg/L	1	0.20	0.05		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Lithium	0.0595	mg/L	1	0.00030	0.00007		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Magnesium	7.46	mg/L	1	0.100	0.006		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Mercury	157	ng/L	2	10	4		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Potassium	1.38	mg/L	1	0.100	0.008		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Selenium	4.32	µg/L	1	0.50	0.04		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Sodium	108	mg/L	1	0.20	0.01		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Strontium	0.0540	mg/L	1	0.00200	0.00005		GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4
Thallium	0.11	µg/L	1	0.20	0.02	J1	GES	07/11/2023 23:33	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.49	pCi/L	0.11	0.14		TTP	07/11/2023 11:33	SW-846 9315-1986, Rev. 0
Carrier Recovery	89.5	%						
Radium-228	0.87	pCi/L	0.16	0.50		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	80.6	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-2

Customer Description: TG-32

Lab Number: 231985-001-01

Preparation: Dissolved

Date Collected: 06/26/2023 11:42 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.008	µg/L	1	0.100	0.008	J1	GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Arsenic	1.10	µg/L	1	0.10	0.03		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Barium	13.3	µg/L	1	0.20	0.05		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Beryllium	0.746	µg/L	1	0.050	0.007		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Cadmium	0.110	µg/L	1	0.020	0.004		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Chromium	0.59	µg/L	1	0.30	0.07		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Cobalt	27.4	µg/L	1	0.020	0.005		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Iron	0.229	mg/L	1	0.020	0.003		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Lead	0.61	µg/L	1	0.20	0.05		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Lithium	0.0599	mg/L	1	0.00030	0.00007		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Manganese	0.102	mg/L	1	0.00100	0.00008		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Selenium	4.14	µg/L	1	0.50	0.04		GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4
Thallium	0.11	µg/L	1	0.20	0.02	J1	GES	07/11/2023 23:38	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-3

Customer Description: TG-32

Lab Number: 231985-002

Preparation:

Date Collected: 06/27/2023 12:01 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.011	µg/L	1	0.100	0.008	J1	GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Arsenic	0.80	µg/L	1	0.10	0.03		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Barium	52.2	µg/L	1	0.20	0.05		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Beryllium	0.200	µg/L	1	0.050	0.007		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Boron	0.037	mg/L	1	0.050	0.007	J1	GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Cadmium	0.020	µg/L	1	0.020	0.004		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Calcium	2.95	mg/L	1	0.05	0.01		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Chromium	0.31	µg/L	1	0.30	0.07		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Cobalt	2.79	µg/L	1	0.020	0.005		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Lead	0.25	µg/L	1	0.20	0.05		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Lithium	0.0414	mg/L	1	0.00030	0.00007		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Magnesium	1.42	mg/L	1	0.100	0.006		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Potassium	2.06	mg/L	1	0.100	0.008		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Selenium	0.04	µg/L	1	0.50	0.04	J1	GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Sodium	8.14	mg/L	1	0.20	0.01		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Strontium	0.0213	mg/L	1	0.00200	0.00005		GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4
Thallium	0.05	µg/L	1	0.20	0.02	J1	GES	07/11/2023 23:43	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.54	pCi/L	0.12	0.18		TTP	07/11/2023 11:33	SW-846 9315-1986, Rev. 0
Carrier Recovery	86.5	%						
Radium-228	0.37	pCi/L	0.12	0.38		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	89.9	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-3

Customer Description: TG-32

Lab Number: 231985-002-01

Preparation: Dissolved

Date Collected: 06/27/2023 12:01 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.018	µg/L	1	0.100	0.008	J1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Arsenic	0.06	µg/L	1	0.10	0.03	J1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Barium	52.1	µg/L	1	0.20	0.05		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Beryllium	0.180	µg/L	1	0.050	0.007		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Cadmium	0.016	µg/L	1	0.020	0.004	J1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Chromium	0.34	µg/L	1	0.30	0.07		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Cobalt	2.78	µg/L	1	0.020	0.005		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Iron	0.074	mg/L	1	0.020	0.003		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Lithium	0.0424	mg/L	1	0.00030	0.00007		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Manganese	0.0315	mg/L	1	0.00100	0.00008		GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Selenium	0.05	µg/L	1	0.50	0.04	J1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	07/11/2023 23:49	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-4

Customer Description: TG-32

Lab Number: 231985-003

Preparation:

Date Collected: 06/27/2023 12:10 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.018	µg/L	1	0.100	0.008	J1	GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Arsenic	1.23	µg/L	1	0.10	0.03		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Barium	132	µg/L	1	0.20	0.05		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Beryllium	0.376	µg/L	1	0.050	0.007		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Boron	0.018	mg/L	1	0.050	0.007	J1	GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Cadmium	0.021	µg/L	1	0.020	0.004		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Calcium	2.90	mg/L	1	0.05	0.01		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Chromium	0.56	µg/L	1	0.30	0.07		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Cobalt	3.89	µg/L	1	0.020	0.005		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Lead	0.15	µg/L	1	0.20	0.05	J1	GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Lithium	0.0240	mg/L	1	0.00030	0.00007		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Magnesium	0.737	mg/L	1	0.100	0.006		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Mercury	3	ng/L	1	5	2	J1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Potassium	2.32	mg/L	1	0.100	0.008		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Selenium	0.14	µg/L	1	0.50	0.04	J1	GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Sodium	6.68	mg/L	1	0.20	0.01		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Strontium	0.0248	mg/L	1	0.00200	0.00005		GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.02	J1	GES	07/11/2023 23:54	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.38	pCi/L	0.22	0.20		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	97.0	%						
Radium-228	0.34	pCi/L	0.15	0.50		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	74.0	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-4

Customer Description: TG-32

Lab Number: 231985-003-01

Preparation: Dissolved

Date Collected: 06/27/2023 12:10 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Arsenic	0.03	µg/L	1	0.10	0.03	J1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Barium	122	µg/L	1	0.20	0.05		GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Beryllium	0.361	µg/L	1	0.050	0.007		GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Cadmium	0.019	µg/L	1	0.020	0.004	J1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Chromium	0.28	µg/L	1	0.30	0.07	J1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Cobalt	3.82	µg/L	1	0.020	0.005		GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Iron	0.142	mg/L	1	0.020	0.003		GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Lithium	0.0245	mg/L	1	0.00030	0.00007		GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Manganese	0.0358	mg/L	1	0.00100	0.00008		GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.02	J1	GES	07/11/2023 23:59	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-7

Customer Description: TG-32

Lab Number: 231985-004

Preparation:

Date Collected: 06/27/2023 10:51 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Arsenic	1.14	µg/L	1	0.10	0.03		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Barium	40.3	µg/L	1	0.20	0.05		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Beryllium	5.11	µg/L	1	0.050	0.007		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Boron	2.02	mg/L	1	0.050	0.007		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Cadmium	0.691	µg/L	1	0.020	0.004		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Calcium	5.73	mg/L	1	0.05	0.01		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Chromium	0.47	µg/L	1	0.30	0.07		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Cobalt	39.3	µg/L	1	0.020	0.005		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Lead	0.88	µg/L	1	0.20	0.05		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Lithium	0.0780	mg/L	1	0.00030	0.00007		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Magnesium	9.21	mg/L	1	0.100	0.006		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Mercury	1220	ng/L	48	240	90		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Potassium	2.05	mg/L	1	0.100	0.008		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Selenium	4.53	µg/L	1	0.50	0.04		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Sodium	17.1	mg/L	1	0.20	0.01		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Strontium	0.0776	mg/L	1	0.00200	0.00005		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4
Thallium	0.20	µg/L	1	0.20	0.02		GES	07/12/2023 00:04	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.29	pCi/L	0.24	0.31		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	88.5	%						
Radium-228	3.40	pCi/L	0.19	0.50		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	80.7	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-7

Customer Description: TG-32

Lab Number: 231985-004-01

Preparation: Dissolved

Date Collected: 06/27/2023 10:51 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Arsenic	1.14	µg/L	1	0.10	0.03		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Barium	40.4	µg/L	1	0.20	0.05		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Beryllium	5.13	µg/L	1	0.050	0.007		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Cadmium	0.692	µg/L	1	0.020	0.004		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Chromium	0.55	µg/L	1	0.30	0.07		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Cobalt	39.9	µg/L	1	0.020	0.005		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Iron	0.049	mg/L	1	0.020	0.003		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Lead	0.87	µg/L	1	0.20	0.05		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Lithium	0.0785	mg/L	1	0.00030	0.00007		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Manganese	0.0812	mg/L	1	0.00100	0.00008		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Selenium	4.57	µg/L	1	0.50	0.04		GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4
Thallium	0.18	µg/L	1	0.20	0.02	J1	GES	07/12/2023 00:09	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 231985-005

Preparation:

Date Collected: 06/26/2023 08:55 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.015	µg/L	1	0.100	0.008	J1	GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Arsenic	0.11	µg/L	1	0.10	0.03		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Barium	16.3	µg/L	1	0.20	0.05		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Beryllium	0.110	µg/L	1	0.050	0.007		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Boron	0.019	mg/L	1	0.050	0.007	J1	GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Cadmium	0.007	µg/L	1	0.020	0.004	J1	GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Calcium	0.21	mg/L	1	0.05	0.01		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Chromium	0.45	µg/L	1	0.30	0.07		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Cobalt	0.932	µg/L	1	0.020	0.005		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Lead	0.11	µg/L	1	0.20	0.05	J1	GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Lithium	0.00487	mg/L	1	0.00030	0.00007		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Magnesium	0.291	mg/L	1	0.100	0.006		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	0.7	µg/L	1	0.5	0.1		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Potassium	0.175	mg/L	1	0.100	0.008		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Selenium	0.23	µg/L	1	0.50	0.04	J1	GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Sodium	3.34	mg/L	1	0.20	0.01		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Strontium	0.00203	mg/L	1	0.00200	0.00005		GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	07/12/2023 00:14	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.45	pCi/L	0.13	0.21		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	106	%						
Radium-228	-0.11	pCi/L	0.14	0.50		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	79.1	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 231985-005-01

Preparation: Dissolved

Date Collected: 06/26/2023 08:55 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.014	µg/L	1	0.100	0.008	J1	GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Arsenic	0.1	µg/L	1	0.10	0.03		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Barium	16.5	µg/L	1	0.20	0.05		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Beryllium	0.112	µg/L	1	0.050	0.007		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Cadmium	0.006	µg/L	1	0.020	0.004	J1	GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Chromium	0.51	µg/L	1	0.30	0.07		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Cobalt	0.926	µg/L	1	0.020	0.005		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Iron	0.113	mg/L	1	0.020	0.003		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Lead	0.11	µg/L	1	0.20	0.05	J1	GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Lithium	0.00485	mg/L	1	0.00030	0.00007		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Manganese	0.00340	mg/L	1	0.00100	0.00008		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	0.5	µg/L	1	0.5	0.1		GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Selenium	0.25	µg/L	1	0.50	0.04	J1	GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	07/12/2023 00:19	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 231985-006

Preparation:

Date Collected: 06/26/2023 08:28 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Arsenic	1.56	µg/L	1	0.10	0.03		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Barium	39.8	µg/L	1	0.20	0.05		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Beryllium	0.234	µg/L	1	0.050	0.007		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Boron	0.067	mg/L	1	0.050	0.007		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Calcium	10.6	mg/L	1	0.05	0.01		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Chromium	0.31	µg/L	1	0.30	0.07		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Cobalt	51.5	µg/L	1	0.020	0.005		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Lithium	0.142	mg/L	1	0.00030	0.00007		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Magnesium	14.5	mg/L	1	0.100	0.006		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Potassium	4.98	mg/L	1	0.100	0.008		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Sodium	20.9	mg/L	1	0.20	0.01		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Strontium	0.0706	mg/L	1	0.00200	0.00005		GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/12/2023 01:26	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.68	pCi/L	0.17	0.24		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	88.5	%						
Radium-228	0.93	pCi/L	0.14	0.45		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	87.0	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 231985-006-01

Preparation: Dissolved

Date Collected: 06/26/2023 08:28 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Arsenic	1.18	µg/L	1	0.10	0.03		GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Barium	39.9	µg/L	1	0.20	0.05		GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Beryllium	0.193	µg/L	1	0.050	0.007		GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Chromium	0.26	µg/L	1	0.30	0.07	J1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Cobalt	52.0	µg/L	1	0.020	0.005		GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Iron	45.0	mg/L	5	0.10	0.02		GES	07/12/2023 11:16	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Lithium	0.142	mg/L	1	0.00030	0.00007		GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Manganese	0.520	mg/L	1	0.00100	0.00008		GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/12/2023 01:31	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-17

Customer Description: TG-32

Lab Number: 231985-007

Preparation:

Date Collected: 06/26/2023 12:47 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.008	µg/L	1	0.100	0.008	J1	GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Arsenic	0.16	µg/L	1	0.10	0.03		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Barium	112	µg/L	1	0.20	0.05		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Beryllium	0.354	µg/L	1	0.050	0.007		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Boron	0.032	mg/L	1	0.050	0.007	J1	GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Cadmium	0.022	µg/L	1	0.020	0.004		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Calcium	0.23	mg/L	1	0.05	0.01		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Chromium	0.49	µg/L	1	0.30	0.07		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Cobalt	5.15	µg/L	1	0.020	0.005		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Lead	0.13	µg/L	1	0.20	0.05	J1	GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Lithium	0.0106	mg/L	1	0.00030	0.00007		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Magnesium	1.60	mg/L	1	0.100	0.006		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Mercury	297	ng/L	4	20	7		RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Potassium	0.384	mg/L	1	0.100	0.008		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Selenium	0.17	µg/L	1	0.50	0.04	J1	GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Sodium	5.80	mg/L	1	0.20	0.01		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Strontium	0.00855	mg/L	1	0.00200	0.00005		GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	07/12/2023 01:36	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	2.10	pCi/L	0.27	0.24		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	105	%						
Radium-228	0.80	pCi/L	0.16	0.52		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	80.2	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-17

Customer Description: TG-32

Lab Number: 231985-007-01

Preparation: Dissolved

Date Collected: 06/26/2023 12:47 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Arsenic	0.08	µg/L	1	0.10	0.03	J1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Barium	121	µg/L	1	0.20	0.05		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Beryllium	0.369	µg/L	1	0.050	0.007		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Cadmium	0.023	µg/L	1	0.020	0.004		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Chromium	0.37	µg/L	1	0.30	0.07		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Cobalt	5.50	µg/L	1	0.020	0.005		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Iron	0.006	mg/L	1	0.020	0.003	J1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Lead	0.12	µg/L	1	0.20	0.05	J1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Lithium	0.0111	mg/L	1	0.00030	0.00007		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Manganese	0.00528	mg/L	1	0.00100	0.00008		GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Selenium	0.16	µg/L	1	0.50	0.04	J1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	07/12/2023 01:42	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 231985-008

Preparation:

Date Collected: 06/27/2023 08:42 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Arsenic	0.55	µg/L	1	0.10	0.03		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Barium	89.0	µg/L	1	0.20	0.05		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Beryllium	0.132	µg/L	1	0.050	0.007		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Boron	0.009	mg/L	1	0.050	0.007	J1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Cadmium	0.013	µg/L	1	0.020	0.004	J1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Calcium	0.23	mg/L	1	0.05	0.01		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Chromium	0.57	µg/L	1	0.30	0.07		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Cobalt	0.933	µg/L	1	0.020	0.005		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Lead	0.13	µg/L	1	0.20	0.05	J1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Lithium	0.0138	mg/L	1	0.00030	0.00007		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Magnesium	0.325	mg/L	1	0.100	0.006		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Mercury	10	ng/L	1	5	2		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Potassium	0.776	mg/L	1	0.100	0.008		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Selenium	0.15	µg/L	1	0.50	0.04	J1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Sodium	5.51	mg/L	1	0.20	0.01		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Strontium	0.00483	mg/L	1	0.00200	0.00005		GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	07/12/2023 01:47	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.57	pCi/L	0.14	0.20		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	102	%						
Radium-228	1.96	pCi/L	0.28	0.89		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	69.4	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 231985-008-01

Preparation: Dissolved

Date Collected: 06/27/2023 08:42 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Arsenic	0.05	µg/L	1	0.10	0.03	J1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Barium	91.9	µg/L	1	0.20	0.05		GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Beryllium	0.150	µg/L	1	0.050	0.007		GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Cadmium	0.014	µg/L	1	0.020	0.004	J1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Chromium	0.24	µg/L	1	0.30	0.07	J1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Cobalt	0.966	µg/L	1	0.020	0.005		GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Iron	0.022	mg/L	1	0.020	0.003		GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Lithium	0.0149	mg/L	1	0.00030	0.00007		GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Manganese	0.00426	mg/L	1	0.00100	0.00008		GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Selenium	0.07	µg/L	1	0.50	0.04	J1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/12/2023 01:52	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-22

Customer Description: TG-32

Lab Number: 231985-009

Preparation:

Date Collected: 06/26/2023 09:43 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.04	µg/L	5	0.50	0.04	U1	GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Arsenic	3.4	µg/L	5	0.5	0.2		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Barium	13.5	µg/L	5	1.0	0.3		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Beryllium	7.71	µg/L	5	0.25	0.04		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Boron	0.06	mg/L	5	0.25	0.04	J1	GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Cadmium	1.09	µg/L	5	0.10	0.02		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Calcium	15.5	mg/L	5	0.25	0.05		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Chromium	0.7	µg/L	5	1.5	0.4	J1	GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Cobalt	109	µg/L	5	0.10	0.03		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Lead	<0.3	µg/L	5	1.0	0.3	U1	GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Lithium	0.236	mg/L	5	0.0015	0.0004		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Magnesium	21.4	mg/L	5	0.50	0.03		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Mercury	29	ng/L	1	5	2		RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.5	µg/L	5	2.5	0.5	U1	GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Potassium	4.55	mg/L	5	0.50	0.04		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Selenium	7.0	µg/L	5	2.5	0.2		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Sodium	90.8	mg/L	5	1.00	0.05		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Strontium	0.121	mg/L	5	0.0100	0.0003		GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4
Thallium	0.2	µg/L	5	1.0	0.1	J1	GES	07/12/2023 11:21	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.51	pCi/L	0.27	0.28		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	68.9	%						
Radium-228	2.26	pCi/L	0.17	0.48		ST	07/10/2023 16:11	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	80.6	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-22

Customer Description: TG-32

Lab Number: 231985-009-01

Preparation: Dissolved

Date Collected: 06/26/2023 09:43 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Arsenic	3.44	µg/L	1	0.10	0.03		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Barium	11.6	µg/L	1	0.20	0.05		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Beryllium	5.90	µg/L	1	0.050	0.007		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Cadmium	1.09	µg/L	1	0.020	0.004		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Chromium	0.41	µg/L	1	0.30	0.07		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Cobalt	112	µg/L	1	0.020	0.005		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Iron	37.4	mg/L	5	0.10	0.02		GES	07/12/2023 11:26	EPA 200.8-1994, Rev. 5.4
Lead	0.15	µg/L	1	0.20	0.05	J1	GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Lithium	0.188	mg/L	1	0.00030	0.00007		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Manganese	0.453	mg/L	1	0.00100	0.00008		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Mercury	3	ng/L	1	5	2	J1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Selenium	8.05	µg/L	1	0.50	0.04		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4
Thallium	0.20	µg/L	1	0.20	0.02		GES	07/12/2023 02:02	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-28

Customer Description: TG-32

Lab Number: 231985-010

Preparation:

Date Collected: 06/26/2023 12:26 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.015	µg/L	1	0.100	0.008	J1	GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Arsenic	0.22	µg/L	1	0.10	0.03		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Barium	119	µg/L	1	0.20	0.05		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Beryllium	0.562	µg/L	1	0.050	0.007		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Boron	0.299	mg/L	1	0.050	0.007		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Cadmium	0.054	µg/L	1	0.020	0.004		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Calcium	1.48	mg/L	1	0.05	0.01		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Chromium	0.47	µg/L	1	0.30	0.07		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Cobalt	13.1	µg/L	1	0.020	0.005		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Lead	0.11	µg/L	1	0.20	0.05	J1	GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Lithium	0.0235	mg/L	1	0.00030	0.00007		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Magnesium	2.89	mg/L	1	0.100	0.006		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Mercury	13	ng/L	1	5	2		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Potassium	0.764	mg/L	1	0.100	0.008		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Selenium	0.21	µg/L	1	0.50	0.04	J1	GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Sodium	5.82	mg/L	1	0.20	0.01		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Strontium	0.0204	mg/L	1	0.00200	0.00005		GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/12/2023 02:07	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	2.64	pCi/L	0.31	0.19		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	90.8	%						
Radium-228	1.36	pCi/L	0.16	0.47		ST	07/12/2023 14:00	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	88.9	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-28

Customer Description: TG-32

Lab Number: 231985-010-01

Preparation: Dissolved

Date Collected: 06/26/2023 12:26 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Arsenic	0.07	µg/L	1	0.10	0.03	J1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Barium	117	µg/L	1	0.20	0.05		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Beryllium	0.495	µg/L	1	0.050	0.007		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Cadmium	0.044	µg/L	1	0.020	0.004		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Chromium	0.36	µg/L	1	0.30	0.07		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Cobalt	12.2	µg/L	1	0.020	0.005		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Iron	0.010	mg/L	1	0.020	0.003	J1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Lead	0.08	µg/L	1	0.20	0.05	J1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Lithium	0.0232	mg/L	1	0.00030	0.00007		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Manganese	0.0496	mg/L	1	0.00100	0.00008		GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Mercury	2	ng/L	1	5	2	J1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Selenium	0.21	µg/L	1	0.50	0.04	J1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4
Thallium	0.02	µg/L	1	0.20	0.02	J1	GES	07/12/2023 02:12	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-30

Customer Description: TG-32

Lab Number: 231985-011

Preparation:

Date Collected: 06/26/2023 12:03 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.010	µg/L	1	0.100	0.008	J1	GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Arsenic	0.21	µg/L	1	0.10	0.03		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Barium	76.7	µg/L	1	0.20	0.05		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Beryllium	0.086	µg/L	1	0.050	0.007		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Boron	1.80	mg/L	1	0.050	0.007		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Cadmium	0.008	µg/L	1	0.020	0.004	J1	GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Calcium	0.54	mg/L	1	0.05	0.01		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Chromium	0.57	µg/L	1	0.30	0.07		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Cobalt	3.81	µg/L	1	0.020	0.005		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Lead	0.08	µg/L	1	0.20	0.05	J1	GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Lithium	0.00896	mg/L	1	0.00030	0.00007		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Magnesium	1.92	mg/L	1	0.100	0.006		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Mercury	130	ng/L	2	10	4		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Potassium	0.754	mg/L	1	0.100	0.008		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Selenium	0.45	µg/L	1	0.50	0.04	J1	GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Sodium	71.8	mg/L	1	0.20	0.01		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Strontium	0.00865	mg/L	1	0.00200	0.00005		GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	07/25/2023 20:36	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.12	pCi/L	0.21	0.22		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	90.2	%						
Radium-228	0.56	pCi/L	0.15	0.48		ST	07/12/2023 14:00	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	85.8	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-30

Customer Description: TG-32

Lab Number: 231985-011-01

Preparation: Dissolved

Date Collected: 06/26/2023 12:03 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.008	µg/L	1	0.100	0.008	J1	GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Arsenic	0.15	µg/L	1	0.10	0.03		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Barium	61.6	µg/L	1	0.20	0.05		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Beryllium	0.103	µg/L	1	0.050	0.007		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Cadmium	0.009	µg/L	1	0.020	0.004	J1	GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Chromium	0.30	µg/L	1	0.30	0.07		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Cobalt	3.83	µg/L	1	0.020	0.005		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Iron	0.024	mg/L	1	0.020	0.003		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Lithium	0.00897	mg/L	1	0.00030	0.00007		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Manganese	0.0143	mg/L	1	0.00100	0.00008		GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Selenium	0.35	µg/L	1	0.50	0.04	J1	GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/25/2023 20:41	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-31

Customer Description: TG-32

Lab Number: 231985-012

Preparation:

Date Collected: 06/26/2023 11:01 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Arsenic	0.36	µg/L	1	0.10	0.03		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Barium	32.9	µg/L	1	0.20	0.05		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Beryllium	1.08	µg/L	5	0.25	0.04		GES	07/26/2023 11:44	EPA 200.8-1994, Rev. 5.4
Boron	0.025	mg/L	1	0.050	0.007	J1	GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Cadmium	0.064	µg/L	1	0.020	0.004		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Calcium	2.69	mg/L	1	0.05	0.01		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Chromium	0.63	µg/L	1	0.30	0.07		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Cobalt	10.1	µg/L	1	0.020	0.005		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Lead	0.33	µg/L	1	0.20	0.05		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Lithium	0.0889	mg/L	5	0.0015	0.0004		GES	07/26/2023 11:44	EPA 200.8-1994, Rev. 5.4
Magnesium	3.92	mg/L	1	0.100	0.006		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Mercury	77	ng/L	1	5	2		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Potassium	1.55	mg/L	1	0.100	0.008		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Selenium	0.78	µg/L	1	0.50	0.04		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Sodium	31.1	mg/L	1	0.20	0.01		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Strontium	0.0389	mg/L	1	0.00200	0.00005		GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4
Thallium	0.09	µg/L	1	0.20	0.02	J1	GES	07/25/2023 20:46	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	2.21	pCi/L	0.29	0.26		TTP	07/07/2023 13:34	SW-846 9315-1986, Rev. 0
Carrier Recovery	90.9	%						
Radium-228	2.08	pCi/L	0.16	0.44		ST	07/12/2023 14:00	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	82.6	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-31

Customer Description: TG-32

Lab Number: 231985-012-01

Preparation: Dissolved

Date Collected: 06/26/2023 11:01 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Arsenic	0.26	µg/L	1	0.10	0.03		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Barium	31.1	µg/L	1	0.20	0.05		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Beryllium	1.06	µg/L	5	0.25	0.04		GES	07/26/2023 11:49	EPA 200.8-1994, Rev. 5.4
Cadmium	0.065	µg/L	1	0.020	0.004		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Chromium	0.34	µg/L	1	0.30	0.07		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Cobalt	9.88	µg/L	1	0.020	0.005		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Iron	0.109	mg/L	1	0.020	0.003		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Lead	0.28	µg/L	1	0.20	0.05		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Lithium	0.0871	mg/L	5	0.0015	0.0004		GES	07/26/2023 11:49	EPA 200.8-1994, Rev. 5.4
Manganese	0.0257	mg/L	1	0.00100	0.00008		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Mercury	7	ng/L	1	5	2		RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Selenium	0.80	µg/L	1	0.50	0.04		GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4
Thallium	0.08	µg/L	1	0.20	0.02	J1	GES	07/25/2023 20:51	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Reissued

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-32

Customer Description: TG-32

Lab Number: 231985-013

Preparation:

Date Collected: 06/26/2023 09:30 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.012	µg/L	1	0.100	0.008	J1	GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Arsenic	1.53	µg/L	1	0.10	0.03		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Barium	23.4	µg/L	1	0.20	0.05		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Beryllium	0.905	µg/L	1	0.050	0.007		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Boron	0.595	mg/L	1	0.050	0.007		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Cadmium	0.042	µg/L	1	0.020	0.004		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Calcium	5.26	mg/L	1	0.05	0.01		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Chromium	0.61	µg/L	1	0.30	0.07		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Cobalt	15.9	µg/L	1	0.020	0.005		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Lead	0.17	µg/L	1	0.20	0.05	J1	GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Lithium	0.0500	mg/L	1	0.00030	0.00007		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Magnesium	5.74	mg/L	1	0.100	0.006		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Mercury	760	ng/L	10	50	20		RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Potassium	2.57	mg/L	1	0.100	0.008		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Selenium	1.59	µg/L	1	0.50	0.04		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Sodium	27.0	mg/L	1	0.20	0.01		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Strontium	0.0736	mg/L	1	0.00200	0.00005		GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4
Thallium	0.11	µg/L	1	0.20	0.02	J1	GES	07/25/2023 20:56	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.41	pCi/L	0.20	0.17		TTP	07/11/2023 12:45	SW-846 9315-1986, Rev. 0
Carrier Recovery	87.4	%						
Radium-228	2.52	pCi/L	0.17	0.46		ST	07/12/2023 14:00	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	85.3	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-32

Customer Description: TG-32

Lab Number: 231985-013-01

Preparation: Dissolved

Date Collected: 06/26/2023 09:30 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Arsenic	1.29	µg/L	1	0.10	0.03		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Barium	23.4	µg/L	1	0.20	0.05		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Beryllium	1.08	µg/L	1	0.050	0.007		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Cadmium	0.064	µg/L	1	0.020	0.004		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Chromium	0.38	µg/L	1	0.30	0.07		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Cobalt	17.1	µg/L	1	0.020	0.005		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Iron	10.7	mg/L	1	0.020	0.003		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Lead	0.11	µg/L	1	0.20	0.05	J1	GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Lithium	0.0527	mg/L	1	0.00030	0.00007		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Manganese	0.0782	mg/L	1	0.00100	0.00008		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Mercury	27	ng/L	1	5	2		RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Selenium	1.74	µg/L	1	0.50	0.04		GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4
Thallium	0.10	µg/L	1	0.20	0.02	J1	GES	07/25/2023 21:01	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 231985-014

Preparation:

Date Collected: 06/26/2023 10:34 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.021	µg/L	1	0.100	0.008	J1	GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Arsenic	1.08	µg/L	1	0.10	0.03		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Barium	41.4	µg/L	1	0.20	0.05		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Beryllium	1.48	µg/L	5	0.25	0.04		GES	07/26/2023 11:54	EPA 200.8-1994, Rev. 5.4
Boron	0.114	mg/L	1	0.050	0.007		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Cadmium	0.056	µg/L	1	0.020	0.004		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Calcium	1.73	mg/L	1	0.05	0.01		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Chromium	0.39	µg/L	1	0.30	0.07		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Cobalt	10.7	µg/L	1	0.020	0.005		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Lead	0.48	µg/L	1	0.20	0.05		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Lithium	0.0246	mg/L	5	0.0015	0.0004		GES	07/26/2023 11:54	EPA 200.8-1994, Rev. 5.4
Magnesium	4.05	mg/L	1	0.100	0.006		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Mercury	5610	ng/L	100	500	200		RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Potassium	0.271	mg/L	1	0.100	0.008		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Selenium	4.21	µg/L	1	0.50	0.04		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Sodium	16.8	mg/L	1	0.20	0.01		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Strontium	0.0303	mg/L	1	0.00200	0.00005		GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/25/2023 21:07	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.78	pCi/L	0.17	0.24		TTP	07/11/2023 12:45	SW-846 9315-1986, Rev. 0
Carrier Recovery	86.1	%						
Radium-228	1.18	pCi/L	0.16	0.48		ST	07/12/2023 14:00	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	87.7	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 231985-014-01

Preparation: Dissolved

Date Collected: 06/26/2023 10:34 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.008	µg/L	1	0.100	0.008	J1	GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Arsenic	1.07	µg/L	1	0.10	0.03		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Barium	40.5	µg/L	1	0.20	0.05		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Beryllium	1.17	µg/L	1	0.050	0.007		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Cadmium	0.053	µg/L	1	0.020	0.004		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Chromium	0.29	µg/L	1	0.30	0.07	J1	GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Cobalt	10.4	µg/L	1	0.020	0.005		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Iron	0.014	mg/L	1	0.020	0.003	J1	GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Lead	0.26	µg/L	1	0.20	0.05		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Lithium	0.0202	mg/L	1	0.00030	0.00007		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Manganese	0.00629	mg/L	1	0.00100	0.00008		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Mercury	670	ng/L	10	50	20		RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Selenium	4.09	µg/L	1	0.50	0.04		GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/25/2023 21:12	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: Duplicate - 1

Customer Description: TG-32

Lab Number: 231985-015

Preparation:

Date Collected: 06/26/2023 13:00 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Arsenic	1.55	µg/L	1	0.10	0.03		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Barium	39.1	µg/L	1	0.20	0.05		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Beryllium	0.223	µg/L	1	0.050	0.007		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Boron	0.069	mg/L	1	0.050	0.007		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Calcium	10.5	mg/L	1	0.05	0.01		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Chromium	0.29	µg/L	1	0.30	0.07	J1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Cobalt	53.7	µg/L	1	0.020	0.005		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Lithium	0.141	mg/L	1	0.00030	0.00007		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Magnesium	14.9	mg/L	1	0.100	0.006		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Potassium	4.98	mg/L	1	0.100	0.008		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Sodium	21.3	mg/L	1	0.20	0.01		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Strontium	0.0691	mg/L	1	0.00200	0.00005		GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	07/25/2023 21:17	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: Duplicate - 1

Customer Description: TG-32

Lab Number: 231985-015-01

Preparation: Dissolved

Date Collected: 06/26/2023 13:00 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Arsenic	1.17	µg/L	1	0.10	0.03		GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Barium	39.6	µg/L	1	0.20	0.05		GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Beryllium	0.210	µg/L	1	0.050	0.007		GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Chromium	0.28	µg/L	1	0.30	0.07	J1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Cobalt	53.1	µg/L	1	0.020	0.005		GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Iron	43.0	mg/L	5	0.10	0.02		GES	07/26/2023 12:04	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Lithium	0.141	mg/L	1	0.00030	0.00007		GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Manganese	0.520	mg/L	1	0.00100	0.00008		GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/06/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4
Thallium	0.02	µg/L	1	0.20	0.02	J1	GES	07/25/2023 21:22	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: Equipment Blank

Customer Description: TG-32

Lab Number: 231985-016

Preparation:

Date Collected: 06/26/2023 09:40 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Arsenic	<0.03	µg/L	1	0.10	0.03	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Barium	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Beryllium	0.027	µg/L	1	0.050	0.007	J1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Boron	<0.007	mg/L	1	0.050	0.007	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Calcium	<0.01	mg/L	1	0.05	0.01	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Chromium	0.32	µg/L	1	0.30	0.07		GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Cobalt	0.037	µg/L	1	0.020	0.005		GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Lithium	<0.00007	mg/L	1	0.00030	0.00007	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Magnesium	<0.006	mg/L	1	0.100	0.006	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Potassium	<0.008	mg/L	1	0.100	0.008	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Sodium	<0.01	mg/L	1	0.20	0.01	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Strontium	<0.00005	mg/L	1	0.00200	0.00005	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	07/25/2023 21:27	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audin: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Customer Sample ID: Field Blank

Customer Description: TG-32

Lab Number: 231985-017

Preparation:

Date Collected: 06/26/2023 12:25 EDT

Date Received: 06/30/2023 11:30 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Arsenic	<0.03	µg/L	1	0.10	0.03	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Barium	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Beryllium	0.015	µg/L	1	0.050	0.007	J1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Boron	<0.007	mg/L	1	0.050	0.007	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Calcium	<0.01	mg/L	1	0.05	0.01	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Chromium	0.53	µg/L	1	0.30	0.07		GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Cobalt	0.036	µg/L	1	0.020	0.005		GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Lithium	<0.00007	mg/L	1	0.00030	0.00007	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Magnesium	<0.006	mg/L	1	0.100	0.006	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	07/10/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Potassium	<0.008	mg/L	1	0.100	0.008	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Sodium	<0.01	mg/L	1	0.20	0.01	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Strontium	<0.00005	mg/L	1	0.00200	0.00005	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	07/25/2023 21:32	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.20	pCi/L	0.08	0.19		TTP	07/11/2023 12:45	SW-846 9315-1986, Rev. 0
Carrier Recovery	87.8	%						
Radium-228	-0.02	pCi/L	0.13	0.46		ST	07/12/2023 14:00	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	89.6	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

231985

Job Comments:

Report originally issued 8/4/23. Report reissued 10/29/23 to correct rounding errors on report and EDD.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Reissued

Job ID: 231985

Customer: Pirkey Power Station

Date Reported: 10/29/2023

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.

Data Qualifier Legend

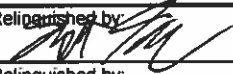
J1 - Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

U1 - Not detected at or above method detection limit (MDL).

Doian Chemical Laboratory (DCL)
4001 Bixby Road
Groveport, Ohio 43125
Michael Ohlinger (614-836-4184)
Contacts: Dave Conover (614-836-4219)

Chain of Custody Record

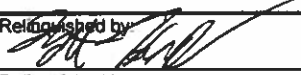
Program: Coal Combustion Residuals (CCR)

Project Name: Pirkey PP CCR						Site Contact:					Date:		For Lab Use Only:		
Contact Name: Leslie Fuerschbach						Analysis Turnaround Time (in Calendar Days) ☉ Routine (28 days for Monitoring Wells)					COC/Order #: 231985				
Contact Phone: 318-673-2744															
Sampler(s): Matt Hamilton Kenny McDonald															
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	250 mL bottle, pH<2, HNO ₃	Field-filter 250 mL bottle, then pH<2, HNO ₃	Three (six every 10th*) 1 L bottles, pH<2, HNO ₃	250 mL Glass bottle, HCL**, pH<2	250 mL Glass bottle, HCL**, pH<2	Sample Specific Notes:			
AD-2	6/26/2023	1042	G	GW	7		X	X	X	X	X				
AD-3	6/27/2023	1101	G	GW	7		X	X	X	X	X				
AD-4	6/27/2023	1110	G	GW	7		X	X	X	X	X				
AD-7	6/27/2023	951	G	GW	7		X	X	X	X	X				
AD-12	6/26/2023	755	G	GW	7		X	X	X	X	X				
AD-13	6/26/2023	728	G	GW	10		X	X	X	X	X				
AD-17	6/26/2023	1147	G	GW	7		X	X	X	X	X				
AD-18	6/27/2023	742	G	GW	7		X	X	X	X	X				
AD-22	6/26/2023	843	G	GW	7		X	X	X	X	X				
AD-28	6/26/2023	1126	G	GW	7		X	X	X	X	X				
AD-30	6/26/2023	1103	G	GW	7		X	X	X	X	X				
AD-31	6/26/2023	1001	G	GW	7		X	X	X	X	X				
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	4	2	F2				
* Six 1L Bottles must be collected for Radium for every 10th sample.															
Special Instructions/QC Requirements & Comments: TG-32 needed															
Relinquished by: 		Company: Esgk		Date/Time: 6-28-23 160		Received by:					Date/Time:				
Relinquished by:		Company:		Date/Time:		Received by:					Date/Time:				
Relinquished by:		Company:		Date/Time:		Received in Laboratory by: Michael Ohlinger					Date/Time: 6/30/23 11:30 Am				

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Contacts: Michael Ohlinger (614-836-4184)
 Dave Conover (614-836-4219)

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Project Name: Pirkey PP CCR Contact Name: Leslie Fuerschbach Contact Phone: 318-673-2744 Sampler(s): Matt Hamilton Kenny McDonald						Site Contact: _____ Date: _____					For Lab Use Only: COC/Order #: _____			
						Analysis Turnaround Time (in Calendar Days) Ⓒ Routine (28 days for Monitoring Wells)						250 mL bottle, pH<2, HNO ₃	Field-filter 250 mL bottle, then pH<2, HNO ₃	Three (six every 10th*) 1 L bottles, pH<2, HNO ₃
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.									
AD-32	6/28/2023	830	G	GW	7		X	X	X	X	X			
AD-33	6/23/2023	934	G	GW	7		X	X	X	X	X			
Duplicate - 1	6/26/2023	1200	G	GW	4		X	X		X	X			
Equipment Blank	6/26/2023	840	G	GW	2		X			X				
Field Blank	6/26/2023	1125	G	GW	5		X		X	X				
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field						4	F4	4	2	F2				
* Six 1L Bottles must be collected for Radium for every 10th sample.														
Special Instructions/QC Requirements & Comments: <div style="text-align: center; font-weight: bold; font-size: 1.2em;">TG-32 needed</div>														
Relinquished by: 			Company: <i>Eske</i>			Date/Time: <i>6-28-23 1600</i>			Received by:			Date/Time:		
Relinquished by:			Company:			Date/Time:			Received by:			Date/Time:		
Relinquished by:			Company:			Date/Time:			Received in Laboratory by: <i>Michael Ohlinger</i>			Date/Time: <i>6/30/23 11:30 AM</i>		

Radium Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

<u>Tamisha Palmer</u>		<u>Chemical Laboratory Technician, Prin</u>	<u>07/11/2023</u>
Name (printed)	Signature	Official Title	Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power
Reviewer Name: Tamisha Palmer
LRC Date: 07/011/2023
Laboratory Job Number: 231985
Prep Batch Number(s): PB23070304

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	No	ER1
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	NA	
	I	Were analytical duplicates analyzed at the appropriate frequency?	NA	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	NA	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power
Reviewer Name: Tamisha Palmer
LRC Date: 07/011/2023
Laboratory Job Number: 231985
Prep Batch Number(s): PB23070304

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Radium Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- NA R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Tamisha Palmer

Name (printed)



Signature

Chemical Technician Prin

Official Title

07/13/2023

Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power
Reviewer Name: Tamisha Palmer
LRC Date: 07/13/2023
Laboratory Job Number: 231985, 231991
Prep Batch Number(s): PB23070606

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	NA	
	I	Were analytical duplicates analyzed at the appropriate frequency?	NA	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	NA	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference effects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power
Reviewer Name: Tamisha Palmer
LRC Date: 07/13/2023
Laboratory Job Number: 231985, 231991
Prep Batch Number(s): PB23070606

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

ICP-MS Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

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 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

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Jonathan Barnhill

Name (printed)



Signature

Lab Supervisor

Official Title

08/03/2023

Date

ICP-MS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Jonathan Barnhill
LRC Date: 08/03/2023
Laboratory Job Number: 231985
Prep Batch Number(s): PB23070502 PB23070503 QC2307072 QC2307106 QC2307184 QC2307222

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	YES	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	No	ER1
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

ICP-MS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	YES	
	I	Were MS/MSD RPDs within laboratory QC limits?	YES	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

ICP-MS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey CCR

Reviewer Name: Jonathan Barnhill

LRC Date: 08/03/2023

Laboratory Job Number: 231985

Prep Batch Number(s): PB23070502 PB23070503 QC2307072 QC2307106 QC2307184 QC2307222

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER2
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	Yes	
	I	Were ion abundance data within the method-required QC limits?	Yes	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	Yes	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

ICP-MS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
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	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
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	I	Are the procedures for compound/analyte identification documented?	Yes	
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	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
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S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Radium Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

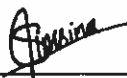
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 - (c) Preparation methods
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- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
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 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

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Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Sunita Timsina

Name (printed)



Signature

Chemist Associate

Official Title

07/12/2023

Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power Station
Reviewer Name: Sunita Timsina
LRC Date: 07/12/2023
Laboratory Job Number: 231985
Prep Batch Number(s): PB23070305, PB23070306, PB23070605

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	No	ER1
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power Station
Reviewer Name: Sunita Timsina
LRC Date: 07/12/2023
Laboratory Job Number: 231985
Prep Batch Number(s): PB23070305, PB23070306, PB23070605

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Mercury Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: _____

Project Name: _____

Reviewer Name: _____

LRC Date: _____

Laboratory Job Number: _____

Prep Batch Number(s): _____

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?		
		Were all departures from standard conditions described in an exception report?		
R2	O, I	Sample and quality control (QC) identification		
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?		
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?		
R3	O, I	Test reports		
		Were all samples prepared and analyzed within holding times?		
		Other than those results < MQL, were all other raw values bracketed by calibration standards?		
		Were calculations checked by a peer or supervisor?		
		Were all analyte identifications checked by a peer or supervisor?		
		Were sample quantitation limits reported for all analytes not detected?		
		Were all results for soil and sediment samples reported on a dry weight basis?		
		Was % moisture (or solids) reported for all soil and sediment samples?		
		If required for the project, TICs reported?		
R4	O	Surrogate recovery data		
		Were surrogates added prior to extraction?		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?		
R5	O, I	Test reports/summary forms for blank samples		
		Were appropriate type(s) of blanks analyzed?		
		Were blanks analyzed at the appropriate frequency?		

Mercury Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?		
		Were blank concentrations < MQL?		
R6	O, I	Laboratory control samples (LCS):		
		Were all COCs included in the LCS?		
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?		
		Were LCSs analyzed at the required frequency?		
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?		
		Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?		
		Was the LCSD RPD within QC limits?		
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
		Were the project/method specified analytes included in the MS and MSD?		
		Were MS/MSD analyzed at the appropriate frequency?		
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		
		Were MS/MSD RPDs within laboratory QC limits?		
R8	O, I	Analytical duplicate data		
		Were appropriate analytical duplicates analyzed for each matrix?		
		Were analytical duplicates analyzed at the appropriate frequency?		
		Were RPDs or relative standard deviations within the laboratory QC limits?		
R9	O, I	Method quantitation limits (MQLs):		
		Are the MQLs for each method analyte included in the laboratory data package?		
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?		
		Are unadjusted MQLs included in the laboratory data package?		
R10	O, I	Other problems/anomalies		
		Are all known problems/anomalies/special conditions noted in this LRC and ER?		
		Were all necessary corrective actions performed for the reported data?		
		Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?		

Mercury Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: _____

Project Name: _____

Reviewer Name: _____

LRC Date: _____

Laboratory Job Number: _____

Prep Batch Number(s): _____

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
		Were response factors and/or relative response factors for each analyte within QC limits?		
		Were percent RSDs or correlation coefficient criteria met?		
		Was the number of standards recommended in the method used for all analytes?		
		Were all points generated between the lowest and highest standard used to calculate the curve?		
		Are ICAL data available for all instruments used?		
		Has the initial calibration curve been verified using an appropriate second source standard?		
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
		Was the CCV analyzed at the method-required frequency?		
		Were percent differences for each analyte within the method-required QC limits?		
		Was the ICAL curve verified for each analyte?		
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?		
S3	O	Mass spectral tuning:		
		Was the appropriate compound for the method used for tuning?		
		Were ion abundance data within the method-required QC limits?		
S4	O	Internal standards (IS):		
		Were IS area counts and retention times within the method-required QC limits?		
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?		
		Were data associated with manual integrations flagged on the raw data?		

Mercury Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
		Did dual column confirmation results meet the method-required QC?		
S7	O	Tentatively identified compounds (TICs):		
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?		
S8	I	Interference Check Sample (ICS) results:		
		Were percent recoveries within method QC limits?		
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		
S10	O, I	Method detection limit (MDL) studies		
		Was a MDL study performed for each reported analyte?		
		Is the MDL either adjusted or supported by the analysis of DCSs?		
S11	O, I	Proficiency test reports:		
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?		
S12	O, I	Standards documentation		
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?		
S13	O, I	Compound/analyte identification procedures		
		Are the procedures for compound/analyte identification documented?		
S14	O, I	Demonstration of analyst competency (DOC)		
		Was DOC conducted consistent with NELAC Chapter 5C?		
		Is documentation of the analyst's competency up-to-date and on file?		
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
		Are all the methods used to generate the data documented, verified, and validated, where applicable?		
S16	O, I	Laboratory standard operating procedures (SOPs):		
		Are laboratory SOPs current and on file for each method performed?		



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-3

Customer Description: TG-32

Lab Number: 233279-001

Preparation:

Date Collected: 10/18/2023 12:47 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Arsenic	0.57	µg/L	1	0.10	0.03		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Barium	57.7	µg/L	1	0.20	0.05		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Beryllium	0.174	µg/L	1	0.050	0.007		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Boron	0.036	mg/L	1	0.050	0.007	J1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Cadmium	0.016	µg/L	1	0.020	0.004	J1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Calcium	4.04	mg/L	1	0.05	0.01		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Chromium	0.33	µg/L	1	0.30	0.07		GES	11/06/2023 16:07	EPA 200.8-1994, Rev. 5.4
Cobalt	3.70	µg/L	1	0.020	0.005		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Lead	0.12	µg/L	1	0.20	0.05	J1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Lithium	0.0587	mg/L	1	0.00030	0.00007		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Magnesium	2.07	mg/L	1	0.100	0.006		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Potassium	2.46	mg/L	1	0.100	0.008		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Selenium	0.04	µg/L	1	0.50	0.04	J1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Sodium	9.00	mg/L	1	0.20	0.01		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Strontium	0.0279	mg/L	1	0.00200	0.00005		GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4
Thallium	0.05	µg/L	1	0.20	0.02	J1	GES	11/02/2023 19:29	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.64	pCi/L	0.14	0.19		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	83.6	%						
Radium-228	0.55	pCi/L	0.21	0.70		ST	11/16/2023 16:35	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	64.1	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-3

Customer Description: TG-32

Lab Number: 233279-001-01

Preparation: Dissolved

Date Collected: 10/18/2023 12:47 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Arsenic	0.37	µg/L	1	0.10	0.03		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Barium	59.8	µg/L	1	0.20	0.05		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Beryllium	0.171	µg/L	1	0.050	0.007		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Boron	0.041	mg/L	1	0.050	0.007	J1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Cadmium	0.015	µg/L	1	0.020	0.004	J1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Calcium	4.26	mg/L	1	0.05	0.01		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Chromium	0.32	µg/L	1	0.30	0.07		GES	11/06/2023 16:12	EPA 200.8-1994, Rev. 5.4
Cobalt	3.97	µg/L	1	0.020	0.005		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Iron	2.85	mg/L	1	0.020	0.003		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Lithium	0.0610	mg/L	1	0.00030	0.00007		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Magnesium	2.20	mg/L	1	0.100	0.006		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Manganese	0.0532	mg/L	1	0.00100	0.00008		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Potassium	2.59	mg/L	1	0.100	0.008		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Sodium	9.46	mg/L	1	0.20	0.01		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Strontium	0.0291	mg/L	1	0.00200	0.00005		GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4
Thallium	0.07	µg/L	1	0.20	0.02	J1	GES	11/02/2023 19:45	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-7R

Customer Description: TG-32

Lab Number: 233279-002

Preparation:

Date Collected: 10/17/2023 10:08 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Arsenic	1.22	µg/L	1	0.10	0.03		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Barium	64.2	µg/L	1	0.20	0.05		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Beryllium	1.64	µg/L	1	0.050	0.007		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Boron	0.089	mg/L	1	0.050	0.007		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Cadmium	0.324	µg/L	1	0.020	0.004		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Calcium	2.70	mg/L	1	0.05	0.01		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Chromium	0.64	µg/L	1	0.30	0.07		GES	11/06/2023 16:17	EPA 200.8-1994, Rev. 5.4
Cobalt	14.2	µg/L	1	0.020	0.005		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Lead	0.22	µg/L	1	0.20	0.05		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Lithium	0.0402	mg/L	1	0.00030	0.00007		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Magnesium	4.42	mg/L	1	0.100	0.006		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Mercury	41	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Potassium	1.52	mg/L	1	0.100	0.008		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Selenium	2.90	µg/L	1	0.50	0.04		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Sodium	19.0	mg/L	1	0.20	0.01		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Strontium	0.0325	mg/L	1	0.00200	0.00005		GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4
Thallium	0.14	µg/L	1	0.20	0.02	J1	GES	11/02/2023 19:50	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.25	pCi/L	0.18	0.13		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	92.0	%						
Radium-228	2	pCi/L	0.20	0.59		ST	11/16/2023 16:35	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	69.8	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-7R

Customer Description: TG-32

Lab Number: 233279-002-01

Preparation: Dissolved

Date Collected: 10/17/2023 10:08 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Arsenic	0.94	µg/L	1	0.10	0.03		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Barium	66.6	µg/L	1	0.20	0.05		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Beryllium	1.63	µg/L	1	0.050	0.007		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Boron	0.089	mg/L	1	0.050	0.007		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Cadmium	0.348	µg/L	1	0.020	0.004		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Calcium	2.87	mg/L	1	0.05	0.01		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Chromium	0.25	µg/L	1	0.30	0.07	J1	GES	11/06/2023 16:22	EPA 200.8-1994, Rev. 5.4
Cobalt	14.9	µg/L	1	0.020	0.005		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Iron	1.68	mg/L	1	0.020	0.003		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Lead	0.15	µg/L	1	0.20	0.05	J1	GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Lithium	0.0408	mg/L	1	0.00030	0.00007		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Magnesium	4.65	mg/L	1	0.100	0.006		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Manganese	0.0412	mg/L	1	0.00100	0.00008		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Mercury	11	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Potassium	1.59	mg/L	1	0.100	0.008		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Selenium	2.84	µg/L	1	0.50	0.04		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Sodium	20.0	mg/L	1	0.20	0.01		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Strontium	0.0322	mg/L	1	0.00200	0.00005		GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4
Thallium	0.14	µg/L	1	0.20	0.02	J1	GES	11/02/2023 19:55	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 233279-003

Preparation:

Date Collected: 10/17/2023 10:41 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.01	µg/L	1	0.100	0.008	J1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Arsenic	0.06	µg/L	1	0.10	0.03	J1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Barium	23.6	µg/L	1	0.20	0.05		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Beryllium	0.142	µg/L	1	0.050	0.007		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Boron	0.015	mg/L	1	0.050	0.007	J1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Cadmium	0.006	µg/L	1	0.020	0.004	J1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Calcium	0.27	mg/L	1	0.05	0.01		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Chromium	0.31	µg/L	1	0.30	0.07		GES	11/06/2023 16:27	EPA 200.8-1994, Rev. 5.4
Cobalt	1.19	µg/L	1	0.020	0.005		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Lead	0.07	µg/L	1	0.20	0.05	J1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Lithium	0.00891	mg/L	1	0.00030	0.00007		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Magnesium	0.389	mg/L	1	0.100	0.006		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Potassium	0.431	mg/L	1	0.100	0.008		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Selenium	0.21	µg/L	1	0.50	0.04	J1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Sodium	4.93	mg/L	1	0.20	0.01		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Strontium	0.00286	mg/L	1	0.00200	0.00005		GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	11/02/2023 20:00	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.51	pCi/L	0.12	0.16		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	84.2	%						
Radium-228	0.57	pCi/L	0.22	0.72		ST	11/16/2023 16:35	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	62.5	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 233279-003-01

Preparation: Dissolved

Date Collected: 10/17/2023 10:41 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.012	µg/L	1	0.100	0.008	J1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Arsenic	0.06	µg/L	1	0.10	0.03	J1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Barium	23.4	µg/L	1	0.20	0.05		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Beryllium	0.133	µg/L	1	0.050	0.007		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Boron	0.014	mg/L	1	0.050	0.007	J1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Cadmium	0.008	µg/L	1	0.020	0.004	J1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Calcium	0.30	mg/L	1	0.05	0.01		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Chromium	0.26	µg/L	1	0.30	0.07	J1	GES	11/06/2023 16:32	EPA 200.8-1994, Rev. 5.4
Cobalt	1.17	µg/L	1	0.020	0.005		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Iron	0.021	mg/L	1	0.020	0.003		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Lead	0.07	µg/L	1	0.20	0.05	J1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Lithium	0.00847	mg/L	1	0.00030	0.00007		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Magnesium	0.397	mg/L	1	0.100	0.006		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Manganese	0.00420	mg/L	1	0.00100	0.00008		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Potassium	0.427	mg/L	1	0.100	0.008		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Selenium	0.13	µg/L	1	0.50	0.04	J1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Sodium	4.88	mg/L	1	0.20	0.01		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Strontium	0.00295	mg/L	1	0.00200	0.00005		GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	11/02/2023 20:05	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 233279-004

Preparation:

Date Collected: 10/17/2023 09:11 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Arsenic	5.71	µg/L	1	0.10	0.03		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Barium	41.2	µg/L	1	0.20	0.05		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Beryllium	0.559	µg/L	1	0.050	0.007		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Boron	0.068	mg/L	1	0.050	0.007		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Calcium	9.49	mg/L	1	0.05	0.01		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Chromium	0.22	µg/L	1	0.30	0.07	J1	GES	11/06/2023 16:37	EPA 200.8-1994, Rev. 5.4
Cobalt	47.6	µg/L	1	0.020	0.005		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Lithium	0.137	mg/L	1	0.00030	0.00007		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Magnesium	14.1	mg/L	1	0.100	0.006		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Potassium	5.13	mg/L	1	0.100	0.008		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Selenium	0.13	µg/L	1	0.50	0.04	J1	GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Sodium	22.0	mg/L	1	0.20	0.01		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Strontium	0.0428	mg/L	1	0.00200	0.00005		GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4
Thallium	0.02	µg/L	1	0.20	0.02	J1	GES	11/02/2023 20:10	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.05	pCi/L	0.17	0.14		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	84.7	%						
Radium-228	-0.65	pCi/L	0.22	0.76		ST	11/16/2023 16:35	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	67.0	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 233279-004-01

Preparation: Dissolved

Date Collected: 10/17/2023 09:11 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Arsenic	1.80	µg/L	1	0.10	0.03		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Barium	39.0	µg/L	1	0.20	0.05		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Beryllium	0.267	µg/L	1	0.050	0.007		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Boron	0.068	mg/L	1	0.050	0.007		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Calcium	9.34	mg/L	1	0.05	0.01		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Chromium	0.5	µg/L	2	0.6	0.1	J1	GES	11/06/2023 16:43	EPA 200.8-1994, Rev. 5.4
Cobalt	46.7	µg/L	1	0.020	0.005		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Iron	44.3	mg/L	2	0.040	0.006		GES	11/06/2023 16:43	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Lithium	0.135	mg/L	1	0.00030	0.00007		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Magnesium	13.8	mg/L	1	0.100	0.006		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Manganese	0.480	mg/L	1	0.00100	0.00008		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Potassium	5.04	mg/L	1	0.100	0.008		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Sodium	21.4	mg/L	1	0.20	0.01		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Strontium	0.0419	mg/L	1	0.00200	0.00005		GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	11/02/2023 20:15	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-17

Customer Description: TG-32

Lab Number: 233279-005

Preparation:

Date Collected: 10/17/2023 13:11 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Arsenic	0.22	µg/L	1	0.10	0.03		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Barium	249	µg/L	1	0.20	0.05		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Beryllium	0.667	µg/L	1	0.050	0.007		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Boron	0.023	mg/L	1	0.050	0.007	J1	GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Cadmium	0.054	µg/L	1	0.020	0.004		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Calcium	0.94	mg/L	1	0.05	0.01		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Chromium	0.31	µg/L	1	0.30	0.07		GES	11/06/2023 16:48	EPA 200.8-1994, Rev. 5.4
Cobalt	11.0	µg/L	1	0.020	0.005		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Lead	0.12	µg/L	1	0.20	0.05	J1	GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Lithium	0.0244	mg/L	1	0.00030	0.00007		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Magnesium	4.05	mg/L	1	0.100	0.006		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Mercury	196	ng/L	4	20	7		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Potassium	1.08	mg/L	1	0.100	0.008		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Selenium	0.58	µg/L	1	0.50	0.04		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Sodium	7.75	mg/L	1	0.20	0.01		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Strontium	0.0193	mg/L	1	0.00200	0.00005		GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	11/02/2023 20:21	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	2.11	pCi/L	0.23	0.13		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	96.7	%						
Radium-228	3.28	pCi/L	0.19	0.53		ST	11/16/2023 16:35	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	81.2	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-17

Customer Description: TG-32

Lab Number: 233279-005-01

Preparation: Dissolved

Date Collected: 10/17/2023 13:11 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Arsenic	0.20	µg/L	1	0.10	0.03		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Barium	251	µg/L	1	0.20	0.05		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Beryllium	0.664	µg/L	1	0.050	0.007		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Boron	0.023	mg/L	1	0.050	0.007	J1	GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Cadmium	0.051	µg/L	1	0.020	0.004		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Calcium	1.01	mg/L	1	0.05	0.01		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Chromium	0.28	µg/L	1	0.30	0.07	J1	GES	11/06/2023 16:53	EPA 200.8-1994, Rev. 5.4
Cobalt	11.2	µg/L	1	0.020	0.005		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Iron	0.032	mg/L	1	0.020	0.003		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Lead	0.14	µg/L	1	0.20	0.05	J1	GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Lithium	0.0243	mg/L	1	0.00030	0.00007		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Magnesium	4.15	mg/L	1	0.100	0.006		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Manganese	0.0381	mg/L	1	0.00100	0.00008		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Potassium	1.12	mg/L	1	0.100	0.008		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Selenium	0.63	µg/L	1	0.50	0.04		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Sodium	7.96	mg/L	1	0.20	0.01		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Strontium	0.0195	mg/L	1	0.00200	0.00005		GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	11/02/2023 20:26	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 233279-006

Preparation:

Date Collected: 10/18/2023 08:47 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.023	µg/L	1	0.100	0.008	J1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Arsenic	0.43	µg/L	1	0.10	0.03		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Barium	84.0	µg/L	1	0.20	0.05		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Beryllium	0.127	µg/L	1	0.050	0.007		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Boron	0.011	mg/L	1	0.050	0.007	J1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Cadmium	0.018	µg/L	1	0.020	0.004	J1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Calcium	0.35	mg/L	1	0.05	0.01		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Chromium	0.52	µg/L	1	0.30	0.07		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Cobalt	1.26	µg/L	1	0.020	0.005		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Lead	0.12	µg/L	1	0.20	0.05	J1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Lithium	0.0186	mg/L	1	0.00030	0.00007		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Magnesium	0.407	mg/L	1	0.100	0.006		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Mercury	84	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Potassium	1.03	mg/L	1	0.100	0.008		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Selenium	0.17	µg/L	1	0.50	0.04	J1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Sodium	5.98	mg/L	1	0.20	0.01		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Strontium	0.00612	mg/L	1	0.00200	0.00005		GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4
Thallium	0.05	µg/L	1	0.20	0.02	J1	GES	11/02/2023 21:53	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.78	pCi/L	0.14	0.13		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	96.4	%						
Radium-228	0.49	pCi/L	0.17	0.58		ST	11/16/2023 16:35	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	64.9	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 233279-006-01

Preparation: Dissolved

Date Collected: 10/18/2023 08:47 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Arsenic	0.06	µg/L	1	0.10	0.03	J1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Barium	82.9	µg/L	1	0.20	0.05		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Beryllium	0.124	µg/L	1	0.050	0.007		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Boron	0.013	mg/L	1	0.050	0.007	J1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Cadmium	0.016	µg/L	1	0.020	0.004	J1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Calcium	0.37	mg/L	1	0.05	0.01		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Chromium	0.30	µg/L	1	0.30	0.07		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Cobalt	1.21	µg/L	1	0.020	0.005		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Iron	0.107	mg/L	1	0.020	0.003		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Lithium	0.0186	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Magnesium	0.389	mg/L	1	0.100	0.006		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Manganese	0.00719	mg/L	1	0.00100	0.00008		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Mercury	15	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Potassium	1.00	mg/L	1	0.100	0.008		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Selenium	0.1	µg/L	1	0.50	0.04	J1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Sodium	5.88	mg/L	1	0.20	0.01		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Strontium	0.00572	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4
Thallium	0.06	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:08	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-22

Customer Description: TG-32

Lab Number: 233279-007

Preparation:

Date Collected: 10/17/2023 11:15 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Arsenic	1.57	µg/L	1	0.10	0.03		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Barium	19.1	µg/L	1	0.20	0.05		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Beryllium	2.65	µg/L	1	0.050	0.007		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Boron	0.020	mg/L	1	0.050	0.007	J1	GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Cadmium	0.551	µg/L	1	0.020	0.004		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Calcium	9.26	mg/L	1	0.05	0.01		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Chromium	0.33	µg/L	1	0.30	0.07		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Cobalt	55.3	µg/L	1	0.020	0.005		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Lead	0.18	µg/L	1	0.20	0.05	J1	GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Lithium	0.0772	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Magnesium	14.3	mg/L	1	0.100	0.006		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Mercury	301	ng/L	4	20	7		RLP	10/30/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Potassium	3.03	mg/L	1	0.100	0.008		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Selenium	4.78	µg/L	1	0.50	0.04		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Sodium	76.9	mg/L	1	0.20	0.01		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Strontium	0.0892	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4
Thallium	0.15	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:14	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.93	pCi/L	0.16	0.17		ST	11/20/2023 12:42	SW-846 9315-1986, Rev. 0
Carrier Recovery	88.4	%						
Radium-228	1.68	pCi/L	0.18	0.55		ST	11/17/2023 16:32	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	71.9	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-22

Customer Description: TG-32

Lab Number: 233279-007-01

Preparation: Dissolved

Date Collected: 10/17/2023 11:15 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Arsenic	1.49	µg/L	1	0.10	0.03		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Barium	18.8	µg/L	1	0.20	0.05		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Beryllium	2.62	µg/L	1	0.050	0.007		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Boron	0.019	mg/L	1	0.050	0.007	J1	GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Cadmium	0.540	µg/L	1	0.020	0.004		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Calcium	9.33	mg/L	1	0.05	0.01		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Chromium	0.30	µg/L	1	0.30	0.07		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Cobalt	55.1	µg/L	1	0.020	0.005		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Iron	20.1	mg/L	1	0.020	0.003		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Lead	0.17	µg/L	1	0.20	0.05	J1	GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Lithium	0.0783	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Magnesium	14.3	mg/L	1	0.100	0.006		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Manganese	0.250	mg/L	1	0.00100	0.00008		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Mercury	40	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Potassium	3.02	mg/L	1	0.100	0.008		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Selenium	4.79	µg/L	1	0.50	0.04		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Sodium	77.5	mg/L	1	0.20	0.01		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Strontium	0.0878	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4
Thallium	0.15	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:19	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-28

Customer Description: TG-32

Lab Number: 233279-008

Preparation:

Date Collected: 10/17/2023 12:14 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Arsenic	0.16	µg/L	1	0.10	0.03		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Barium	114	µg/L	1	0.20	0.05		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Beryllium	0.469	µg/L	1	0.050	0.007		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Boron	0.294	mg/L	1	0.050	0.007		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Cadmium	0.043	µg/L	1	0.020	0.004		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Calcium	1.23	mg/L	1	0.05	0.01		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Chromium	0.42	µg/L	1	0.30	0.07		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Cobalt	10.9	µg/L	1	0.020	0.005		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Lead	0.09	µg/L	1	0.20	0.05	J1	GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Lithium	0.0262	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Magnesium	2.51	mg/L	1	0.100	0.006		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Mercury	9	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Potassium	0.795	mg/L	1	0.100	0.008		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Selenium	0.22	µg/L	1	0.50	0.04	J1	GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Sodium	5.54	mg/L	1	0.20	0.01		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Strontium	0.0178	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:24	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1.10	pCi/L	0.17	0.14		ST	11/20/2023 09:08	SW-846 9315-1986, Rev. 0
Carrier Recovery	94.7	%						
Radium-228	1.21	pCi/L	0.15	0.45		ST	11/17/2023 16:32	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	85.0	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-28

Customer Description: TG-32

Lab Number: 233279-008-01

Preparation: Dissolved

Date Collected: 10/17/2023 12:14 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Arsenic	0.07	µg/L	1	0.10	0.03	J1	GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Barium	118	µg/L	1	0.20	0.05		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Beryllium	0.468	µg/L	1	0.050	0.007		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Boron	0.312	mg/L	1	0.050	0.007		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Cadmium	0.045	µg/L	1	0.020	0.004		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Calcium	1.39	mg/L	1	0.05	0.01		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Chromium	0.63	µg/L	1	0.30	0.07		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Cobalt	11.6	µg/L	1	0.020	0.005		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Iron	0.253	mg/L	1	0.020	0.003		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Lead	0.09	µg/L	1	0.20	0.05	J1	GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Lithium	0.0265	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Magnesium	2.71	mg/L	1	0.100	0.006		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Manganese	0.0511	mg/L	1	0.00100	0.00008		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Mercury	5	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Potassium	0.866	mg/L	1	0.100	0.008		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Selenium	0.20	µg/L	1	0.50	0.04	J1	GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Sodium	5.97	mg/L	1	0.20	0.01		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Strontium	0.0185	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:29	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-30

Customer Description: TG-32

Lab Number: 233279-009

Preparation:

Date Collected: 10/17/2023 11:34 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Arsenic	0.17	µg/L	1	0.10	0.03		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Barium	63.8	µg/L	1	0.20	0.05		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Beryllium	0.090	µg/L	1	0.050	0.007		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Boron	2.07	mg/L	1	0.050	0.007		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Cadmium	0.01	µg/L	1	0.020	0.004	J1	GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Calcium	0.79	mg/L	1	0.05	0.01		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Chromium	0.44	µg/L	1	0.30	0.07		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Cobalt	4.11	µg/L	1	0.020	0.005		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Lithium	0.0124	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Magnesium	2.19	mg/L	1	0.100	0.006		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Mercury	5	ng/L	1	5	2		RLP	10/30/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Potassium	0.931	mg/L	1	0.100	0.008		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Selenium	0.42	µg/L	1	0.50	0.04	J1	GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Sodium	77.4	mg/L	1	0.20	0.01		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Strontium	0.0103	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:34	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.99	pCi/L	0.18	0.17		ST	11/20/2023 09:08	SW-846 9315-1986, Rev. 0
Carrier Recovery	78.5	%						
Radium-228	-0.14	pCi/L	0.18	0.63		ST	11/17/2023 16:32	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	71.8	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-30

Customer Description: TG-32

Lab Number: 233279-009-01

Preparation: Dissolved

Date Collected: 10/17/2023 11:34 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.008	µg/L	1	0.100	0.008	J1	GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Arsenic	0.14	µg/L	1	0.10	0.03		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Barium	53.8	µg/L	1	0.20	0.05		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Beryllium	0.088	µg/L	1	0.050	0.007		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Boron	2.06	mg/L	1	0.050	0.007		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Cadmium	0.01	µg/L	1	0.020	0.004	J1	GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Calcium	0.83	mg/L	1	0.05	0.01		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Chromium	0.42	µg/L	1	0.30	0.07		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Cobalt	4.13	µg/L	1	0.020	0.005		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Iron	0.250	mg/L	1	0.020	0.003		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Lithium	0.0123	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Magnesium	2.18	mg/L	1	0.100	0.006		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Manganese	0.0234	mg/L	1	0.00100	0.00008		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Potassium	0.935	mg/L	1	0.100	0.008		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Selenium	0.33	µg/L	1	0.50	0.04	J1	GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Sodium	76.8	mg/L	1	0.20	0.01		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Strontium	0.0102	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:39	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
 4001 Bixby Road
 Groveport, OH 43125
 Phone: 614-836-4221
 Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 233279-010

Preparation:

Date Collected: 10/17/2023 12:10 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Arsenic	0.58	µg/L	1	0.10	0.03		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Barium	45.9	µg/L	1	0.20	0.05		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Beryllium	1.00	µg/L	1	0.050	0.007		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Boron	0.094	mg/L	1	0.050	0.007		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Cadmium	0.037	µg/L	1	0.020	0.004		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Calcium	1.15	mg/L	1	0.05	0.01		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Chromium	0.33	µg/L	1	0.30	0.07		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Cobalt	7.51	µg/L	1	0.020	0.005		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Lead	0.22	µg/L	1	0.20	0.05		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Lithium	0.0194	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Magnesium	2.95	mg/L	1	0.100	0.006		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Mercury	6120	ng/L	100	500	200		RLP	10/30/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Potassium	0.283	mg/L	1	0.100	0.008		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Selenium	1.97	µg/L	1	0.50	0.04		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Sodium	15.1	mg/L	1	0.20	0.01		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Strontium	0.0223	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4
Thallium	0.04	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:44	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	1	pCi/L	0.17	0.17		ST	11/20/2023 09:08	SW-846 9315-1986, Rev. 0
Carrier Recovery	87.1	%						
Radium-228	0.79	pCi/L	0.16	0.53		ST	11/17/2023 16:32	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	76.7	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 233279-010-01

Preparation: Dissolved

Date Collected: 10/17/2023 12:10 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	0.009	µg/L	1	0.100	0.008	J1	GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Arsenic	0.50	µg/L	1	0.10	0.03		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Barium	44.3	µg/L	1	0.20	0.05		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Beryllium	0.977	µg/L	1	0.050	0.007		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Boron	0.086	mg/L	1	0.050	0.007		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Cadmium	0.037	µg/L	1	0.020	0.004		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Calcium	1.14	mg/L	1	0.05	0.01		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Chromium	0.26	µg/L	1	0.30	0.07	J1	GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Cobalt	7.12	µg/L	1	0.020	0.005		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Iron	0.057	mg/L	1	0.020	0.003		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Lead	0.21	µg/L	1	0.20	0.05		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Lithium	0.0191	mg/L	1	0.00030	0.00007		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Magnesium	2.75	mg/L	1	0.100	0.006		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Manganese	0.00547	mg/L	1	0.00100	0.00008		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Mercury	110	ng/L	2	10	4		RLP	10/30/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Potassium	0.284	mg/L	1	0.100	0.008		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Selenium	2.00	µg/L	1	0.50	0.04		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Sodium	14.5	mg/L	1	0.20	0.01		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Strontium	0.0214	mg/L	1	0.00200	0.00005		GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4
Thallium	0.03	µg/L	1	0.20	0.02	J1	GES	11/02/2023 22:49	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: DUPLICATE A

Customer Description: TG-32

Lab Number: 233279-011

Preparation:

Date Collected: 10/17/2023 15:00 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Arsenic	1.23	µg/L	1	0.10	0.03		GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Barium	66.8	µg/L	1	0.20	0.05	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Beryllium	1.61	µg/L	1	0.050	0.007	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Boron	0.090	mg/L	1	0.050	0.007		GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Cadmium	0.378	µg/L	1	0.020	0.004		GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Calcium	2.85	mg/L	1	0.05	0.01	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Chromium	0.47	µg/L	1	0.30	0.07		GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Cobalt	16.3	µg/L	1	0.020	0.005	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Lead	0.19	µg/L	1	0.20	0.05	J1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Lithium	0.0399	mg/L	1	0.00030	0.00007	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Magnesium	4.82	mg/L	1	0.100	0.006	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Mercury	33	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Potassium	1.62	mg/L	1	0.100	0.008		GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Selenium	3.35	µg/L	1	0.50	0.04		GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Sodium	21.3	mg/L	1	0.20	0.01	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Strontium	0.0335	mg/L	1	0.00200	0.00005	M1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4
Thallium	0.14	µg/L	1	0.20	0.02	J1	GES	10/30/2023 20:14	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: DUPLICATE A

Customer Description: TG-32

Lab Number: 233279-011-01

Preparation: Dissolved

Date Collected: 10/17/2023 15:00 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Arsenic	1.06	µg/L	1	0.10	0.03		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Barium	65.7	µg/L	1	0.20	0.05		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Beryllium	1.58	µg/L	1	0.050	0.007		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Boron	0.089	mg/L	1	0.050	0.007		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Cadmium	0.378	µg/L	1	0.020	0.004		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Calcium	2.78	mg/L	1	0.05	0.01		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Chromium	0.39	µg/L	1	0.30	0.07		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Cobalt	16.0	µg/L	1	0.020	0.005		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Iron	1.84	mg/L	1	0.020	0.003		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Lead	0.15	µg/L	1	0.20	0.05	J1	GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Lithium	0.0394	mg/L	1	0.00030	0.00007		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Magnesium	4.72	mg/L	1	0.100	0.006		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Manganese	0.0427	mg/L	1	0.00100	0.00008		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Mercury	14	ng/L	1	5	2		RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Potassium	1.58	mg/L	1	0.100	0.008		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Selenium	3.19	µg/L	1	0.50	0.04		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Sodium	20.8	mg/L	1	0.20	0.01		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Strontium	0.0330	mg/L	1	0.00200	0.00005		GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4
Thallium	0.15	µg/L	1	0.20	0.02	J1	GES	10/30/2023 21:20	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: EQUIPMENT BLANK

Customer Description: TG-32

Lab Number: 233279-012

Preparation:

Date Collected: 10/17/2023 11:15 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Arsenic	<0.03	µg/L	1	0.10	0.03	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Barium	<0.05	µg/L	1	0.20	0.05	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Beryllium	<0.007	µg/L	1	0.050	0.007	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Boron	<0.007	mg/L	1	0.050	0.007	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Calcium	<0.01	mg/L	1	0.05	0.01	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Chromium	0.38	µg/L	1	0.30	0.07		GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Cobalt	0.035	µg/L	1	0.020	0.005		GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Lithium	<0.00007	mg/L	1	0.00030	0.00007	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Magnesium	<0.006	mg/L	1	0.100	0.006	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Potassium	<0.008	mg/L	1	0.100	0.008	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Sodium	<0.01	mg/L	1	0.20	0.01	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Strontium	<0.00005	mg/L	1	0.00200	0.00005	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	10/30/2023 21:25	EPA 200.8-1994, Rev. 5.4



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

Customer Sample ID: FIELD BLANK

Customer Description: TG-32

Lab Number: 233279-013

Preparation:

Date Collected: 10/17/2023 11:18 EDT

Date Received: 10/23/2023 11:00 EDT

Metals

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Antimony	<0.008	µg/L	1	0.100	0.008	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Arsenic	<0.03	µg/L	1	0.10	0.03	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Barium	<0.05	µg/L	1	0.20	0.05	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Beryllium	<0.007	µg/L	1	0.050	0.007	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Boron	<0.007	mg/L	1	0.050	0.007	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Cadmium	<0.004	µg/L	1	0.020	0.004	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Calcium	<0.01	mg/L	1	0.05	0.01	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Chromium	0.51	µg/L	1	0.30	0.07		GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Cobalt	0.045	µg/L	1	0.020	0.005		GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Lead	<0.05	µg/L	1	0.20	0.05	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Lithium	<0.00007	mg/L	1	0.00030	0.00007	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Magnesium	<0.006	mg/L	1	0.100	0.006	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Mercury	<2	ng/L	1	5	2	U1	RLP	10/26/2023 00:00	EPA 245.7-2005, Rev. 2.0
Molybdenum	<0.1	µg/L	1	0.5	0.1	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Potassium	<0.008	mg/L	1	0.100	0.008	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Selenium	<0.04	µg/L	1	0.50	0.04	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Sodium	<0.01	mg/L	1	0.20	0.01	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Strontium	<0.00005	mg/L	1	0.00200	0.00005	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4
Thallium	<0.02	µg/L	1	0.20	0.02	U1	GES	10/30/2023 21:30	EPA 200.8-1994, Rev. 5.4

Radiochemistry

Parameter	Result	Units	UNC*(+/-)	MDA*	Data Qualifiers	Analyst	Analysis Date	Method
Radium-226	0.32	pCi/L	0.09	0.16		ST	11/20/2023 09:08	SW-846 9315-1986, Rev. 0
Carrier Recovery	101	%						
Radium-228	0.07	pCi/L	0.14	0.47		ST	11/17/2023 16:32	SW-846 9320-2014, Rev. 1.0
Carrier Recovery	89.6	%						

* The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233279

Customer: Pirkey Power Station

Date Reported: 12/12/2023

233279-005-01

Comments:

Hg bottle was broken upon arrival.

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.

Data Qualifier Legend

U1 - Not detected at or above method detection limit (MDL).

J1 - Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

M1 - The associated matrix spike (MS) or matrix spike duplicate (MSD) recovery was outside acceptance limits.

Dolan Chemical Laboratory (DCL)

4001 Bldg Road
Groveport, Ohio 43125

Contacts: Jonathan Barnhill (318-673-3803)
Michael Ohlinger (614-830-4184)

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Site Contact: _____ Date: _____

For Lab Use Only:
COC/Order #: _____

2332079

Project Name: Pitkey - CCR Metals
Contact Name: Leslie Fuerschbach
Contact Phone: 318-423-3805
Sampler(s): Matt Hamilton Kenny McDonald

Analysis Turnaround Time (in Calendar Days)

Site Contact: _____ Date: _____

COC/Order #: _____

Sample Identification	Sample Date	Sample Time	Sample Type (G-Comp, G-Grab)	Matrix	# of Cont.	Sampler(s) Initials					Sample Specific Notes
						B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, TL and Na, K, Mg, Sr	Field-filter 250 mL bottle, then pH<2, HNO ₃	Three (six every 10hr) L bottles, pH<2, HNO ₃	250 mL Glass bottle, HCL ⁺⁺ , pH<2	250 mL Glass bottle, HCL ⁺⁺ , pH<2	
AD-3	10/18/2023	1147	G	GW	7	X	X	X	X	X	
AD-7R	10/17/2023	908	G	GW	10	X	X	X	X	X	
AD-12	10/17/2023	941	G	GW	7	X	X	X	X	X	
AD-13	10/17/2023	811	G	GW	7	X	X	X	X	X	
AD-17	10/17/2023	1211	G	GW	7	X	X	X	X	X	
AD-18	10/18/2023	747	G	GW	7	X	X	X	X	X	
AD-22	10/17/2023	1015	G	GW	7	X	X	X	X	X	
AD-28	10/17/2023	1114	G	GW	7	X	X	X	X	X	
AD-30	10/17/2023	1034	G	GW	7	X	X	X	X	X	
AD-33	10/17/2023	1110	G	GW	7	X	X	X	X	X	
DUPLICATE A	10/17/2023	1400	G	GW	4	X	X		X	X	
EQUIPMENT BLANK	10/17/2023	1015	G	GW	2	X			X		
FIELD BLANK	10/17/2023	1018	G	GW	5	X		X	X		

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field

* Six 1L Bottles must be collected for Radium for every 10th sample.

TG-32

Special Instructions/QC Requirements & Comments:

Relinquished by: *[Signature]* Company: *East* Date/Time: *10-15-23 1500* Received by: *[Signature]* Date/Time: _____

Relinquished by: *[Signature]* Company: _____ Date/Time: _____ Received by: *[Signature]* Date/Time: _____

Relinquished by: _____ Company: _____ Date/Time: _____ Received by: *[Signature]* Date/Time: *10/23/23 1100*

AEP WATER & WASTE SAMPLE RECEIPT FORM

<u>Package Type</u> <input checked="" type="radio"/> Cooler <input type="radio"/> Box <input type="radio"/> Bag <input type="radio"/> Envelope			<u>Delivery Type</u> PONY UPS <input checked="" type="radio"/> FedEX USPS Other _____		
Plant/Customer <u>Pittky</u>		Number of Plastic Containers: <u>44</u>			
Opened By <u>MBK/MSO</u>		Number of Glass Containers: <u>24</u>			
Date/Time <u>10/23/23 11:00</u>		Number of Mercury Containers: _____			
Were all temperatures within 0-6°C? Y / N or <input checked="" type="radio"/> N/A Initial: _____ on ice / <input checked="" type="radio"/> no ice (IR Gun Ser# <u>2213689000</u> , Expir. <u>03/24/2024</u>) - If No, specify each deviation: _____					
Was container in good condition? <input checked="" type="radio"/> Y <input type="radio"/> N Comments _____					
Was Chain of Custody received? <input checked="" type="radio"/> Y <input type="radio"/> N Comments _____					
Requested turnaround: <u>Routine</u> If RUSH, who was notified? _____					
pH (15 min)		Cr ⁶ (pres) (24 hr)	NO ₂ or NO ₃ (48 hr)	ortho-PO ₄ (48 hr)	Hg-diss (pres) (48 hr)

Was COC filled out properly? Y N Comments _____

Were samples labeled properly? Y N Comments _____

Were correct containers used? Y N Comments _____

Was pH checked & Color Coding done? Y N or N/A Initial & Date: Jacob ^{10/24/23 MSO} MSO ^{10/24/23} MSO ^{10/23/23}

pH paper (circle one): MQuant PN1.09535.0001, LOT# _____ [OR] Lab Rat, PN4801, LOT# X000RWOG21 Exp 11/15/2024

- Was Add'l Preservative needed? Y N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 233279 Initial & Date & Time : _____

Logged by MSO Comments: _____

Reviewed by MBK _____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

AEP WATER & WASTE SAMPLE RECEIPT FORM

<p><u>Package Type</u></p> <p><input checked="" type="radio"/> Cooler <input type="radio"/> Box <input type="radio"/> Bag <input type="radio"/> Envelope</p>	<p><u>Delivery Type</u></p> <p><input type="radio"/> PONY <input type="radio"/> UPS <input checked="" type="radio"/> FedEX <input type="radio"/> USPS</p> <p>Other _____</p>			
Plant/Customer <u>P. Tracy</u>	Number of Plastic Containers: <u>16</u>			
Opened By <u>MSJ</u>	Number of Glass Containers: <u>-</u>			
Date/Time <u>10/23/23</u> <u>10/24/23</u> <u>12:00PM</u>	Number of Mercury Containers: <u>-</u>			
Were all temperatures within 0-6°C? Y / N or <input checked="" type="radio"/> N/A Initial: _____ on ice / <input checked="" type="radio"/> no ice (IR Gun Ser# <u>2213689000</u> , Expir. <u>03/24/2024</u>) - If No, specify each deviation: _____				
Was container in good condition? <input checked="" type="radio"/> Y / N Comments _____				
Was Chain of Custody received? <input checked="" type="radio"/> Y / N Comments _____				
Requested turnaround: <u>same</u> If RUSH, who was notified? _____				
pH (15 min)	Cr ⁶ (pres) (24 hr)	NO ₂ or NO ₃ (48 hr)	ortho-PO ₄ (48 hr)	Hg-diss (pres) (48 hr)

Was COC filled out properly? Y / N Comments _____

Were samples labeled properly? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: MSJ 10/24/23

pH paper (circle one): MQuant,PN1.09535.0001.LOT# _____ [OR] Lab Rat,PN4801.LOT# X888RW002T Exp 11/15/2024

- Was Add'l Preservative needed? Y / N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 233279 Initial & Date & Time : _____

Logged by MSJ Comments: _____

Reviewed by mbk _____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Mercury Laboratory Review Checklist


Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Susann Sulzmann		Senior Chemist	12-7-2023
Name (printed)	Signature	Official Title	Date

Mercury Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Susann Sulzmann
LRC Date: 12-7-2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23102509, PB23102510

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	yes	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Mercury Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Mercury Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Susann Sulzmann
LRC Date: 12-7-2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23102509, PB23102510

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?		
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Mercury Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

ICP-MS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Jonathan Barnhill
LRC Date: 12/7/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23102703 PB23110202 PB23110205 PB23110603 QC2310261 QC2311029 QC2311063

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	No	ER1
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

ICP-MS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	No	ER3
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

ICP-MS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Jonathan Barnhill
LRC Date: 12/7/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23102703 PB23110202 PB23110205 PB23110603 QC2310261 QC2311029 QC2311063

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER2
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	Yes	
	I	Were ion abundance data within the method-required QC limits?	Yes	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	Yes	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

ICP-MS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

ICP-MS Laboratory Review Checklist

Table 3. Exception Reports.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey CCR

Reviewer Name: Jonathan Barnhill

LRC Date: 12/7/2023

Laboratory Job Number: 233279

Prep Batch Number(s): PB23102703 PB23110202 PB23110205 PB23110603 QC2310261 QC2311029 QC2311063

Exception Report No.	Description
ER1	Linear Dynamic Range (LDR) study used to determine upper limit of analyte calibration.
ER2	CCB acceptance criteria is $CCB < 2.2 * MDL$.
ER3	Sample 233279-011 failed to meet acceptance criteria on Matrix spike for Ca Li Ba Be Co Na Mg Sr

¹ Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.

² O - organic analyses; I - inorganic analyses (including general chemistry constituents, when applicable).

³ NA - Not applicable; NR - Not reviewed.

⁴ Exception Report identification number; an Exception Report should be completed for an item if the result is "No" or "NR."

Radium Laboratory Review Checklist

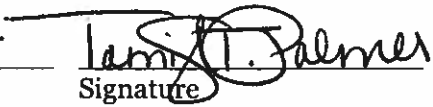
Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Tamisha T. Palmer		Chemical Tech. Principal	12/08/2023
Name (printed)	Signature	Official Title	Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power
Reviewer Name: Tamisha Palmer
LRC Date: 12/08/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23111406, PB23111407

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	No	ER1
	I	Were analytical duplicates analyzed at the appropriate frequency?	No	ER1
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	No	ER1
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey Power
Reviewer Name: Tamisha Palmer
LRC Date: 12/08/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23111406, PB23111407

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Radium Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

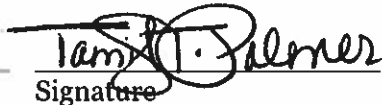
- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Tamisha T. Palmer

Name (printed)


Signature

Chemical Tech. Principal

Official Title

12/08/2023

Date

Radium Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Tamisha Palmer
LRC Date: 12/11/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23111102, PB23111103

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	ER1
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	ER1
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	ER1
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	ER1
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	NA	
	I	Were analytical duplicates analyzed at the appropriate frequency?	NA	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	NA	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Radium Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey
Reviewer Name: Tamisha Palmer
LRC Date: 12/11/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB23111102, PB23111103

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Radium Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: AD-3

Customer Description: TG-32

Lab Number: 233267-001

Preparation:

Date Collected: 10/18/2023 12:47 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.05	mg/L	2	0.10	0.02	J1	CRJ	11/10/2023 16:27	EPA 300.1 -1997, Rev. 1.0
Chloride	6.17	mg/L	2	0.04	0.01		CRJ	11/10/2023 16:27	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.06	mg/L	2	0.06	0.02		CRJ	11/10/2023 16:27	EPA 300.1 -1997, Rev. 1.0
Sulfate	28.6	mg/L	2	0.6	0.1		CRJ	11/10/2023 16:27	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	5	mg/L	1	20	5	J1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	140	mg/L	1	50	20		ELT	10/23/2023 07:40	SM 2540C-2015

Customer Sample ID: AD-7R

Customer Description: TG-32

Lab Number: 233267-002

Preparation:

Date Collected: 10/17/2023 10:08 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	1.12	mg/L	2	0.10	0.02		CRJ	11/10/2023 18:50	EPA 300.1 -1997, Rev. 1.0
Chloride	24.1	mg/L	2	0.04	0.01		CRJ	11/10/2023 18:50	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.16	mg/L	2	0.06	0.02		CRJ	11/10/2023 18:50	EPA 300.1 -1997, Rev. 1.0
Sulfate	39.9	mg/L	2	0.6	0.1		CRJ	11/10/2023 18:50	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	190	mg/L	1	50	20		ELT	10/23/2023 07:40	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: AD-12

Customer Description: TG-32

Lab Number: 233267-003

Preparation:

Date Collected: 10/17/2023 10:41 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.09	mg/L	2	0.10	0.02	J1	CRJ	11/10/2023 19:26	EPA 300.1 -1997, Rev. 1.0
Chloride	6.74	mg/L	2	0.04	0.01		CRJ	11/10/2023 19:26	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.07	mg/L	2	0.06	0.02		CRJ	11/10/2023 19:26	EPA 300.1 -1997, Rev. 1.0
Sulfate	2.7	mg/L	2	0.6	0.1		CRJ	11/10/2023 19:26	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	58	mg/L	1	50	20		ELT	10/23/2023 07:40	SM 2540C-2015

Customer Sample ID: AD-13

Customer Description: TG-32

Lab Number: 233267-004

Preparation:

Date Collected: 10/17/2023 09:11 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.23	mg/L	2	0.10	0.02		CRJ	11/10/2023 17:39	EPA 300.1 -1997, Rev. 1.0
Chloride	42.9	mg/L	10	0.20	0.05		CRJ	11/10/2023 17:03	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.45	mg/L	2	0.06	0.02		CRJ	11/10/2023 17:39	EPA 300.1 -1997, Rev. 1.0
Sulfate	86.9	mg/L	10	3.0	0.6		CRJ	11/10/2023 17:03	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	47	mg/L	1	20	5		MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	280	mg/L	1	50	20		ELT	10/23/2023 08:01	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: AD-17

Customer Description: TG-32

Lab Number: 233267-005

Preparation:

Date Collected: 10/17/2023 13:11 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.13	mg/L	2	0.10	0.02		CRJ	11/10/2023 20:02	EPA 300.1 -1997, Rev. 1.0
Chloride	29.7	mg/L	2	0.04	0.01		CRJ	11/10/2023 20:02	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.27	mg/L	2	0.06	0.02		CRJ	11/10/2023 20:02	EPA 300.1 -1997, Rev. 1.0
Sulfate	1.6	mg/L	2	0.6	0.1		CRJ	11/10/2023 20:02	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	77	mg/L	1	50	20		ELT	10/23/2023 08:07	SM 2540C-2015

Customer Sample ID: AD-18

Customer Description: TG-32

Lab Number: 233267-006

Preparation:

Date Collected: 10/18/2023 08:47 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.03	mg/L	2	0.10	0.02	J1	CRJ	11/10/2023 22:26	EPA 300.1 -1997, Rev. 1.0
Chloride	5.05	mg/L	2	0.04	0.01		CRJ	11/10/2023 22:26	EPA 300.1 -1997, Rev. 1.0
Fluoride	<0.02	mg/L	2	0.06	0.02	U1	CRJ	11/10/2023 22:26	EPA 300.1 -1997, Rev. 1.0
Sulfate	10	mg/L	2	0.6	0.1		CRJ	11/10/2023 22:26	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	98	mg/L	1	50	20		ELT	10/23/2023 08:07	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: AD-22

Customer Description: TG-32

Lab Number: 233267-007

Preparation:

Date Collected: 10/17/2023 11:15 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.60	mg/L	2	0.10	0.02		CRJ	11/11/2023 02:37	EPA 300.1 -1997, Rev. 1.0
Chloride	80.5	mg/L	25	0.5	0.1		CRJ	11/10/2023 20:38	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.26	mg/L	2	0.06	0.02		CRJ	11/11/2023 02:37	EPA 300.1 -1997, Rev. 1.0
Sulfate	212	mg/L	25	8	2		CRJ	11/10/2023 20:38	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	480	mg/L	1	50	20		ELT	10/23/2023 08:07	SM 2540C-2015

Customer Sample ID: AD-28

Customer Description: TG-32

Lab Number: 233267-008

Preparation:

Date Collected: 10/17/2023 12:14 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.06	mg/L	2	0.10	0.02	J1	CRJ	11/11/2023 06:48	EPA 300.1 -1997, Rev. 1.0
Chloride	4.64	mg/L	2	0.04	0.01		CRJ	11/11/2023 06:48	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.50	mg/L	2	0.06	0.02		CRJ	11/11/2023 06:48	EPA 300.1 -1997, Rev. 1.0
Sulfate	22.1	mg/L	2	0.6	0.1		CRJ	11/11/2023 06:48	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	94	mg/L	1	50	20		ELT	10/23/2023 08:14	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: AD-30

Customer Description: TG-32

Lab Number: 233267-009

Preparation:

Date Collected: 10/17/2023 11:34 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.23	mg/L	2	0.10	0.02		CRJ	11/11/2023 02:01	EPA 300.1 -1997, Rev. 1.0
Chloride	26.7	mg/L	2	0.04	0.01		CRJ	11/11/2023 02:01	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.05	mg/L	2	0.06	0.02	J1	CRJ	11/11/2023 02:01	EPA 300.1 -1997, Rev. 1.0
Sulfate	148	mg/L	10	3.0	0.6		CRJ	11/10/2023 21:50	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	290	mg/L	1	50	20		ELT	10/23/2023 08:14	SM 2540C-2015

Customer Sample ID: AD-33

Customer Description: TG-32

Lab Number: 233267-010

Preparation:

Date Collected: 10/17/2023 12:10 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	0.22	mg/L	2	0.10	0.02		CRJ	11/11/2023 07:24	EPA 300.1 -1997, Rev. 1.0
Chloride	9.03	mg/L	2	0.04	0.01		CRJ	11/11/2023 07:24	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.18	mg/L	2	0.06	0.02		CRJ	11/11/2023 07:24	EPA 300.1 -1997, Rev. 1.0
Sulfate	41.7	mg/L	2	0.6	0.1		CRJ	11/11/2023 07:24	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	130	mg/L	1	50	20		ELT	10/23/2023 08:14	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: DUPLICATE A

Customer Description: TG-32

Lab Number: 233267-011

Preparation:

Date Collected: 10/17/2023 15:00 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	1.16	mg/L	2	0.10	0.02		CRJ	11/11/2023 05:36	EPA 300.1 -1997, Rev. 1.0
Chloride	24.4	mg/L	2	0.04	0.01		CRJ	11/11/2023 05:36	EPA 300.1 -1997, Rev. 1.0
Fluoride	0.16	mg/L	2	0.06	0.02		CRJ	11/11/2023 05:36	EPA 300.1 -1997, Rev. 1.0
Sulfate	39.9	mg/L	2	0.6	0.1		CRJ	11/11/2023 05:36	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	160	mg/L	1	50	20		ELT	10/23/2023 08:14	SM 2540C-2015

Customer Sample ID: EQUIPMENT BLANK

Customer Description: TG-32

Lab Number: 233267-012

Preparation:

Date Collected: 10/17/2023 11:15 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	<0.02	mg/L	2	0.10	0.02	U1	CRJ	11/11/2023 03:48	EPA 300.1 -1997, Rev. 1.0
Chloride	0.13	mg/L	2	0.04	0.01		CRJ	11/11/2023 03:48	EPA 300.1 -1997, Rev. 1.0
Fluoride	<0.02	mg/L	2	0.06	0.02	U1	CRJ	11/11/2023 03:48	EPA 300.1 -1997, Rev. 1.0
Sulfate	0.2	mg/L	2	0.6	0.1	J1	CRJ	11/11/2023 03:48	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	<20	mg/L	1	50	20	U1	ELT	10/23/2023 08:21	SM 2540C-2015



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Customer Sample ID: FIELD BLANK

Customer Description: TG-32

Lab Number: 233267-013

Preparation:

Date Collected: 10/17/2023 11:18 EDT

Date Received: 10/20/2023 10:00 EDT

Ion Chromatography

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Bromide	<0.02	mg/L	2	0.10	0.02	U1	CRJ	11/11/2023 04:24	EPA 300.1 -1997, Rev. 1.0
Chloride	0.13	mg/L	2	0.04	0.01		CRJ	11/11/2023 04:24	EPA 300.1 -1997, Rev. 1.0
Fluoride	<0.02	mg/L	2	0.06	0.02	U1	CRJ	11/11/2023 04:24	EPA 300.1 -1997, Rev. 1.0
Sulfate	0.2	mg/L	2	0.6	0.1	J1	CRJ	11/11/2023 04:24	EPA 300.1 -1997, Rev. 1.0

Wet Chemistry

Parameter	Result	Units	Dilution	RL	MDL	Data Qualifiers	Analyst	Analysis Date	Method
Alkalinity, as CaCO3	<5	mg/L	1	20	5	U1	MGK	10/23/2023 15:48	SM 2320B-2011
TDS, Filterable Residue	<20	mg/L	1	50	20	U1	ELT	10/23/2023 08:21	SM 2540C-2015

Report Verification

This report and the above data have been confirmed by the following analyst.

Michael Ohlinger, Chemist

Email: msohlinger@aep.com

Phone: 614-836-4184

Audinet: 8-210-4184

THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED AND SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF THE LABORATORY. ALL TEST RESULTS MEET ALL OF THE REQUIREMENTS OF THE ACCREDITING AUTHORITY, UNLESS OTHERWISE NOTED. ALL TIMES LISTED ARE IN THE EASTERN TIME ZONE.



Water Analysis Report

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
Phone: 614-836-4221
Audinet: 210-4221

Job ID: 233267

Customer: Pirkey Power Station

Date Reported: 11/29/2023

Data Qualifier Legend

J1 - Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.

U1 - Not detected at or above method detection limit (MDL).

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Jonathan Bernhill (318-673-3803)
 Contacts: Michael Ohlinger (614-836-4184)

Project Name: Pirkey - CCR
 Contact Name: Leslie Fuerschbech
 Contact Phone: 318-423-3805

Sampler(s): Matt Hamilton Kenny McDonald

For Lab Use Only:
 COC/Order #: 233267

Date: _____

Analysis Turnaround Time (in Calendar Days)

250 mL bottle, pH<2, HNO₃
 Field-filter 250 mL bottle, then pH<2, HNO₃
 1 L bottle, Cool, 0-5°C
 Three (six every 10th*) L bottles, pH<2, HNO₃
 40 mL Glass vial or bottle, HCL, pH<2
 250 mL PTFE lined or bottle, HCL, pH<2

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	# of Cont.	Matrix		Sample Specific Notes		
					Matrix	Cont.			
AD-3	10/18/2023	1147	G	1	GW	1			
AD-7R	10/17/2023	908	G	1	GW	1			
AD-12	10/17/2023	941	G	1	GW	1			
AD-13	10/17/2023	811	G	1	GW	1			
AD-17	10/17/2023	1211	G	1	GW	1			
AD-18	10/18/2023	747	G	1	GW	1			
AD-22	10/17/2023	1015	G	1	GW	1			
AD-28	10/17/2023	1114	G	1	GW	1			
AD-30	10/17/2023	1034	G	1	GW	1			
AD-33	10/17/2023	1110	G	1	GW	1			
DUPLICATE A	10/17/2023	1400	G	1	GW	1			
EQUIPMENT BLANK	10/17/2023	1015	G	1	GW	1			
FIELD BLANK	10/17/2023	1018	G	1	GW	1			
					F4	1	4	2	2

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____ ; F= filter in field

* Six 1L Bottles must be collected for Radium for every 10th sample.

TG-32

Special Instructions/QC Requirements & Comments:

Relinquished by: *JF Tomlinson* Date/Time: 10-15-23 1500 Received by: _____ Date/Time: _____

Relinquished by: *Eask* Date/Time: _____ Received by: _____ Date/Time: _____

Relinquished by: _____ Date/Time: _____ Received by: *Michael Ohlinger* Date/Time: 10/20/23 12:00

Form COC-04, AEP Chain of Custody (COC) Record for Coal Combustion Residual (CCR) Sampling - Shreveport, Rev. 1, 1/10/17

AEP WATER & WASTE SAMPLE RECEIPT FORM

<u>Package Type</u>			<u>Delivery Type</u>				
<input checked="" type="radio"/> Cooler	<input type="radio"/> Box	<input type="radio"/> Bag	<input type="radio"/> Envelope	<input type="radio"/> PONY	<input type="radio"/> UPS	<input type="radio"/> FedEx	<input type="radio"/> USPS
				Other _____			

Plant/Customer Pirkey Number of Plastic Containers: 13

Opened By wcb MGK Number of Glass Containers: _____

Date/Time 10/20/23 1000 Number of Mercury Containers: _____

Were all temperatures within 0-6°C? Y / N or N/A Initial: wcb MGK on ice / no ice
(IR Gun Ser# 2213689000, Expir. 03/24/2024) - If No, specify each deviation: _____

Was container in good condition? Y / N Comments _____

Was Chain of Custody received? Y / N Comments _____

Requested turnaround: 11/17/23 If RUSH, who was notified? _____

pH (15 min)	Cr ⁶⁺ (pres) (24 hr)	NO ₂ or NO ₃ (48 hr)	ortho-PO ₄ (48 hr)	Hg-diss (pres) (48 hr)
-------------	------------------------------------	--	-------------------------------	---------------------------

Was COC filled out properly? Y / N Comments _____

Were samples labeled properly? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: wcb MGK 10/20/23

pH paper (circle one): MQuant.PN1.09535.0001.LOT# _____ (OR) Lab Rat.PN4801.LOT# XD00RWDG21 Exp 11/15/2023

- Was Add'l Preservative needed? Y / N If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 233267 Initial & Date & Time: _____

Logged by MSO Comments: _____

Reviewed by wcb _____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Ion Chromatography Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

This data package consists of:

- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - (a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

Release Statement: I am responsible for the release of this laboratory data package. This data package as been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Tim Arnold		Principle Chemistr	11/13/2023
Name (printed)	Signature	Official Title	Date

Ion Chromatography Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Tim Arnold
LRC Date: 11/13/2023
Laboratory Job Number: 233267
Prep Batch Number(s): QC2311105

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	Yes	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	Yes	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	Yes	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	Yes	
	I	Were MS/MSD analyzed at the appropriate frequency?	Yes	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Were MS/MSD RPDs within laboratory QC limits?	Yes	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

Ion Chromatography Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Tim Arnold
LRC Date: 11/13/2023
Laboratory Job Number: 233267
Prep Batch Number(s): QC2311105

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	Yes	
	I	Was the number of standards recommended in the method used for all analytes?	Yes	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	Yes	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	Yes	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Ion Chromatography Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

TDS Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

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 - (b) Dilution factors
 - (c) Preparation methods
 - (d) Cleanup methods
 - (e) If required for the project, tentatively identified compounds (TICs)
- R4 Surrogate recovery data including:
 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
- R5 Test reports/summary forms for blank samples
- R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
- R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

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Michael Ohlinger		Chemist	11/29/23
Name (printed)	Signature	Official Title	Date

TDS Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory

Project Name: Pirkey CCR

Reviewer Name: Michael Ohlinger

LRC Date: 11/29/23

Laboratory Job Number: 233267

Prep Batch Number(s): QC2310229

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	NA	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
	I	Were blank concentrations < MQL?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

TDS Laboratory Review Checklist

Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Michael Ohlinger
LRC Date: 11/29/23
Laboratory Job Number: 233267
Prep Batch Number(s): QC2310229

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	NA	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	NA	
	I	Were percent differences for each analyte within the method-required QC limits?	NA	
	I	Was the ICAL curve verified for each analyte?	NA	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	NA	
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

TDS Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

Alkalinity Laboratory Review Checklist

Municipal Solid Waste Laboratory Review Checklist

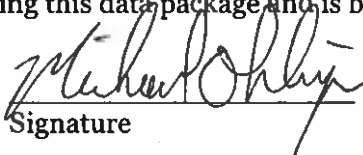
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 - (a) Calculated recovery (%R)
 - (b) The laboratory's surrogate QC limits
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 - (a) LCS spiking amounts
 - (b) Calculated %R for each analyte
 - (c) The laboratory's LCS QC limits
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 - (a) Samples associated with the MS/MSD clearly identified
 - (b) MS/MSD spiking amounts
 - (c) Concentration of each MS/MSD analyte measured in the parent and spiked samples
 - (d) Calculated %Rs and relative percent differences (RPDs)
 - (e) The laboratory's MS/MSD QC limits
- R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - (a) The amount of analyte measured in the duplicate
 - (b) The calculated RPD
 - (c) The laboratory's QC limits for analytical duplicates
- R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix
- R10 Other problems or anomalies
- The Exception Report for every item for which the result is "No" or "NR" (Not Reviewed)

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Michael Ohlinger
Name (printed)


Signature

Chemist
Official Title

11/29/23
Date

Alkalinity Laboratory Review Checklist

Table 1. Reportable Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Michael Ohlinger
LRC Date: 11/29/23
Laboratory Job Number: 233267
Prep Batch Number(s): QC2310189

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
R1	O, I	Chain-of-custody (COC)		
	I	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	Yes	
	I	Were all departures from standard conditions described in an exception report?	Yes	
R2	O, I	Sample and quality control (QC) identification		
	I	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	Yes	
	I	Are all laboratory ID numbers cross-referenced to the corresponding QC data?	Yes	
R3	O, I	Test reports		
	I	Were all samples prepared and analyzed within holding times?	Yes	
	I	Other than those results < MQL, were all other raw values bracketed by calibration standards?	NA	
	I	Were calculations checked by a peer or supervisor?	Yes	
	I	Were all analyte identifications checked by a peer or supervisor?	Yes	
	I	Were sample quantitation limits reported for all analytes not detected?	Yes	
	I	Were all results for soil and sediment samples reported on a dry weight basis?	NA	
	I	Was % moisture (or solids) reported for all soil and sediment samples?	NA	
	I	If required for the project, TICs reported?	NA	
R4	O	Surrogate recovery data		
	I	Were surrogates added prior to extraction?	NA	
	I	Were surrogate percent recoveries in all samples within the laboratory QC limits?	NA	
R5	O, I	Test reports/summary forms for blank samples		
	I	Were appropriate type(s) of blanks analyzed?	Yes	
	I	Were blanks analyzed at the appropriate frequency?	Yes	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
	I	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Yes	
R6	O, I	Laboratory control samples (LCS):		
	I	Were blank concentrations < MQL?	Yes	
	I	Were all COCs included in the LCS?	Yes	
	I	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	Yes	
	I	Were LCSs analyzed at the required frequency?	Yes	
	I	Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Yes	
	I	Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	Yes	
	I	Was the LCSD RPD within QC limits?	Yes	
R7	O, I	Matrix spike (MS) and matrix spike duplicate (MSD) data		
	I	Were the project/method specified analytes included in the MS and MSD?	NA	
	I	Were MS/MSD analyzed at the appropriate frequency?	NA	
	I	Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	NA	
	I	Were MS/MSD RPDs within laboratory QC limits?	NA	
R8	O, I	Analytical duplicate data		
	I	Were appropriate analytical duplicates analyzed for each matrix?	Yes	
	I	Were analytical duplicates analyzed at the appropriate frequency?	Yes	
	I	Were RPDs or relative standard deviations within the laboratory QC limits?	Yes	
R9	O, I	Method quantitation limits (MQLs):		
	I	Are the MQLs for each method analyte included in the laboratory data package?	Yes	
	I	Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Yes	
	I	Are unadjusted MQLs included in the laboratory data package?	Yes	
R10	O, I	Other problems/anomalies		
	I	Are all known problems/anomalies/special conditions noted in this LRC and ER?	Yes	
	I	Were all necessary corrective actions performed for the reported data?	Yes	
	I	Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	Yes	

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Table 2. Supporting Data.

Laboratory Name: American Electric Power Dolan Chemical Laboratory
Project Name: Pirkey CCR
Reviewer Name: Michael Ohlinger
LRC Date: 11/29/23
Laboratory Job Number: 233267
Prep Batch Number(s): QC2310189

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S1	O, I	Initial calibration (ICAL)		
	I	Were response factors and/or relative response factors for each analyte within QC limits?	NA	
	I	Were percent RSDs or correlation coefficient criteria met?	NA	
	I	Was the number of standards recommended in the method used for all analytes?	NA	
	I	Were all points generated between the lowest and highest standard used to calculate the curve?	Yes	
	I	Are ICAL data available for all instruments used?	NA	
	I	Has the initial calibration curve been verified using an appropriate second source standard?	NA	
S2	O, I	Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):		
	I	Was the CCV analyzed at the method-required frequency?	Yes	
	I	Were percent differences for each analyte within the method-required QC limits?	Yes	
	I	Was the ICAL curve verified for each analyte?	Yes	
	I	Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	No	ER1
S3	O	Mass spectral tuning:		
	I	Was the appropriate compound for the method used for tuning?	NA	
	I	Were ion abundance data within the method-required QC limits?	NA	
S4	O	Internal standards (IS):		
	I	Were IS area counts and retention times within the method-required QC limits?	NA	
S5	O, I	Raw data (NELAC section 1 appendix A glossary, and section 5.)		
	I	Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Yes	
	I	Were data associated with manual integrations flagged on the raw data?	NA	

Alkalinity Laboratory Review Checklist

Item ¹	Analytes ²	Description	Result (Yes, No, NA, NR) ³	Exception Report No. ⁴
S6	O	Dual column confirmation		
	I	Did dual column confirmation results meet the method-required QC?	NA	
S7	O	Tentatively identified compounds (TICs):		
	I	If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?	NA	
S8	I	Interference Check Sample (ICS) results:		
	I	Were percent recoveries within method QC limits?	NA	
S9	I	Serial dilutions, post digestion spikes, and method of standard additions		
	I	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	NA	
S10	O, I	Method detection limit (MDL) studies		
	I	Was a MDL study performed for each reported analyte?	Yes	
	I	Is the MDL either adjusted or supported by the analysis of DCSs?	Yes	
S11	O, I	Proficiency test reports:		
	I	Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Yes	
S12	O, I	Standards documentation		
	I	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	Yes	
S13	O, I	Compound/analyte identification procedures		
	I	Are the procedures for compound/analyte identification documented?	Yes	
S14	O, I	Demonstration of analyst competency (DOC)		
	I	Was DOC conducted consistent with NELAC Chapter 5C?	Yes	
	I	Is documentation of the analyst's competency up-to-date and on file?	Yes	
S15	O, I	Verification/validation documentation for methods (NELAC Chap 5n 5)		
	I	Are all the methods used to generate the data documented, verified, and validated, where applicable?	Yes	
S16	O, I	Laboratory standard operating procedures (SOPs):		
	I	Are laboratory SOPs current and on file for each method performed?	Yes	

APPENDIX 6- Well Installation/Decommissioning Logs

Reports documenting monitoring well plugging and abandonment or well installation are included in the appendix.

STATE OF TEXAS PLUGGING REPORT for Tracking #232687

Owner: SWPCO	Owner Well #: MW-7 (AD-7)
Address: 2400 FM 3251 Hallsville, TX 75650	Grid #: 35-37-1
Well Location: 2400 FM 3251 Hallsville, TX 75650	Latitude: 32° 27' 40.81" N
Well County: Harrison	Longitude: 094° 29' 12.31" W
	Elevation: No Data

Well Type: **Monitor**

Drilling Information

Company: No Data	Date Drilled: 10/3/1983
Driller: No Data	License Number: No Data

	<i>Diameter (in.)</i>	<i>Top Depth (ft.)</i>	<i>Bottom Depth (ft.)</i>
Borehole:	10	0	40

Plugging Information

Date Plugged: **9/12/2023** Plugger: **Rich Herman**

Plug Method: **Pour in 3/8 bentonite chips when standing water in well is less than 100 feet depth, cement top 2 feet**

Casing Left in Well:

<i>Dia (in.)</i>	<i>Top (ft.)</i>	<i>Bottom (ft.)</i>
4	0	40

Plug(s) Placed in Well:

<i>Top (ft.)</i>	<i>Bottom (ft.)</i>	<i>Description (number of sacks & material)</i>
0	40	Bentonite 9 Bags/Sacks

Certification Data: The driller certified that the driller plugged this well (or the well was plugged under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the reports(s) being returned for completion and resubmittal.

Company Information: **ETTL Engineers & Consultants, Inc.**
1717 East Erwin Street
Tyler, TX 75702

Driller Name: **Rich Herman** License Number: **59385**

Comments: **All casing and screen left in the hole. When attempting to pull, 3' of stickup was all that came out. No cement cap per client request due to grading that is currently going on**