

Annual Groundwater Monitoring Report

Southwestern Electric Power Company
H. W. Pirkey Power Plant
West Bottom Ash Pond CCR Management Unit
CN600126767; RN100214287
Registration No: CCR104
Hallsville, Texas
January 31, 2024

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An **AEP** Company

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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
- TDS – Total Dissolved Solids
- TCEQ – Texas Commission on Environmental Quality

I. Overview

This *Annual Groundwater Monitoring Report* (Report) has been prepared to report the status of activities for the preceding year at the West Bottom Ash Pond (WBAP) 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 rule requires 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 WBAP was operating under the Assessment monitoring program.
- At the end of the current annual reporting period, the WBAP was operating under the Assessment monitoring program.
- The WBAP initiated an assessment monitoring program on April 3, 2018.
- Groundwater samples were collected for AD-3, AD-12, AD-17, AD-18, AD-28, and AD-30 in June and October 2023 and analyzed for Appendix III and Appendix IV constituents, as specified in 30 TAC §352.941 or §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-28

The following Appendix III parameters exceeded background:

- Boron at AD-28 and AD-30
 - Chloride at AD-17 and AD-30
 - Fluoride at AD-17 and AD-28
 - Sulfate at AD-30
 - TDS at AD-30
- A successful ASDs for the Appendix IV parameter that exceeded the GWPS for the 2nd semi-annual 2022 was certified on June 27, 2023 and submitted to TCEQ June 27, 2023 for approval.

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

The following Appendix IV parameters exceeded established GWPS:

- Cobalt at AD-28

The following Appendix III parameters exceeded background:

- Boron at AD-28 and AD-30
- Chloride at AD-17 and AD-30
- Fluoride at AD-28
- Sulfate at AD-30
- TDS at AD-30

- A successful ASD for the Appendix IV parameter that exceeded the GWPS 1st semi-annual 2023 was certified January 29, 2024 and submitted to TCEQ January 30, 2024 for approval.
- The 2nd semi-annual sampling event was held in October 2023 and data are still undergoing statistical analysis.
- Because an alternate source for the SSL(s) was identified, but no alternate source for the SSI(s) was identified, WBAP 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 March 30, 2022, WBAP ceased receipt of CCR and non-CCR wastestreams and commenced closure by removal in accordance with the certified closure plan.
- The CCR material was removed from April to June of 2022 from the WBAP. An additional 12 inches of soil was then removed, finishing in July of 2022. The last inspection for the removal was completed on July 26, 2022.
- On May 5, 2023, the WBAP was closed by removal in accordance with 30 TAC §352.1221 (40 CFR 257.102) and the most recent Written Closure Plan. A Closure Completion Notification certified by a Professional engineer was submitted to TCEQ. Groundwater monitoring will continue until TCEQ's Executive Director issues a closure certification.

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

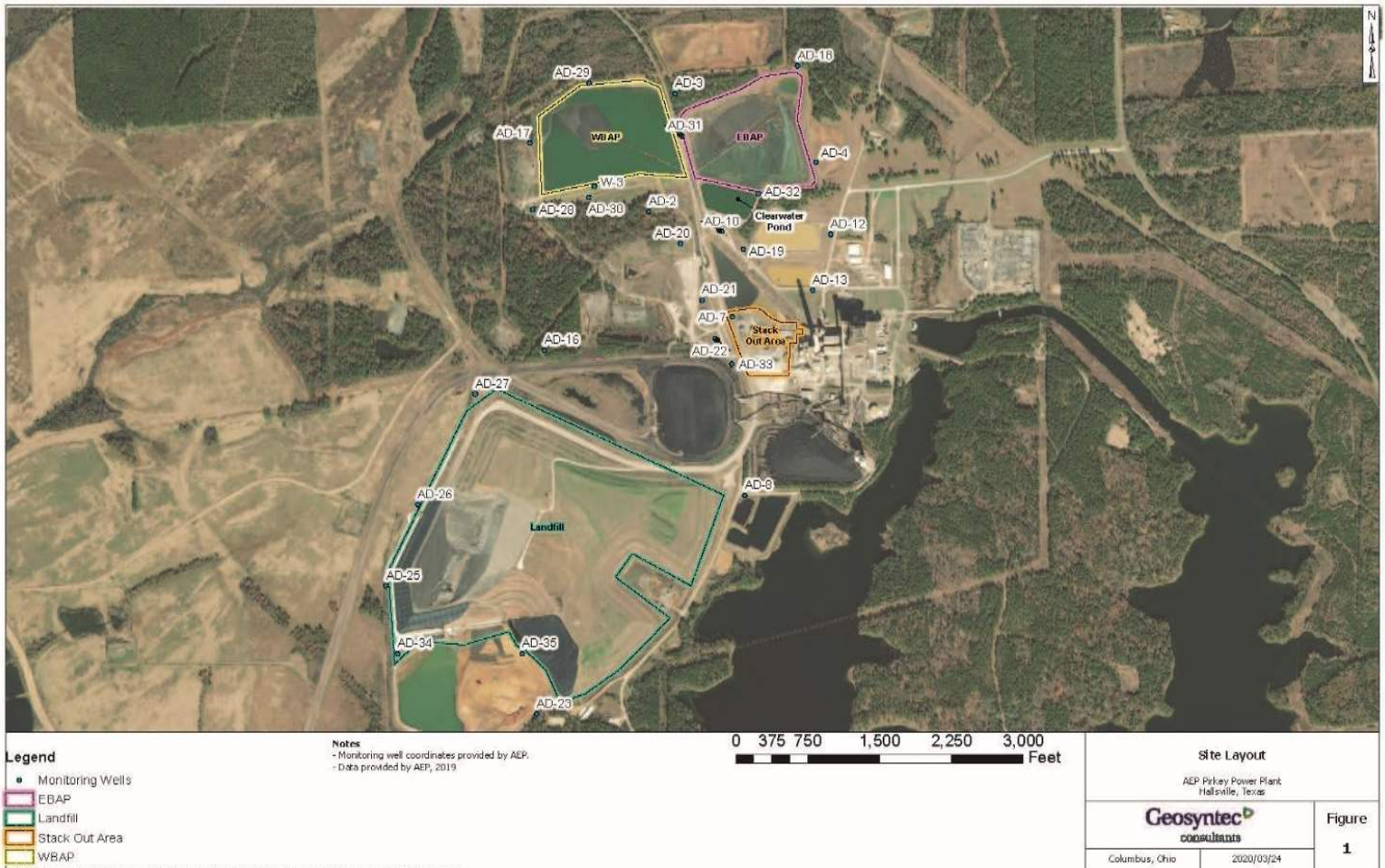
- A map, aerial photograph or a drawing showing the CCR management unit(s), all groundwater monitoring wells and monitoring well identification numbers;
- All of the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected 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.

WBAP Monitoring Wells	
Upgradient	Downgradient
AD-3	AD-17
AD-12	AD-28
AD-18	AD-30



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 WBAP, did not change. That network design report, 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.

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-28

The following Appendix III parameters exceeded background:

- Boron at AD-28 and AD-30
- Chloride at AD-17 and AD-30
- Fluoride at AD-17 and AD-28
- Sulfate at AD-30
- TDS at AD-30

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

The following Appendix IV parameters exceeded established GWPS:

- Cobalt at AD-28

The following Appendix III parameters exceeded background:

- Boron at AD-28 and AD-30
- Chloride at AD-17 and AD-30

- Fluoride at AD-28
- Sulfate at AD-30
- TDS at AD-30

The 2nd semi-annual sampling event was held in October 2023 and data are still undergoing statistical analysis.

VI. Alternate Source Demonstration

A successful ASDs for the Appendix IV parameter that exceeded the GWPS for the 2nd semi-annual 2022 was certified on June 27, 2023 and submitted to TCEQ June 27, 2023 for approval.

A successful ASD for the Appendix IV parameter that exceeded the GWPS 1st semi-annual 2023 was certified January 29, 2024 and submitted to TCEQ January 30, 2024 for approval.

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, WBAP remained in Assessment Monitoring

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

The WBAP 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 WBAP, 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.

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 March 30, 2022, WBAP ceased receipt of CCR and non-CCR wastestreams and commenced closure by removal for this CCR Unit in accordance with the certified closure plan.

The CCR material was removed from April to June of 2022 from the WBAP. An additional 12 inches of soil was then removed, finishing in July of 2022. The last inspection for the removal was completed on July 26, 2022.

On May 5, 2023, the WBAP was closed by removal in accordance with 30 TAC §352.1221 (40 CFR 257.102) and the most recent Written Closure Plan. A Closure Completion Notification certified by a Professional engineer was submitted to TCEQ. Groundwater monitoring will continue until TCEQ's Executive Director issues a closure certification.

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:

- Complete the statistical evaluation of the second semi-annual groundwater monitoring event that took place in October 2023;
- If any SSLs are identified, then an alternate source demonstration will be completed.
- Responding to any new data received in light of 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-3
Pirkey - WBAP
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	0.04	2.9	6	< 0.083 U1	4.9	18	136
7/14/2016	Background	0.06	4.67	6	< 0.083 U1	4.7	30	161
9/8/2016	Background	0.06	4.28	7	< 0.083 U1	4.5	28	145
10/13/2016	Background	0.05	4.93	8	< 0.083 U1	5.5	31	168
11/14/2016	Background	0.07	4.61	7	< 0.083 U1	5.4	29	170
1/12/2017	Background	0.05	3.81	7	< 0.083 U1	5.3	27	152
3/1/2017	Background	0.05	2.55	5	< 0.083 U1	5.1	16	124
4/10/2017	Background	0.06	2.6	10	< 0.083 U1	4.9	19	140
8/24/2017	Detection	0.08625	2.37	6	< 0.083 U1	5.6	17	68
3/22/2018	Assessment	0.05508	3.41	5	< 0.083 U1	5.3	26	140
8/21/2018	Assessment	0.055	4.79	9	< 0.083 U1	5.6	34	166
2/27/2019	Assessment	0.034	3.46	6.16	0.04 J1	5.3	21.8	50
5/23/2019	Assessment	0.045	6.19	5.99	0.09	4.9	29.5	154
8/13/2019	Assessment	0.05 J1	5.08	6.83	0.19	5.1	32.5	168
3/11/2020	Assessment	0.04 J1	2.84	5.76	0.04 J1	4.8	19.5	124
6/3/2020	Assessment	0.04 J1	4.56	6.44	0.09	5.3	29.2	171
11/3/2020	Assessment	0.054	4.58	6.32	0.08	5.0	30.1	167
3/9/2021	Assessment	0.03 J1	4.22	5.98	0.06	5.0	27.1	158
5/25/2021	Assessment	0.051	4.7	6.06	0.08	4.6	28.8	150
11/16/2021	Assessment	0.054	4.92	6.42	0.12	5.3	31.3	150
3/29/2022	Assessment	0.059	6.09	6.84	0.21	4.8	34.0	170 L1
6/21/2022	Assessment	0.08 J1	3.1	5.65	0.04 J1	4.4	21.2	--
8/30/2022	Assessment	--	--	--	--	4.7	--	170
11/16/2022	Assessment	0.063	5.05	7.40	0.18	5.9	34.4	160
6/27/2023	Assessment	0.037 J1	2.95	5.67	0.03 J1	5.8	22.4	150
10/18/2023	Assessment	0.036 J1	4.04	6.17	0.06	4.8	28.6	140

**Table 1. Groundwater Data Summary: AD-3
Pirkey - WBAP
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	59	0.412956 J1	0.0947139 J1	0.724945 J1	3.12937 J1	1.059	< 0.083 U1	< 0.68 U1	0.025	0.00992 J1	0.774997 J1	3.29747 J1	< 0.86 U1
7/14/2016	Background	< 0.93 U1	2.10876 J1	70	0.583927 J1	< 0.07 U1	1	7	1.69	< 0.083 U1	< 0.68 U1	0.095	0.025	1.16077 J1	2.50173 J1	< 0.86 U1
9/8/2016	Background	< 0.93 U1	< 1.05 U1	70	0.502486 J1	< 0.07 U1	0.974129 J1	7	1.491	< 0.083 U1	< 0.68 U1	0.087	0.00618 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
10/13/2016	Background	< 0.93 U1	4.22879 J1	82	0.591063 J1	0.159178 J1	2	9	3.42	< 0.083 U1	< 0.68 U1	0.991	0.0073 J1	< 0.29 U1	1.92667 J1	< 0.86 U1
11/14/2016	Background	< 0.93 U1	1.98138 J1	64	0.310985 J1	< 0.07 U1	0.42234 J1	8	1.532	< 0.083 U1	< 0.68 U1	0.092	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/12/2017	Background	< 0.93 U1	< 1.05 U1	62	0.281878 J1	< 0.07 U1	0.551806 J1	4.96138 J1	2.01	< 0.083 U1	< 0.68 U1	0.079	0.0057 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/1/2017	Background	< 0.93 U1	< 1.05 U1	62	0.279961 J1	< 0.07 U1	< 0.23 U1	2.54266 J1	0.862	< 0.083 U1	< 0.68 U1	0.046	< 0.005 U1	< 0.29 U1	1.78128 J1	1.13014 J1
4/10/2017	Background	< 0.93 U1	< 1.05 U1	61	0.284613 J1	< 0.07 U1	0.250858 J1	2.40319 J1	0.991	< 0.083 U1	< 0.68 U1	0.046	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/22/2018	Assessment	< 0.93 U1	< 1.05 U1	57.94	0.22 J1	< 0.07 U1	0.86 J1	3.74 J1	0.739	< 0.083 U1	< 0.68 U1	0.06189	< 0.005 U1	< 0.29 U1	1.13 J1	< 0.86 U1
8/21/2018	Assessment	< 0.01 U1	1.01	63.3	0.240	0.02 J1	0.496	7.18	1.837	< 0.083 U1	0.355	0.0876	< 0.005 U1	0.1 J1	0.1	0.057
2/27/2019	Assessment	0.04 J1	0.13	54.2	< 0.4 U1	0.03 J1	0.04 J1	2.31	0.3144	0.04 J1	0.05 J1	0.0525	< 0.005 U1	< 0.4 U1	0.05 J1	< 0.1 U1
5/23/2019	Assessment	< 0.4 U1	< 0.6 U1	61.8	< 0.4 U1	< 0.2 U1	< 0.8 U1	4.94	0.988	0.09	< 0.4 U1	0.0734	< 0.005 U1	< 8 U1	< 0.6 U1	< 0.1 U1
8/13/2019	Assessment	< 0.02 U1	2.41	58.3	0.196	0.02 J1	0.206	6.55	1.378	0.19	0.417	0.108	< 0.005 U1	< 0.4 U1	0.1 J1	< 0.1 U1
3/11/2020	Assessment	< 0.02 U1	0.81	62.4	0.312	0.02 J1	0.1 J1	2.62	1.504	0.04 J1	0.396	0.0353	0.003 J1	< 0.4 U1	0.09 J1	< 0.1 U1
6/3/2020	Assessment	< 0.02 U1	0.66	57.4	0.228	0.09	0.226	4.36	1.352	0.09	0.372	0.0561	0.003 J1	< 0.4 U1	0.06 J1	< 0.1 U1
11/3/2020	Assessment	< 0.02 U1	1.22	64.8	0.257	0.02 J1	0.220	5.27	1.594	0.08	0.364	0.0714	< 0.002 U1	< 0.4 U1	0.08 J1	< 0.1 U1
3/9/2021	Assessment	< 0.02 U1	0.53	60.7	0.185	0.02 J1	0.207	3.63	0.709	0.06	0.1 J1	0.0445	< 0.002 U1	< 0.1 U1	< 0.09 U1	< 0.04 U1
5/25/2021	Assessment	< 0.02 U1	0.49	66.4	0.169	0.097	0.32	3.98	1.30	0.08	0.20	0.0452	< 0.002 U1	< 0.1 U1	0.09 J1	0.05 J1
11/16/2021	Assessment	< 0.02 U1	1.90	64.1	0.200	0.016 J1	0.63	5.87	1.32	0.12	0.43	0.0722	0.006	< 0.1 U1	< 0.09 U1	< 0.04 U1
3/29/2022	Assessment	< 0.02 U1	1.51	68.3	0.163	0.012 J1	0.40	7.88	1.91	0.21	0.28	0.0934	< 0.002 U1	< 0.1 U1	< 0.09 U1	0.04 J1
6/21/2022	Assessment	< 0.1 U1	0.2 J1	55.6	0.22 J1	< 0.02 U1	0.3 J1	2.70	1.68	0.04 J1	< 0.3 U1	0.0457	0.004 J1	< 0.5 U1	< 0.5 U1	< 0.2 U1
11/16/2022	Assessment	< 0.02 U1	1.22	63.7	0.186	0.012 J1	0.63	7.40	1.51	0.18	0.31	0.0837	< 0.002 U1	< 0.1 U1	0.09 J1	0.05 J1
6/27/2023	Assessment	0.011 J1	0.80	52.2	0.200	0.020	0.31	2.79	0.91	0.03 J1	0.25	0.0414	< 0.002 U1	< 0.1 U1	0.04 J1	0.05 J1
10/18/2023	Assessment	< 0.008 U1	0.57	57.7	0.174	0.016 J1	0.33	3.70	1.19	0.06	0.12 J1	0.0587	< 0.002 U1	< 0.1 U1	0.04 J1	0.05 J1

**Table 1. Groundwater Data Summary: AD-12
Pirkey - WBAP
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 - WBAP

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-17
Pirkey - WBAP
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	0.02	0.648	12	< 0.083 U1	4.3	4	68
7/14/2016	Background	0.03	1.28	34	< 0.083 U1	3.3	4	96
9/8/2016	Background	0.03	1.19	29	< 0.083 U1	3.9	6	88
10/13/2016	Background	0.03	1.34	32	0.393 J1	3.6	6	96
11/15/2016	Background	0.03	1.3	30	0.3446 J1	3.7	6	88
1/12/2017	Background	0.03	1.08	26	< 0.083 U1	4.4	6	90
3/1/2017	Background	0.04	0.57	19	< 0.083 U1	4.0	5	80
4/10/2017	Background	0.03	0.395	20	< 0.083 U1	4.2	9	88
8/24/2017	Detection	0.04495	1.06	25	0.245 J1	4.6	6	98
12/21/2017	Detection	--	--	26	< 0.083 U1	--	8	76
3/22/2018	Assessment	0.03113	0.0981	13	< 0.083 U1	4.4	5	44
8/21/2018	Assessment	0.044	0.997	35	< 0.083 U1	3.9	7	98
2/28/2019	Assessment	0.03 J1	0.2 J1	10.2	0.12	3.7	2.4	68
5/23/2019	Assessment	0.019	0.2 J1	10.3	0.13	4.0	2.4	58
8/13/2019	Assessment	0.03 J1	0.777	26.3	0.24	4.8	1.8	88
3/11/2020	Assessment	< 0.02 U1	0.1 J1	10.1	0.13	4.4	2.4	60 J1
6/3/2020	Assessment	0.02 J1	0.312	22.7	0.26	4.2	2.7	77
11/3/2020	Assessment	0.03 J1	1.06	32.4	0.24	3.7	1.8	86
3/9/2021	Assessment	0.02 J1	< 0.1 U1	10.2	0.17	4.3	2.3	83
5/25/2021	Assessment	0.031 J1	< 0.1 U1	9.30	0.17	3.9	2.66	60
11/16/2021	Assessment	0.022 J1	0.98	31.3	0.29	4.0	2.58	90
3/29/2022	Assessment	0.031 J1	0.24	16.2	0.26	4.1	6.77	60 L1
6/21/2022	Assessment	0.021 J1	1.10	30.2	0.30	3.3	5.78	90
11/16/2022	Assessment	0.026 J1	1.23	35.0	0.26	4.5	2.91	80
6/26/2023	Assessment	0.032 J1	0.23	15.4	0.19	4.5	2.4	60
10/17/2023	Assessment	0.023 J1	0.94	29.7	0.27	3.1	1.6	77

Table 1. Groundwater Data Summary: AD-17

Pirkey - WBAP

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	1.21333 J1	143	0.507354 J1	0.0868344 J1	1	5	2.082	< 0.083 U1	< 0.68 U1	< 0.00013 U1	0.06	< 0.29 U1	2.55378 J1	< 0.86 U1
7/14/2016	Background	< 0.93 U1	1.3096 J1	334	0.85295 J1	0.0833036 J1	2	14	3.12	< 0.083 U1	< 0.68 U1	0.027	0.138	0.485824 J1	< 0.99 U1	< 0.86 U1
9/8/2016	Background	< 0.93 U1	1.76675 J1	327	0.948023 J1	< 0.07 U1	5	14	4.473	< 0.083 U1	< 0.68 U1	0.028	0.142	< 0.29 U1	< 0.99 U1	1.0754 J1
10/13/2016	Background	< 0.93 U1	< 1.05 U1	324	0.753919 J1	< 0.07 U1	0.542006 J1	14	6.64	0.393 J1	< 0.68 U1	0.026	0.05	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/15/2016	Background	< 0.93 U1	< 1.05 U1	290	0.708598 J1	< 0.07 U1	0.448238 J1	13	7.94	0.3446 J1	< 0.68 U1	0.026	0.078	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/12/2017	Background	< 0.93 U1	< 1.05 U1	234	0.541302 J1	< 0.07 U1	0.723126 J1	10	9.6	< 0.083 U1	< 0.68 U1	0.023	0.055	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/1/2017	Background	< 0.93 U1	< 1.05 U1	176	0.499114 J1	< 0.07 U1	0.359001 J1	8	2.31	< 0.083 U1	< 0.68 U1	0.019	0.084	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/10/2017	Background	< 0.93 U1	< 1.05 U1	140	0.511666 J1	< 0.07 U1	0.689417 J1	7	3.67	< 0.083 U1	< 0.68 U1	0.016	0.069	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/22/2018	Assessment	< 0.93 U1	< 1.05 U1	94.77	0.38 J1	< 0.07 U1	1.21	4.57 J1	1.669	< 0.083 U1	< 0.68 U1	0.01186	0.125	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/21/2018	Assessment	< 0.01 U1	0.41	223	0.588	0.04	0.367	10.9	2.505	< 0.083 U1	0.181	0.0234	0.216	< 0.02 U1	0.5	0.051
2/28/2019	Assessment	< 0.4 U1	< 0.6 U1	71.4	< 0.4 U1	< 0.2 U1	< 0.8 U1	2.93	0.772	0.12	< 0.4 U1	0.00912	0.107	< 8 U1	< 0.6 U1	< 2 U1
5/23/2019	Assessment	< 0.4 U1	< 0.6 U1	82.9	< 0.4 U1	< 0.2 U1	0.9 J1	3.15	1.62	0.13	< 0.4 U1	0.00911	0.103	< 8 U1	< 0.6 U1	< 0.1 U1
8/13/2019	Assessment	< 0.02 U1	0.40	216	0.554	0.04 J1	0.732	9.03	6.40	0.24	0.2 J1	0.0193	0.447	< 0.4 U1	0.3	< 0.1 U1
3/11/2020	Assessment	< 0.02 U1	0.46	73.5	0.285	0.02 J1	0.700	3.04	3.986	0.13	0.2 J1	0.00822	0.175	< 0.4 U1	0.2 J1	< 0.1 U1
6/3/2020	Assessment	< 0.02 U1	0.17	176	0.553	0.03 J1	0.208	7.02	2.44	0.26	0.09 J1	0.0147	0.346	< 0.4 U1	0.4	< 0.1 U1
11/3/2020	Assessment	< 0.02 U1	0.44	263	0.610	0.05	0.518	12.1	8.21	0.24	0.209	0.0237	0.476	< 0.4 U1	0.4	< 0.1 U1
3/9/2021	Assessment	< 0.02 U1	0.13	76.7	0.321	0.02 J1	0.222	3.05	0.816	0.17	0.06 J1	0.00924	0.123	< 0.1 U1	0.1 J1	< 0.04 U1
5/25/2021	Assessment	< 0.02 U1	0.14	74.5	0.262	0.012 J1	0.36	2.85	1.41	0.17	0.07 J1	0.00759	0.127	< 0.1 U1	0.12 J1	< 0.04 U1
11/16/2021	Assessment	< 0.02 U1	0.21	266	0.686	0.058	0.33	11.8	6.42	0.29	0.13 J1	0.0236	0.350	< 0.1 U1	0.35 J1	0.04 J1
3/29/2022	Assessment	< 0.02 U1	0.30	112	0.481	0.028	0.70	6.48	3.01	0.26	0.1 J1	0.0126	0.300 J1	< 0.1 U1	0.26 J1	< 0.04 U1
6/21/2022	Assessment	< 0.02 U1	0.39	250	0.650	0.063	0.51	12.2	11.96	0.30	0.13 J1	0.0206	0.200 J1	< 0.1 U1	0.44 J1	0.05 J1
11/16/2022	Assessment	< 0.02 U1	0.13	276	0.662	0.061	0.37	12.7	6.75	0.26	0.16 J1	0.0267	0.400 J1	< 0.1 U1	0.36 J1	0.07 J1
6/26/2023	Assessment	0.008 J1	0.16	112	0.354	0.022	0.49	5.15	2.90	0.19	0.13 J1	0.0106	0.297	< 0.1 U1	0.17 J1	< 0.02 U1
10/17/2023	Assessment	< 0.008 U1	0.22	249	0.667	0.054	0.31	11.0	5.39	0.27	0.12 J1	0.0244	0.196	< 0.1 U1	0.58	0.04 J1

**Table 1. Groundwater Data Summary: AD-18
Pirkey - WBAP
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
5/10/2016	Background	0.01	0.548	8	< 0.083 U1	4.5	7	108
7/14/2016	Background	0.01	0.409	8	< 0.083 U1	4.7	7	116
9/8/2016	Background	0.01	0.343	8	< 0.083 U1	4.7	8	110
10/13/2016	Background	0.02	0.56	7	< 0.083 U1	4.1	10	124
11/15/2016	Background	0.02	0.59	7	< 0.083 U1	4.4	7	134
1/12/2017	Background	0.01	0.415	7	< 0.083 U1	4.7	10	128
3/1/2017	Background	0.01	0.224	6	< 0.083 U1	4.1	7	108
4/10/2017	Background	0.01	0.304	7	< 0.083 U1	4.1	8	102
8/24/2017	Detection	0.0278	0.435	8	< 0.083 U1	4.9	8	68
3/22/2018	Assessment	0.01642	0.292	6	< 0.083 U1	5.4	6	100
8/21/2018	Assessment	0.012	0.321	10	< 0.083 U1	5.1	8	118
2/28/2019	Assessment	< 0.02 U1	0.490	8.19	0.02 J1	5.0	6.1	84
5/23/2019	Assessment	0.013	0.684	8.82	0.02 J1	5.2	10.6	104
8/13/2019	Assessment	< 0.02 U1	0.647	8.49	0.01 J1	5.2	6.6	90
3/11/2020	Assessment	< 0.02 U1	0.3 J1	7.34	0.02 J1	4.4	6.1	90 J1
6/3/2020	Assessment	< 0.02 U1	0.2 J1	8.30	0.03 J1	4.5	6.3	119
11/3/2020	Assessment	--	--	--	--	4.4	--	--
11/4/2020	Assessment	< 0.02 U1	0.2 J1	6.30	0.02 J1	--	6.3	100
3/9/2021	Assessment	0.009 J1	0.2 J1	6.61	0.02 J1	4.5	6.6	113
5/25/2021	Assessment	0.021 J1	0.3	7.16	0.02 J1	4.4	7.46	100 P1
11/16/2021	Assessment	--	--	--	--	3.9	--	--
11/17/2021	Assessment	0.01 J1	0.20	5.99	< 0.02 U1	--	6.23	100
3/29/2022	Assessment	0.009 J1	0.24	5.26	< 0.02 U1	4.4	7.31	140 L1
6/21/2022	Assessment	--	--	--	--	4.6	--	--
6/22/2022	Assessment	< 0.009 U1	1.49	5.20	< 0.02 U1	--	6.47	110
11/15/2022	Assessment	--	--	--	--	4.5	--	--
11/16/2022	Assessment	0.011 J1	0.19	4.94	< 0.02 U1	--	6.55	90
2/28/2023	Assessment	< 0.009 U1	0.18	5.49	< 0.02 U1	4.4	7.52	100
6/27/2023	Assessment	0.009 J1	0.23	5.28	< 0.02 U1	4.4	8.2	110
8/23/2023	Assessment	0.012 J1	3.17	5.02	0.02 J1	4.4	6.9	88
10/18/2023	Assessment	0.011 J1	0.35	5.05	< 0.02 U1	3.9	10	98

Table 1. Groundwater Data Summary: AD-18

Pirkey - WBAP

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
5/10/2016	Background	< 0.93 U1	< 1.05 U1	157	0.262755 J1	0.109247 J1	1	1.82932 J1	0.847	< 0.083 U1	< 0.68 U1	0.004	0.01536 J1	< 0.29 U1	1.71074 J1	< 0.86 U1
7/14/2016	Background	< 0.93 U1	3.77261 J1	139	0.243326 J1	< 0.07 U1	3	2.16037 J1	3.264	< 0.083 U1	< 0.68 U1	0.02	0.064	0.41347 J1	2.45009 J1	< 0.86 U1
9/8/2016	Background	< 0.93 U1	< 1.05 U1	115	0.226343 J1	< 0.07 U1	0.779959 J1	1.09947 J1	1.105	< 0.083 U1	< 0.68 U1	0.019	0.03	< 0.29 U1	< 0.99 U1	< 0.86 U1
10/13/2016	Background	< 0.93 U1	< 1.05 U1	112	0.192611 J1	< 0.07 U1	0.631027 J1	2.24885 J1	1.161	< 0.083 U1	< 0.68 U1	0.026	0.01416 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/15/2016	Background	< 0.93 U1	< 1.05 U1	94	0.107171 J1	< 0.07 U1	0.724569 J1	1.66054 J1	1.486	< 0.083 U1	< 0.68 U1	0.017	0.029	< 0.29 U1	< 0.99 U1	< 0.86 U1
1/12/2017	Background	< 0.93 U1	< 1.05 U1	99	0.169196 J1	< 0.07 U1	0.411433 J1	1.62881 J1	0.976	< 0.083 U1	< 0.68 U1	0.026	0.01887 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/1/2017	Background	< 0.93 U1	< 1.05 U1	99	0.105337 J1	< 0.07 U1	0.572874 J1	0.976724 J1	0.468	< 0.083 U1	< 0.68 U1	0.017	0.01086 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/10/2017	Background	< 0.93 U1	< 1.05 U1	105	0.130316 J1	< 0.07 U1	0.967681 J1	0.98157 J1	0.648	< 0.083 U1	< 0.68 U1	0.019	0.0096 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/22/2018	Assessment	< 0.93 U1	< 1.05 U1	97.75	0.09 J1	< 0.07 U1	< 0.23 U1	0.97 J1	0.942	< 0.083 U1	< 0.68 U1	0.01647	0.006 J1	< 0.29 U1	1.53 J1	< 0.86 U1
8/21/2018	Assessment	0.02 J1	1.01	99.8	0.129	0.02 J1	0.809	1.18	1.108	< 0.083 U1	0.280	0.0175	0.014 J1	0.08 J1	0.2	0.060
2/28/2019	Assessment	< 0.4 U1	< 0.6 U1	106	< 0.4 U1	< 0.2 U1	< 0.8 U1	1.11	0.615	0.02 J1	0.7 J1	0.0177	0.009 J1	< 8 U1	< 0.6 U1	< 2 U1
5/23/2019	Assessment	< 0.4 U1	< 0.6 U1	131	< 0.4 U1	< 0.2 U1	< 0.8 U1	1.47	0.492	0.02 J1	< 0.4 U1	0.0209	0.009 J1	< 8 U1	< 0.6 U1	< 0.1 U1
8/13/2019	Assessment	< 0.02 U1	0.45	100	0.118	0.02 J1	0.212	1.25	0.473	0.01 J1	0.2 J1	0.0183	0.023 J1	< 0.4 U1	0.09 J1	< 0.1 U1
3/11/2020	Assessment	< 0.02 U1	0.09 J1	97.1	0.09 J1	0.01 J1	0.1 J1	0.948	4.813	0.02 J1	< 0.05 U1	0.0134	0.003 J1	< 0.4 U1	0.05 J1	< 0.1 U1
6/3/2020	Assessment	< 0.02 U1	0.22	100	0.1 J1	0.01 J1	0.2 J1	0.950	0.728	0.03 J1	0.06 J1	0.0132	0.007	< 0.4 U1	0.09 J1	< 0.1 U1
11/4/2020	Assessment	< 0.02 U1	0.29	89.3	0.08 J1	0.01 J1	0.1 J1	0.917	1.169	0.02 J1	0.06 J1	0.0128	0.028	< 0.4 U1	0.2 J1	< 0.1 U1
3/9/2021	Assessment	< 0.02 U1	0.28	88.7	0.09 J1	0.01 J1	0.271	0.827	0.331	0.02 J1	0.08 J1	0.0131	0.006	< 0.1 U1	0.1 J1	< 0.04 U1
5/25/2021	Assessment	< 0.02 U1	0.42	103	0.088	0.014 J1	0.55	0.964	0.77	0.02 J1	0.15 J1	0.0127	0.014	< 0.1 U1	0.13 J1	0.05 J1
11/17/2021	Assessment	< 0.02 U1	0.19	82.2	0.078	0.011 J1	0.31	0.801	1.91	< 0.02 U1	< 0.05 U1	0.0124	0.030	< 0.1 U1	0.11 J1	< 0.04 U1
3/29/2022	Assessment	0.02 J1	1.55	90.1	0.106	0.01 J1	1.40	0.842	2.01	< 0.02 U1	0.53	0.0137	0.021	< 0.1 U1	0.38 J1	0.05 J1
6/22/2022	Assessment	< 0.02 U1	0.30	79.3	0.073	0.012 J1	0.47	0.790	0.73	< 0.02 U1	0.11 J1	0.0108	< 0.007 U1	< 0.1 U1	0.14 J1	< 0.04 U1
11/16/2022	Assessment	< 0.02 U1	0.25	77.4	0.071	0.009 J1	0.54	0.723	1.61	< 0.02 U1	0.08 J1	0.0125	0.018	< 0.1 U1	0.12 J1	< 0.04 U1
2/28/2023	Assessment	< 0.02 U1	0.26	77.9	0.085	0.01 J1	0.38	0.750	1.10	< 0.02 U1	0.18 J1	0.0123	0.006	< 0.1 U1	< 0.09 U1	< 0.04 U1
6/27/2023	Assessment	0.009 J1	0.55	89.0	0.132	0.013 J1	0.57	0.933	2.53	< 0.02 U1	0.13 J1	0.0138	0.010	< 0.1 U1	0.15 J1	0.04 J1
8/23/2023	Assessment	0.056 J1	0.54	70.6	0.115	0.015 J1	1.15	0.731	1.27	0.02 J1	0.43	0.0119	0.005	0.1 J1	0.18 J1	0.03 J1
10/18/2023	Assessment	0.023 J1	0.43	84.0	0.127	0.018 J1	0.52	1.26	1.27	< 0.02 U1	0.12 J1	0.0186	0.084	< 0.1 U1	0.17 J1	0.05 J1

**Table 1. Groundwater Data Summary: AD-28
Pirkey - WBAP
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	0.277	2.16	6	0.9005 J1	4.7	18	106
7/14/2016	Background	0.301	1.69	6	0.4478 J1	5.1	17	96
9/7/2016	Background	0.332	1.25	6	0.3966 J1	4.1	19	94
10/13/2016	Background	0.23	3.21	6	0.532 J1	5.3	19	124
11/15/2016	Background	0.32	1.64	8	0.9199 J1	4.2	16	112
1/12/2017	Background	0.285	1.22	7	0.7158 J1	4.1	17	84
3/1/2017	Background	0.293	1.25	5	< 0.083 U1	3.4	18	96
4/10/2017	Background	0.293	1.2	7	0.6732 J1	4.1	20	104
8/24/2017	Detection	0.281	1.22	6	0.557 J1	5.1	18	96
12/21/2017	Detection	0.277	1.14	--	--	--	--	--
3/22/2018	Assessment	0.254	1.4	5	0.6327 J1	5.2	23	100
8/21/2018	Assessment	0.330	1.39	9	0.4982 J1	5.0	22	96
2/27/2019	Assessment	0.458	1.65	6.29	0.81	5.0	19.6	32
5/22/2019	Assessment	0.313	1.24	4.48	0.69	4.6	20.1	100
8/12/2019	Assessment	0.366	1.72	6.04	0.65	4.7	22.5	128
3/11/2020	Assessment	0.370	1.14	5.48	1.04	4.2	29.1	112
6/2/2020	Assessment	0.351	1.18	5.33	0.87	4.5	26.2	125
11/2/2020	Assessment	0.395	1.38	5.51	0.55	4.4	21.9	104
3/9/2021	Assessment	0.358	1.26	5.16	1.03	4.2	28.3	117
5/25/2021	Assessment	0.391	1.3	4.92	1.0	3.9	27.6	110
11/16/2021	Assessment	0.363	1.22	4.79	0.58	4.3	24.2	100
3/29/2022	Assessment	0.356	1.31	5.07	0.68	3.7	28.9	100 L1
6/21/2022	Assessment	0.311	1.40	4.36	0.61	4.0	28.0	110
11/16/2022	Assessment	0.334	1.34	4.96	0.48	4.3	23.3	80
6/26/2023	Assessment	0.299	1.48	4.14	0.54	4.2	25.9	120
10/17/2023	Assessment	0.294	1.23	4.64	0.50	3.5	22.1	94

Table 1. Groundwater Data Summary: AD-28

Pirkey - WBAP

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	1.58838 J1	2.49885 J1	223	0.968775 J1	< 0.07 U1	1	18	1.212	0.9005 J1	< 0.68 U1	0.004	0.146	< 0.29 U1	1.10335 J1	< 0.86 U1
7/14/2016	Background	< 0.93 U1	1.52986 J1	170	0.663081 J1	< 0.07 U1	0.982579 J1	15	2.29	0.4478 J1	< 0.68 U1	0.034	0.162	< 0.29 U1	< 0.99 U1	< 0.86 U1
9/7/2016	Background	< 0.93 U1	< 1.05 U1	168	0.728735 J1	< 0.07 U1	0.605543 J1	14	1.44	0.3966 J1	< 0.68 U1	0.03	0.069	< 0.29 U1	< 0.99 U1	1.24745 J1
10/13/2016	Background	< 0.93 U1	6	152	0.42032 J1	< 0.07 U1	6	18	2.547	0.532 J1	< 0.68 U1	0.066	0.085	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/15/2016	Background	< 0.93 U1	1.40867 J1	148	0.520895 J1	< 0.07 U1	0.638766 J1	13	3.35	0.9199 J1	< 0.68 U1	0.032	0.029	0.294156 J1	< 0.99 U1	< 0.86 U1
1/12/2017	Background	< 0.93 U1	< 1.05 U1	154	0.475597 J1	< 0.07 U1	< 0.23 U1	12	2.67	0.7158 J1	< 0.68 U1	0.031	0.025	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/1/2017	Background	< 0.93 U1	< 1.05 U1	163	0.576508 J1	< 0.07 U1	0.968975 J1	14	2.082	< 0.083 U1	< 0.68 U1	0.031	0.025	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/10/2017	Background	< 0.93 U1	< 1.05 U1	162	0.654819 J1	< 0.07 U1	0.324151 J1	15	2.331	0.6732 J1	< 0.68 U1	0.03	0.026	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/22/2018	Assessment	< 0.93 U1	< 1.05 U1	166	0.95 J1	< 0.07 U1	< 0.23 U1	14.36	1.288	0.6327 J1	< 0.68 U1	0.02561	0.046	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/21/2018	Assessment	0.03 J1	0.64	143	0.598	0.05	0.688	14.4	2.028	0.4982 J1	0.266	0.0307	0.028	0.05 J1	0.3	0.03 J1
2/27/2019	Assessment	< 0.4 U1	< 0.6 U1	154	0.9 J1	< 0.2 U1	< 0.8 U1	14.3	2.318	0.81	< 0.4 U1	0.0266	0.061	< 8 U1	< 0.6 U1	< 2 U1
5/22/2019	Assessment	< 0.4 U1	< 0.6 U1	148	0.5 J1	< 0.2 U1	< 0.8 U1	13.8	1.948	0.69	< 0.4 U1	0.0227	0.028	< 8 U1	< 0.6 U1	< 0.1 U1
8/12/2019	Assessment	0.02 J1	0.64	113	0.473	0.04 J1	0.416	12.8	2.381	0.65	0.1 J1	0.0380	0.092	< 0.4 U1	0.2 J1	< 0.1 U1
3/11/2020	Assessment	< 0.02 U1	0.21	172	0.959	0.07	0.235	17.1	2.265	1.04	0.1 J1	0.0226	0.028	< 0.4 U1	0.4	< 0.1 U1
6/2/2020	Assessment	< 0.02 U1	0.16	146	0.801	0.05	0.230	13.6	1.667	0.87	0.06 J1	0.0223	0.026	< 0.4 U1	0.3	< 0.1 U1
11/2/2020	Assessment	< 0.02 U1	0.18	131	0.466	0.04 J1	0.2 J1	13.4	2.33	0.55	0.06 J1	0.0279	0.064	< 0.4 U1	0.2	< 0.1 U1
3/9/2021	Assessment	< 0.02 U1	0.16	153	0.958	0.07	0.292	15.3	1.214	1.03	0.08 J1	0.0223	0.019	< 0.1 U1	0.3	< 0.04 U1
5/25/2021	Assessment	0.02 J1	0.18	153	0.771	0.062	0.47	15.0	1.18	1.0	0.11 J1	0.0190	0.019	< 0.1 U1	0.21 J1	< 0.04 U1
11/16/2021	Assessment	< 0.02 U1	0.27	120	0.501	0.049	0.59	11.8	2.17	0.58	0.10 J1	0.0240	0.024	< 0.1 U1	0.17 J1	< 0.04 U1
3/29/2022	Assessment	< 0.02 U1	0.09 J1	120	0.605	0.057	0.35	12.5	2.98	0.68	0.05 J1	0.0242	0.012	< 0.1 U1	0.26 J1	< 0.04 U1
6/21/2022	Assessment	< 0.02 U1	0.14	130	0.463	0.047	0.40	13.3	5.96	0.61	0.08 J1	0.0213	0.007	< 0.1 U1	0.15 J1	< 0.04 U1
11/16/2022	Assessment	< 0.02 U1	0.10	125	0.459	0.046	0.54	11.8	5.15	0.48	0.15 J1	0.0270	0.008	< 0.1 U1	0.16 J1	< 0.04 U1
6/26/2023	Assessment	0.015 J1	0.22	119	0.562	0.054	0.47	13.1	4.00	0.54	0.11 J1	0.0235	0.013	< 0.1 U1	0.21 J1	0.03 J1
10/17/2023	Assessment	0.009 J1	0.16	114	0.469	0.043	0.42	10.9	2.31	0.50	0.09 J1	0.0262	0.009	< 0.1 U1	0.22 J1	0.03 J1

**Table 1. Groundwater Data Summary: AD-30
Pirkey - WBAP
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	0.258	0.591	18	< 0.083 U1	4.7	14	112
7/14/2016	Background	0.384	0.499	22	< 0.083 U1	4.8	14	118
9/7/2016	Background	0.515	0.27	24	< 0.083 U1	4.4	15	110
10/13/2016	Background	0.625	0.373	24	< 0.083 U1	4.2	18	140
11/15/2016	Background	0.701	0.326	25	< 0.083 U1	4.3	19	132
1/12/2017	Background	0.697	0.286	26	< 0.083 U1	5.2	22	136
3/1/2017	Background	0.824	0.273	22	< 0.083 U1	4.8	25	136
4/11/2017	Background	0.837	0.242	24	< 0.083 U1	4.2	27	124
8/24/2017	Detection	1.39	0.294	25	< 0.083 U1	5.2	46	176
12/21/2017	Detection	1.27	0.363	26	< 0.083 U1	--	48	152
3/22/2018	Assessment	0.937	0.345	17	< 0.083 U1	5.2	44	140
8/21/2018	Assessment	1.57	0.716	29	< 0.083 U1	4.8	66	188
2/28/2019	Assessment	0.491	0.3 J1	14.6	< 0.04 U1	4.2	31.5	--
4/3/2019	Assessment	--	--	--	--	--	--	135
5/23/2019	Assessment	0.520	1.74	18.8	0.04 J1	4.9	29.2	112
8/12/2019	Assessment	1.25	0.302	28.1	0.03 J1	4.9	39.8	160
3/11/2020	Assessment	1.63	0.351	22.8	0.05 J1	4.6	76.4	188
6/2/2020	Assessment	1.58	0.341	23.2	0.05 J1	4.9	77.2	219
11/2/2020	Assessment	2.55	0.523	30.6	0.05 J1	4.4	109	252
3/9/2021	Assessment	1.91	0.478	23.5	0.07	4.5	122	264
5/25/2021	Assessment	1.84	0.6	22.8	0.08	4.1	113	240
11/15/2021	Assessment	2.78	0.67	30.9	0.05 J1	3.7	149	330
3/28/2022	Assessment	2.45	0.66	29.5	0.07	4.0	170	330 L1
6/20/2022	Assessment	2.49	0.75	26.0	0.06	4.2	177	340
11/16/2022	Assessment	2.86	0.71	27.4	0.07	5.1	177	340
6/26/2023	Assessment	1.80	0.54	18.2	0.04 J1	5.0	147	300
10/17/2023	Assessment	2.07	0.79	26.7	0.05 J1	4.2	148	290

Table 1. Groundwater Data Summary: AD-30

Pirkey - WBAP

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	1.71137 J1	1.92931 J1	54	0.155441 J1	< 0.07 U1	3	2.21375 J1	1.057	< 0.083 U1	< 0.68 U1	< 0.00013 U1	0.278	< 0.29 U1	< 0.99 U1	< 0.86 U1
7/14/2016	Background	< 0.93 U1	< 1.05 U1	54	0.126875 J1	< 0.07 U1	0.994219 J1	2.13856 J1	4.701	< 0.083 U1	< 0.68 U1	0.01	0.649	1.14165 J1	< 0.99 U1	< 0.86 U1
9/7/2016	Background	< 0.93 U1	< 1.05 U1	52	0.153878 J1	< 0.07 U1	0.769517 J1	1.83325 J1	0.312	< 0.083 U1	< 0.68 U1	0.009	0.214	< 0.29 U1	< 0.99 U1	1.34697 J1
10/13/2016	Background	< 0.93 U1	< 1.05 U1	56	0.0606961 J1	< 0.07 U1	0.543859 J1	2.26228 J1	2.27	< 0.083 U1	< 0.68 U1	0.01	0.709	< 0.29 U1	< 0.99 U1	< 0.86 U1
11/15/2016	Background	< 0.93 U1	< 1.05 U1	52	0.0603858 J1	< 0.07 U1	< 0.23 U1	1.91681 J1	4.07	< 0.083 U1	< 0.68 U1	0.009	0.584	< 0.29 U1	1.2068 J1	0.959001 J1
1/12/2017	Background	< 0.93 U1	< 1.05 U1	51	0.0580655 J1	< 0.07 U1	0.504125 J1	1.76108 J1	0.355	< 0.083 U1	< 0.68 U1	0.009	1.588	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/1/2017	Background	0.997045 J1	< 1.05 U1	55	0.0632093 J1	< 0.07 U1	0.740184 J1	1.69598 J1	0.354	< 0.083 U1	< 0.68 U1	0.008	2.59	< 0.29 U1	< 0.99 U1	< 0.86 U1
4/11/2017	Background	< 0.93 U1	< 1.05 U1	55	0.0611 J1	< 0.07 U1	0.535696 J1	1.80383 J1	1.861	< 0.083 U1	< 0.68 U1	0.008	1.207	< 0.29 U1	< 0.99 U1	< 0.86 U1
3/22/2018	Assessment	< 0.93 U1	< 1.05 U1	56.42	0.09 J1	< 0.07 U1	1.47	2.6 J1	1.108	< 0.083 U1	< 0.68 U1	0.00837	0.104	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/21/2018	Assessment	< 100 U1	0.77	62.9	0.07 J1	< 0.05 U1	1.22	2.93	0.987	< 0.083 U1	0.2 J1	0.0118	1.123	< 200 U1	0.4 J1	0.1 J1
2/28/2019	Assessment	< 0.4 U1	< 0.6 U1	43.3	< 0.4 U1	< 0.2 U1	4 J1	1.67	1.144	< 0.04 U1	< 0.4 U1	0.00707	0.461	< 8 U1	< 0.6 U1	< 2 U1
5/23/2019	Assessment	< 0.4 U1	0.6 J1	59.2	< 0.4 U1	< 0.2 U1	1 J1	3.26	1.089	0.04 J1	< 0.4 U1	0.00841	0.165	< 8 U1	< 0.6 U1	< 0.1 U1
8/12/2019	Assessment	< 0.02 U1	0.21	58.0	0.07 J1	< 0.01 U1	0.374	2.10	1.217	0.03 J1	0.06 J1	0.00804	0.345	< 0.4 U1	0.2 J1	< 0.1 U1
3/11/2020	Assessment	< 0.02 U1	0.23	82.6	0.08 J1	< 0.01 U1	0.300	2.82	3.41	0.05 J1	0.09 J1	0.00788	0.010	0.8 J1	0.2 J1	< 0.1 U1
6/2/2020	Assessment	< 0.02 U1	0.19	77.3	0.08 J1	< 0.01 U1	0.531	2.64	0.983	0.05 J1	0.09 J1	0.00779	0.021	< 0.4 U1	0.2	< 0.1 U1
11/2/2020	Assessment	< 0.02 U1	0.15	104	0.09 J1	0.01 J1	0.328	4.10	1.311	0.05 J1	< 0.05 U1	0.0104	0.085	< 0.4 U1	0.2 J1	< 0.1 U1
3/9/2021	Assessment	< 0.02 U1	0.15	115	0.107	0.01 J1	0.301	3.87	1.144	0.07	< 0.05 U1	0.00939	0.018	< 0.1 U1	0.3	< 0.04 U1
5/25/2021	Assessment	< 0.02 U1	0.17	104	0.158	0.019 J1	0.42	4.95	1.83	0.08	0.07 J1	0.00858	0.015	< 0.1 U1	0.30 J1	< 0.04 U1
11/15/2021	Assessment	< 0.02 U1	0.21	113	0.107	0.008 J1	0.51	4.55	1.48	0.05 J1	0.06 J1	0.0113	0.060	< 0.1 U1	0.33 J1	< 0.04 U1
3/28/2022	Assessment	< 0.02 U1	0.19	129	0.125	0.012 J1	0.45	4.76	2.30	0.07	< 0.05 U1	0.0101	0.035	< 0.1 U1	0.44 J1	0.04 J1
6/20/2022	Assessment	< 0.02 U1	0.23	106	0.089	0.014 J1	0.42	4.90	3.71	0.06	< 0.05 U1	0.0100	0.014	< 0.1 U1	0.34 J1	0.04 J1
11/16/2022	Assessment	< 0.02 U1	0.16	89.4	0.108	0.013 J1	0.55	4.86	1.52	0.07	< 0.05 U1	0.0119	0.017	< 0.1 U1	0.35 J1	0.05 J1
6/26/2023	Assessment	0.010 J1	0.21	76.7	0.086	0.008 J1	0.57	3.81	1.68	0.04 J1	0.08 J1	0.00896	0.130	< 0.1 U1	0.45 J1	0.04 J1
10/17/2023	Assessment	< 0.008 U1	0.17	63.8	0.090	0.01 J1	0.44	4.11	0.99	0.05 J1	< 0.05 U1	0.0124	0.005	< 0.1 U1	0.42 J1	0.04 J1

**Table 1. Groundwater Data Summary
Pirkey - West Bottom Ash Pond**

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.

mg/L: milligrams per liter

P1: The precision between duplicate results was above acceptance limits.

pCi/L: picocuries per liter

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		
Gradient	Upgradient	AD-4	AD-18	AD-2	AD-31	AD-32	AD-3	AD-18	AD-17	AD-28	AD-30
Well	AD-12	AD-4	AD-18	AD-2	AD-31	AD-32	AD-3	AD-18	AD-17	AD-28	AD-30
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 West Bottom Ash Pond**

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)
West Bottom Ash Pond	AD-3 ^[1]	4.0	NC	NC	11.1	10.9	NC	NC	13.5	9.0
	AD-12 ^[1]	4.0	35.7	3.4	44.0	2.8	30.4	4.0	20.3	6.0
	AD-17 ^[2]	2.0	NC	NC	10.4	5.9	NC	NC	5.7	10.6
	AD-18 ^[1]	2.0	12.1	5.0	15.8	3.8	15.0	4.0	10.4	5.9
	AD-28 ^[2]	2.0	NC	NC	12.7	4.8	NC	NC	12.2	5.0
	AD-30 ^[2]	2.0	NC	NC	11.9	5.1	NC	NC	21.8	2.8

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 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

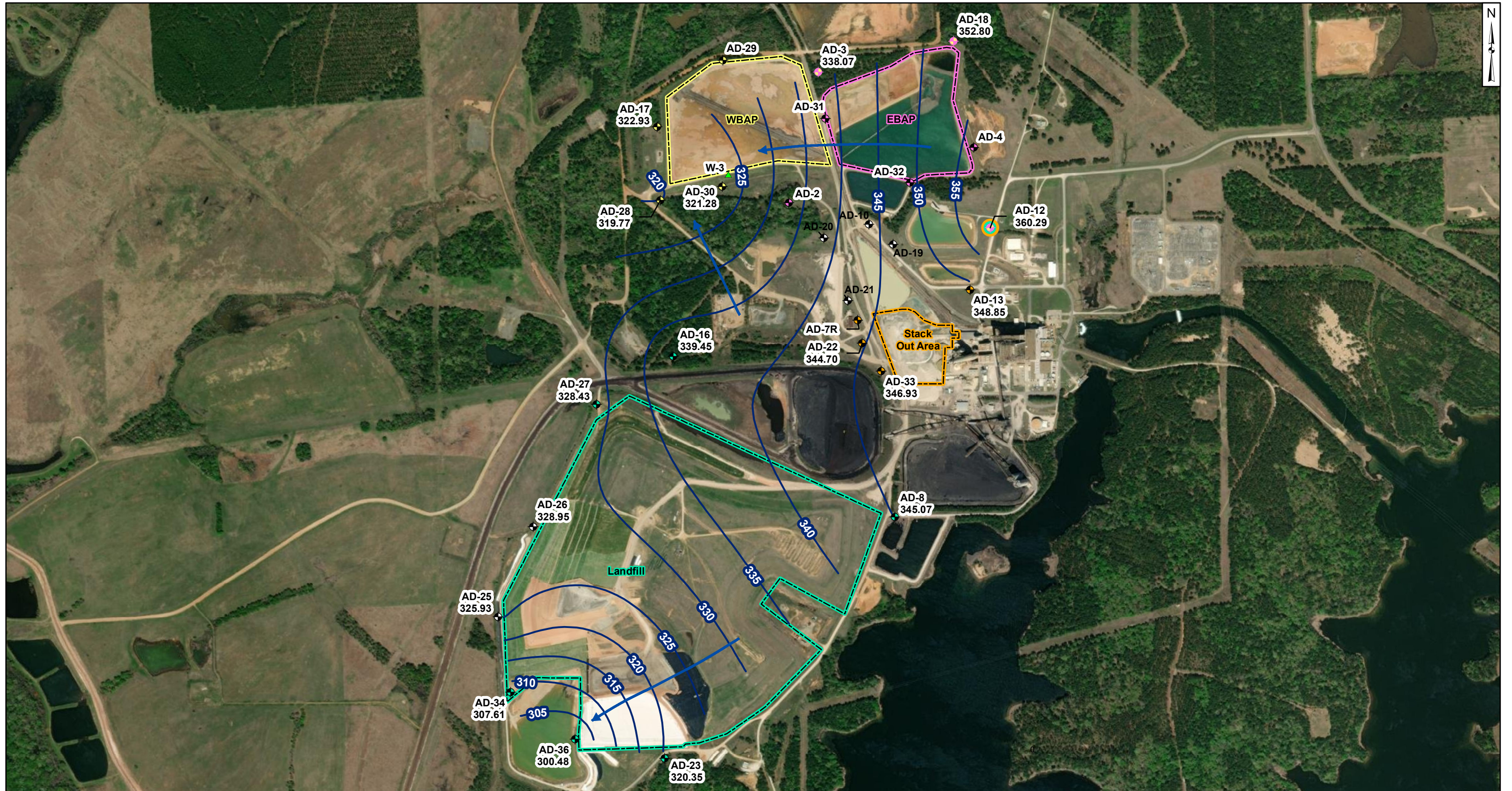
**Potentiometric Contours: Uppermost Aquifer
June 2023**

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Columbus, Ohio 2023/10/06

Figure 1



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 2

APPENDIX 2- Statistical Analyses

The reports summarizing the statistical evaluation follow.

STATISTICAL ANALYSIS SUMMARY, WEST BOTTOM ASH POND

H.W. Pirkey Power Plant Hallsville, Texas

Prepared for

American Electric Power
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Columbus, Ohio 43215-2372

Prepared by

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500 West Wilson Bridge Road, Suite 250
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Project Number: CHA8500B

March 28, 2023

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LIST OF ATTACHMENTS

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
GWPS	groundwater protection standard
LCL	lower confidence limit
LPL	lower prediction limit
MCL	maximum contaminant level
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
WBAP	West Bottom Ash Pond

1. INTRODUCTION

In accordance with the 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 West Bottom Ash Pond (WBAP), an existing CCR unit at the H.W. Pirkey Power Plant located 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 at the WBAP. An alternative source was not identified at the time, so the WBAP initiated assessment monitoring in 2018. GWPSs were set in accordance with § 352.951(b) and a statistical evaluation of the assessment monitoring data was conducted. During 2022, sampling events for both Appendix III parameters and Appendix IV parameters, as required by § 352.951(a), were completed in March and June. During the June 2022 assessment monitoring event, a statistically significant level (SSL) was observed for cobalt (Geosyntec, 2023). In accordance with § 352.951(e), an alternative source demonstration (ASD) was successfully completed (Geosyntec, 2022); thus, the unit remained in assessment monitoring. The results of the assessment monitoring event completed in November 2022 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. An SSL was identified for cobalt. Thus, 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. WEST BOTTOM ASH POND EVALUATION

2.1 Data Validation and QA/QC

During the assessment monitoring program, one set of samples was collected for analysis from the background and compliance wells to meet the requirements of § 352.951(a) in November 2022. 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 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 WBAP were conducted in accordance with the November 2021 Statistical Analysis Plan (Geosyntec 2021a). 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 determined to be the greater value of the background concentration and the maximum contaminant level (MCL) for each Appendix IV parameter. 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. Tolerance limits were calculated parametrically with 95% coverage and 95% confidence for chromium, combined radium, and lithium. Non-parametric tolerance limits were calculated for arsenic, barium, beryllium, cadmium, cobalt, and selenium due to apparent non-normal distributions and for antimony, fluoride, lead, mercury, molybdenum, and thallium due to a high non-detect 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). 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 WBAP:

- The LCL for cobalt exceeded the GWPS of 0.00900 mg/L at AD-28 (0.0133 mg/L).

As a result, either the Pirkey WBAP will move to an assessment of corrective measures or an ASD will be conducted to evaluate whether 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, sulfate, and total dissolved solids (TDS), whereas interwell tests were used to evaluate potential SSIs for boron, chloride, and fluoride. Interwell and intrawell prediction limits are updated periodically during the assessment monitoring period as sufficient data became available.

Mann-Whitney (Wilcoxon rank-sum) tests were performed to determine whether the newer data are affected by a release from the WBAP. Because the interwell Appendix III limits and the Appendix IV GWPSs are based on data from upgradient wells which we would not expect 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) to the new compliance samples (July 2020 – June 2022) for calcium, pH, sulfate, and TDS. Results were evaluated to determine if 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 dataset. Where a statistically significant difference was found between the medians of the two groups, the data were reviewed to evaluate the cause of the difference and to determine if adding newer data to the background dataset, replacing the background dataset with the newer data, or continuing to use the existing background dataset was most appropriate. If the differences appeared to have been caused by a release, then the previous background dataset would have continued to be used.

The complete Mann-Whitney test results and a summary of the significant findings can be found in Attachment C. Statistically significant differences were found between the two groups for pH, sulfate, and TDS at select wells. Typically, when the test concludes that the medians of the two groups are significantly different, particularly in the downgradient wells, the background is not updated to include the newer data but will be reconsidered in the future. In the case of pH at AD-30 and of sulfate at AD-28, the recent data were mostly within the range of historic concentrations. Thus, the background datasets for these well-constituent pairs were updated to include all available data through June 2022. Due to a continuous increase in concentrations for sulfate and TDS at

AD-30, these records were not updated with the more recent compliance data, resulting in more conservative prediction limits. The remaining background datasets were updated to include all available data through June 2022.

Prediction limits for the interwell tests were calculated using data collected during the 2022 assessment monitoring events. New background well data were tested for outliers prior to being added to the background dataset. 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. The revised interwell prediction limits were used to evaluate potential SSIs for boron, chloride, and fluoride.

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

Interwell UPLs were updated for boron, chloride, and fluoride using historical data through November 2022. Intrawell UPLs were calculated for calcium, pH, sulfate, and TDS using historical data through June 2022 except as noted above. The updated prediction limits are summarized in Table 3. The prediction limits were calculated for a one-of-two retesting procedure; i.e., if at least one sample in a series of two does not exceed the UPL, or in the case of pH, is neither less than the lower prediction limit (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 compliance wells for constituents evaluated using intrawell prediction limits.

2.2.4 Evaluation of Potential Appendix III SSIs

While an SSL was identified for the 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 re-calculated 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 0.0693 mg/L at AD-28 (0.334 mg/L) and AD-30 (2.86 mg/L).

- Chloride concentrations exceeded the interwell UPL of 8.92 mg/L at AD-17 (35.0 mg/L) and AD-30 (27.4 mg/L).
- Fluoride concentrations exceeded the interwell UPL of 0.257 mg/L at AD-17 (0.26 mg/L) and AD-28 (0.48 mg/L).
- Sulfate concentrations exceeded the intrawell UPL of 31.6 mg/L at AD-30 (177 mg/L).
- TDS concentrations exceeded the intrawell UPL of 206 mg/L at AD-30 (340 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 WBAP in November 2022 in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that prevented data usage. A review of outliers identified no potential outliers in the November 2022 data. GWPSs were re-established 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. An SSL was identified for cobalt.

The interwell prediction limits for boron, chloride, and fluoride and the intrawell prediction limits for calcium, pH, sulfate, and TDS were updated to incorporate more recent data. Appendix III parameters were compared to established prediction limits, with exceedances identified for boron, chloride, fluoride, sulfate, and TDS.

3. REFERENCES

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

Geosyntec. 2022. Alternative Source Demonstration Report - Texas State CCR Rule. H.W. Pirkey Power Plant. June.

Geosyntec. 2023. October 2022 Assessment Monitoring Report Revisions – Pirkey West Bottom Ash Pond (WBAP). January.

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
Pirkey Plant - West Bottom Ash Pond**

Geosyntec Consultants, Inc.

Parameter	Unit	AD-3	AD-12	AD-17	AD-18	AD-28	AD-30
		11/16/2022	11/15/2022	11/16/2022	11/16/2022	11/16/2022	11/16/2022
Antimony	µg/L	0.1 U1	0.1 U1	0.1 U1	0.1 U1	0.1 U1	0.1 U1
Arsenic	µg/L	1.22	0.06 J1	0.13	0.25	0.10	0.16
Barium	µg/L	63.7	30.6	276	77.4	125	89.4
Beryllium	µg/L	0.186	0.153	0.662	0.071	0.459	0.108
Boron	mg/L	0.063	0.013 J1	0.026 J1	0.011 J1	0.334	2.86
Cadmium	µg/L	0.012 J1	0.007 J1	0.061	0.009 J1	0.046	0.013 J1
Calcium	mg/L	5.05	0.36	1.23	0.19	1.34	0.71
Chloride	mg/L	7.40	8.03	35.0	4.94	4.96	27.4
Chromium	µg/L	0.63	0.45	0.37	0.54	0.54	0.55
Cobalt	µg/L	7.40	1.59	12.7	0.723	11.8	4.86
Combined Radium	pCi/L	1.51	1.46	6.75	1.61	5.15	1.52
Fluoride	mg/L	0.18	0.08	0.26	0.06 U1	0.48	0.07
Lead	µg/L	0.31	0.08 J1	0.16 J1	0.08 J1	0.15 J1	0.2 U1
Lithium	mg/L	0.0837	0.0119	0.0267	0.0125	0.0270	0.0119
Mercury	µg/L	0.005 U1	0.005 U1	0.400 J1	0.018	0.008	0.017
Molybdenum	µg/L	0.5 U1	0.5 U1	0.5 U1	0.5 U1	0.5 U1	0.5 U1
Selenium	µg/L	0.09 J1	0.23 J1	0.36 J1	0.12 J1	0.16 J1	0.35 J1
Sulfate	mg/L	34.4	3.39	2.91	6.55	23.3	177
Thallium	µg/L	0.05 J1	0.2 U1	0.07 J1	0.2 U1	0.2 U1	0.05 J1
Total Dissolved Solids	mg/L	160	70	80	90	80	340
pH	SU	5.94	4.73	4.51	4.46	4.29	5.05

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 which were not detected were replaced with the reporting limit.

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

**Table 2: Appendix IV Groundwater Protection Standards
Pirkey Plant - West Bottom Ash Pond**

Geosyntec Consultants, Inc.

Constituent Name	MCL	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600	0.000100	0.00600
Arsenic, Total (mg/L)	0.0100	0.00423	0.0100
Barium, Total (mg/L)	2.00	0.157	2.00
Beryllium, Total (mg/L)	0.00400	0.00100	0.00400
Cadmium, Total (mg/L)	0.00500	0.000159	0.00500
Chromium, Total (mg/L)	0.100	0.00277	0.100
Cobalt, Total (mg/L)	n/a	0.00900	0.00900
Combined Radium, Total (pCi/L)	5.00	3.07	5.00
Fluoride, Total (mg/L)	4.00	0.257	4.00
Lead, Total (mg/L)	n/a	0.00100	0.00100
Lithium, Total (mg/L)	n/a	0.288	0.288
Mercury, Total (mg/L)	0.00200	0.0000640	0.00200
Molybdenum, Total (mg/L)	n/a	0.00116	0.00116
Selenium, Total (mg/L)	0.0500	0.00330	0.0500
Thallium, Total (mg/L)	0.00200	0.00113	0.00200

Notes:

MCL = Maximum Contaminant Level

GWPS = Groundwater Protection Standard

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

Grey cells indicate the GWPS is based on the calculated UTL because an MCL does not exist.

**Table 3: Appendix III Data Summary
Pirkey - West Bottom Ash Pond**

Analyte	Unit	Description	AD-17	AD-28	AD-30
			11/16/2022	11/16/2022	11/16/2022
Boron	mg/L	Interwell Background Value (UPL)	0.0693		
		Analytical Result	0.026	0.334	2.86
Calcium	mg/L	Intrawell Background Value (UPL)	1.34	3.21	1.03
		Analytical Result	1.23	1.34	0.71
Chloride	mg/L	Interwell Background Value (UPL)	8.92		
		Analytical Result	35.0	4.96	27.4
Fluoride	mg/L	Interwell Background Value (UPL)	0.257		
		Analytical Result	0.26	0.48	0.07
pH	SU	Intrawell Background Value (UPL)	4.7	5.4	5.3
		Intrawell Background Value (LPL)	3.3	3.4	3.8
		Analytical Result	4.5	4.3	5.1
Sulfate	mg/L	Intrawell Background Value (UPL)	8.56	30.1	31.6
		Analytical Result	2.91	23.3	177
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	108	130	206
		Analytical Result	80	80	340

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

Bold values exceed the background value.

Background values are shaded gray.

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

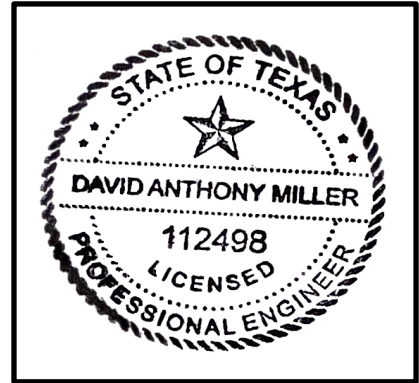
I certify that selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Pirkey West Bottom Ash Pond CCR management area and that the requirements of § 352.931(a) have been met.

David Anthony Miller

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



112498

License Number

Texas

Licensing State

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:

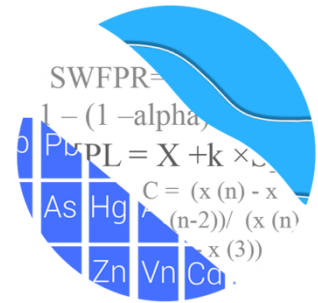
- As reported in SDG 223664, chromium, cobalt, and molybdenum were detected in the equipment blank sample “Equipment Blank” collected on 11/16/2022. The detected chromium concentration in the equipment blank (0.47 µg/L) was more than 10% of the detected values in the groundwater samples, which could 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



February 6, 2023

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

Re: Pirkey WBAP - Assessment Monitoring Event & Background Update 2022

Dear Ms. Kreinberg,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the background update and assessment of 2022 groundwater data for American Electric Power Inc.'s Pirkey West Bottom Ash Pond. 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 Residuals (CCR) program in 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** AD-3, AD-12, and AD-18
- **Downgradient wells:** AD-17, AD-28, and AD-30

Data were sent electronically, and the statistical analysis was reviewed by Kristina Rayner, Founder and Senior Statistician of Groundwater Stats Consulting. The analysis was conducted according to the Statistical Analysis Plan and initial screening evaluation prepared in November 2017 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 CCR program consists of the following constituents listed below. The terms “constituent” and “parameter” are interchangeable.

- **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 and box plots for Appendix III and IV parameters are provided for all wells and constituents, and are used to evaluate concentrations over the entire record (Figures A & B, respectively). A summary of the values identified as outliers in this report and through previous screenings follows this letter. These values are deselected prior to the statistical analysis. All flagged values may also be seen in a lighter font and disconnected symbol on the time series graphs (Figure C).

In earlier analyses, 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 during the initial background screening and demonstrated that the selected statistical methods for Appendix III parameters comply with the USEPA Unified Guidance recommendations as discussed below. During this analysis, data from all wells were screened for updating Appendix III background statistical limits, which was last performed in January 2021, as described below.

Summary of Statistical Methods – Appendix III Parameters

Based on the original background screening described in the 2017 screening report, the following statistical methods were selected for Appendix III parameters:

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

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. While the annual false positive rate associated with parametric limits is fixed at 10% as recommended by the EPA Unified

Guidance (2009), the false positive rate associated with nonparametric limits is not fixed and depends upon the available background sample size, number of future comparisons, and verification resample plan. 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 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 is necessary to accommodate these types of changes. In the intrawell case, data for all wells and constituents may be 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 the interwell case, prediction limits are updated with upgradient well data following each sampling event after careful screening for any new outliers. In some cases, deselecting the earlier portion of data may be necessary prior to construction of limits so that resulting statistical limits are conservative (lower) from a regulatory perspective and capable of rapidly detecting 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.

Appendix III Background Update Summaries

November 2019

Samples from all wells for intrawell parameters and from all upgradient wells for interwell parameters were evaluated using Tukey's outlier test and visual screening. Samples during August and December 2017 that were previously absent were also incorporated into this

analysis. No values were noted or flagged as outliers for Appendix III parameters. A summary of Tukey's test results and flagged outliers followed the November 2019 background update.

For constituents requiring intrawell prediction limits, 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 February 2019 to evaluate whether the groups are statistically different at the 99% confidence level. Statistically significant differences were found between the two groups for pH in upgradient well AD-18, and sulfate in downgradient well AD-30. This resulted in truncating earlier portions of background data for pH in upgradient well AD-18 to use the 8 most recent values and using trend tests in lieu of prediction limits for sulfate in downgradient well AD-30. The full results of the Mann-Whitney test were included with the November 2019 background update.

January 2021

Prior to updating background data for the 2020 analysis, Tukey's outlier test and visual screening were used to evaluate data for outliers at all wells for calcium, pH, sulfate, and TDS, which utilize intrawell prediction limits, and at all upgradient wells for boron, chloride, and fluoride, which utilize interwell prediction limits. No values were noted or flagged as outliers for Appendix III parameters.

No seasonal adjustments were made. However, calcium at well AD-17 showed a possible seasonal pattern, which if it persists, could suggest the need for a seasonal adjustment in the future.

For constituents requiring intrawell prediction limits, the Mann-Whitney (Wilcoxon Rank Sum) test was used to compare the medians of historical data through February 2019 to the new compliance samples at each well through June 2020 to evaluate whether the groups are statistically different at the 99% confidence level. A statistically significant difference was found between the two groups for sulfate in well AD-17 and the record for sulfate at well AD-17 was updated because the recent data were lower than the older data, and the update resulted in the same or a lower prediction limit.

Since the December 2019 background update, concentrations for sulfate in well AD-30 briefly returned (decreased) to near the older historic concentrations, but recently have substantially increased. Although the Mann-Whitney test did not identify a statistically significant difference in medians, a trend test was recommended in lieu of a prediction limit for this well/constituent pair until concentrations stabilize. Additionally, because pH

concentrations in upgradient well AD-18 have returned to historical levels, all historical data were used instead of using a truncated portion of background data as was recommended during the 2019 background update. Intrawell prediction limits using all historical data through June 2020, combined with a 1-of-2 resample plan, were constructed and a trend test was used to evaluate sulfate in well AD-30 which resulted in an increasing trend during the 2020 background update.

For parameters tested using interwell analyses, the Sen's Slope/Mann-Kendall trend test was used to evaluate data in upgradient wells and determine whether concentrations are statistically increasing, decreasing or stable. A statistically significant increasing trend was identified for boron in upgradient well AD-18, and statistically significant decreasing trends were noted for fluoride in upgradient wells AD-3 and AD-12. Since all three of these trends were strongly influenced by substantial numbers of non-detects near one end of the record, no adjustments were made at this time. All well/constituent pairs for parameters using interwell prediction limits were updated to use all historical data through November 2020.

February 2022

Interwell and intrawell prediction limits were last updated during Fall 2020, and the results of those findings were submitted with the January 5, 2021 report. Upgradient well data through November 2021 were re-screened for the purpose of updating the interwell prediction limits for boron, chloride, and fluoride. Intrawell prediction limits will be updated during the Fall 2022 update when sufficient compliance samples are available.

Outlier Analysis

Prior to updating background data during this analysis, Tukey's outlier test and visual screening were used to re-evaluate data through November 2021 at all upgradient wells for parameters utilizing interwell prediction limits (boron, chloride, and fluoride). Tukey's outlier test identified several values as potential outliers; though, no new values were flagged as outliers and no changes were made to previously flagged outliers for these constituents due to the potential outliers either being consistent with previous data, or below the Maximum Containment Level (MCL).

For parameters which use intrawell prediction limits (calcium, pH, sulfate, and TDS), values were not re-evaluated for new outliers as these records had insufficient samples for updating background at that time.

Intrawell – Prediction Limits

Intrawell prediction limits, combined with a 1-of-2 resample plan, were constructed using historical data through June 2020 for calcium, pH, sulfate, and TDS. Background data sets for all parameters utilizing intrawell prediction limits will be updated after the Fall 2022 sample event when a minimum of 4 compliance samples are available.

Due to significant differences identified between background and compliance medians using the Mann-Whitney test as discussed above, trend tests were initially recommended in lieu of prediction limits for sulfate in downgradient well AD-30. However, during this analysis, a prediction limit was constructed using the earlier and stable portion of the record through April 2017 for the purpose of comparing future compliance samples.

Interwell – Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate data at upgradient wells for boron, chloride, and fluoride to identify statistically significant increasing or decreasing trends. The results of the trend analyses showed decreasing trends for fluoride in upgradient wells AD-3, AD-12, and AD-18. However, the magnitudes of the trends were low relative to the average concentrations in these wells; therefore, no adjustments were required at this time.

Interwell – Prediction Limits

Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed using all available data from upgradient wells through November 2021 for boron, chloride, and fluoride (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. Interwell prediction limits pool upgradient well data to establish a background limit for an individual constituent.

February 2023

Outlier Analysis

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

Tukey's outlier test on all wells for calcium, chloride, sulfate, and TDS did not identify any values; therefore, no new values were flagged. Tukey's outlier test on pooled upgradient well data identified both high and low values for fluoride as outliers; however, no new values were flagged as outliers. Tukey's outlier test results for all Appendix III parameters are shown in Figure C.

Intrawell – Mann-Whitney Test

For calcium, pH, sulfate, 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 D). Statistically significant differences were identified for the following well/constituent pairs:

Increase:

- Sulfate: AD-28 and AD-30
- TDS: AD-30

Decrease:

- pH: AD-30

Typically, when the test concludes that the medians of the two groups are significantly different, particularly in the downgradient wells, the background data are not updated to include the newer data unless it can be reasonably justified that the change in concentrations reflects a naturally occurring shift unrelated to practices at the site. In studies such as the current one, in which one or both of the segments being compared are short, the comparison is complicated by the fact that normal short-term variation may be mistaken for long-term change in medians.

In this analysis, the records for pH at well AD-30 and sulfate at AD-28 were updated because more recent concentrations were mostly within the range of historic concentrations resulting in statistical limits similar to those previously established. Due to the continuous increase in concentrations for sulfate and TDS at AD-30, these records were not 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, were constructed using historical data through June 2022 for calcium, pH, sulfate, and TDS (Figure E). A summary of the limits follows this letter.

Interwell – Trend Test Evaluation

The Sen's Slope/Mann Kendall trend test was used to evaluate data at upgradient wells for boron, chloride, and fluoride to identify statistically significant increasing or decreasing trends (Figure F). The results of the trend analyses showed decreasing trends for fluoride in upgradient wells AD-3 and AD-12. However, the magnitudes of the trends were influenced by higher reporting limits early in the record compared more recent, lower detected values; therefore, no adjustments were required at this time.

Interwell – Prediction Limits

Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed using all available data from upgradient wells through November 2022 for boron, chloride, and fluoride (Figure G). 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. Interwell prediction limits pool upgradient well data to establish a background limit for an individual constituent. A summary table of the updated limits may be found following this letter.

Evaluation of Appendix IV Parameters – November 2022

Prior to evaluating Appendix IV parameters, upgradient well data are screened through both 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 through November 2022 identified outliers for fluoride. Among these identified values, however, no new values were flagged as outliers as they were similar to concentrations at neighboring upgradient wells or were below the MCL.

During previous screenings, the highest value for lithium at upgradient well AD-3 was flagged to construct statistical limits that are conservative (i.e., lower) from a regulatory perspective. The reporting limit for thallium for the February 2019 event was 0.01 mg/L, which is higher than the historical reporting limit of 0.002 mg/L. Therefore, this value was

flagged as an outlier at wells with reported non-detects for the February 2019 event. Similarly, the high non-detects for molybdenum of 0.04 mg/L for February and May of 2019 are flagged since they are censored at a much higher level than the other non-detects.

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 new outliers were flagged and no changes to previously flagged outliers were made during this analysis. All flagged values may be seen on the Outlier Summary following this letter (Figure C).

Interwell Upper Tolerance Limits

Upper tolerance limits were used to calculate background limits from pooled upgradient well data through November 2022 for Appendix IV parameters (Figure H). For parametric limits a target of 95% confidence and 95% coverage is used. 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 using all 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 J). Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. An exceedance was found for cobalt in downgradient well AD-28. A summary of the confidence interval results follows this letter.

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

For Groundwater Stats Consulting,



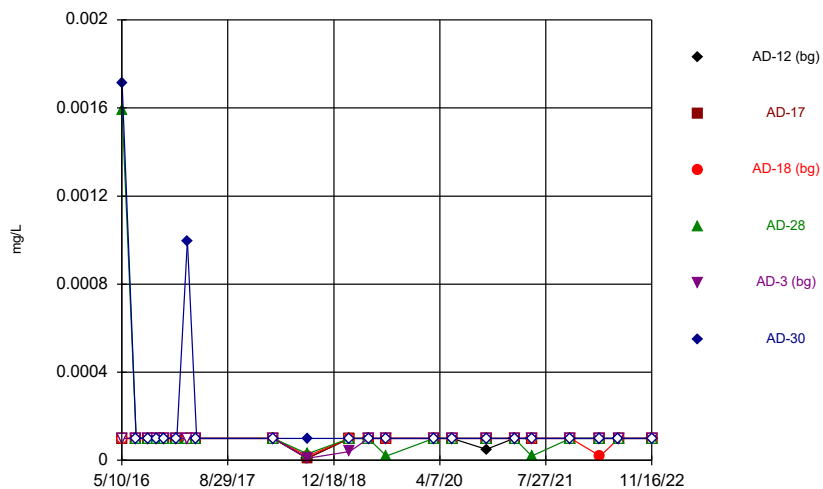
Andrew T. Collins
Project Manager



Kristina L. Rayner
Senior Statistician

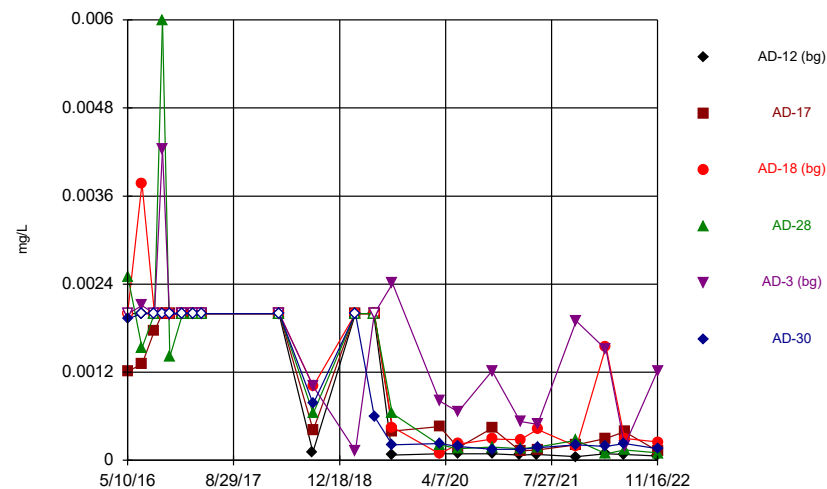
FIGURE A
Time Series

Time Series



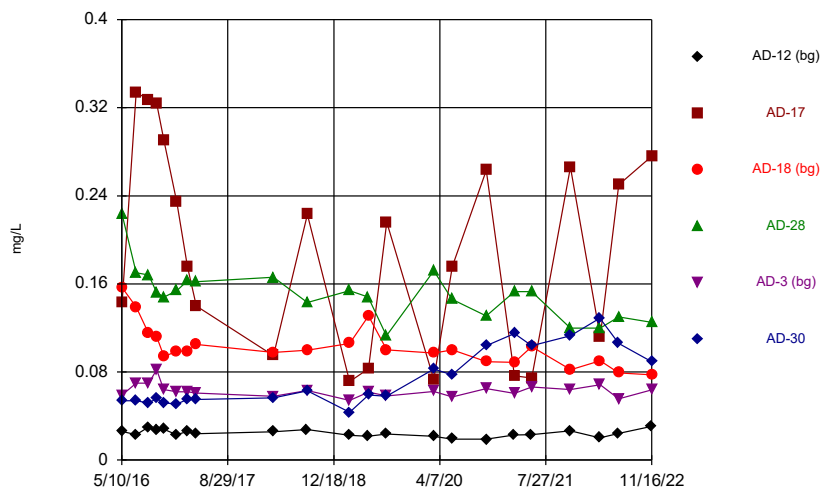
Constituent: Antimony, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



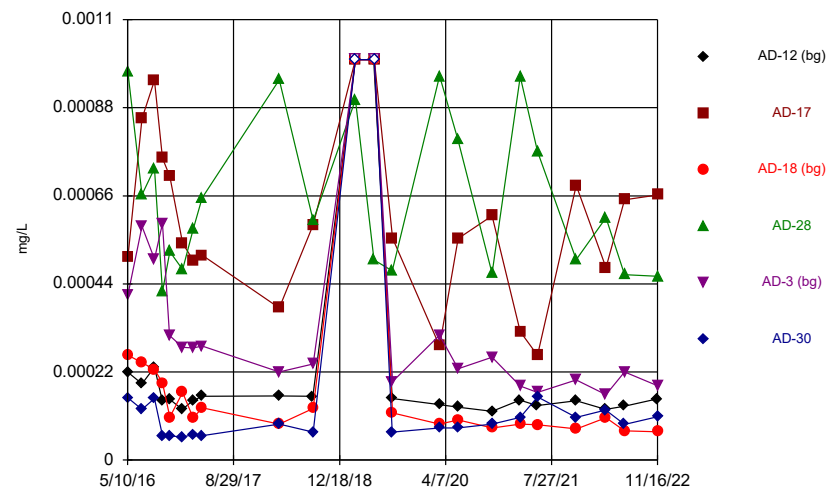
Constituent: Arsenic, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



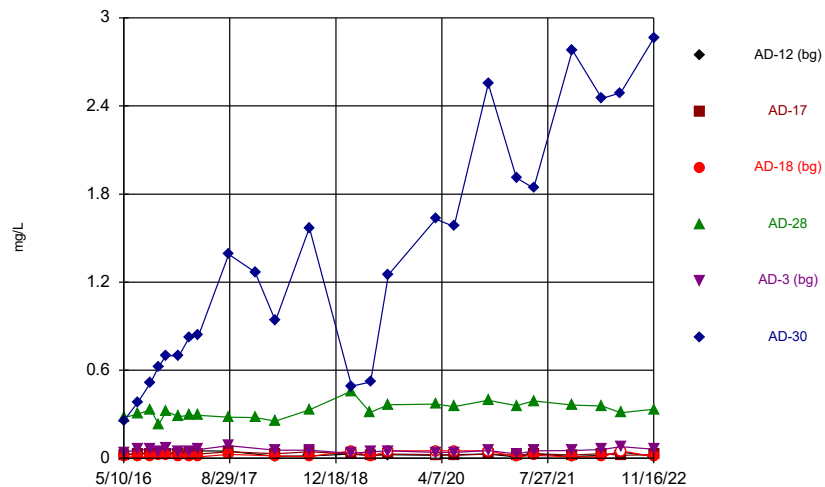
Constituent: Barium, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



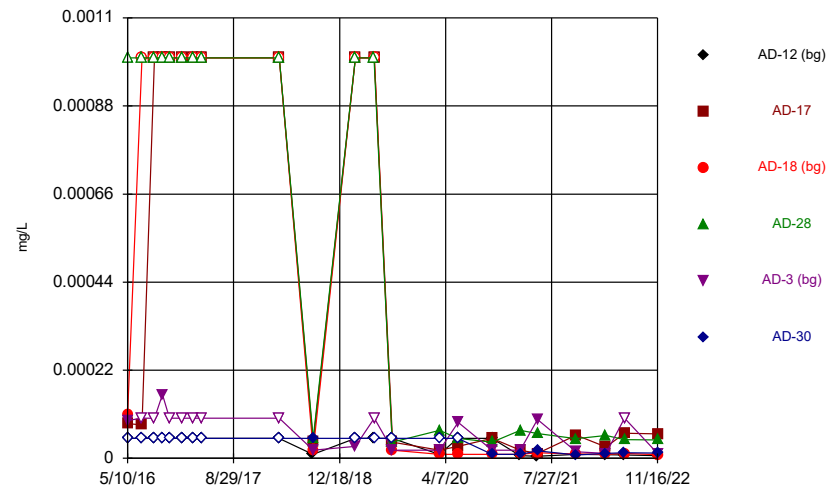
Constituent: Beryllium, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



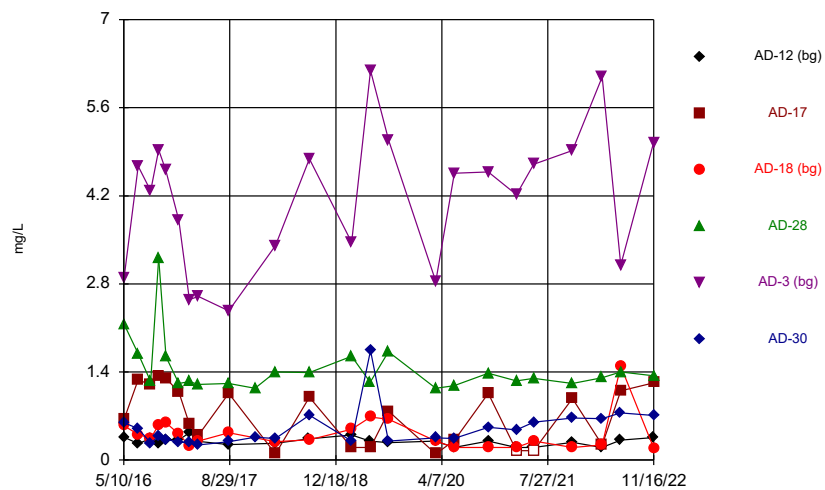
Constituent: Boron, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



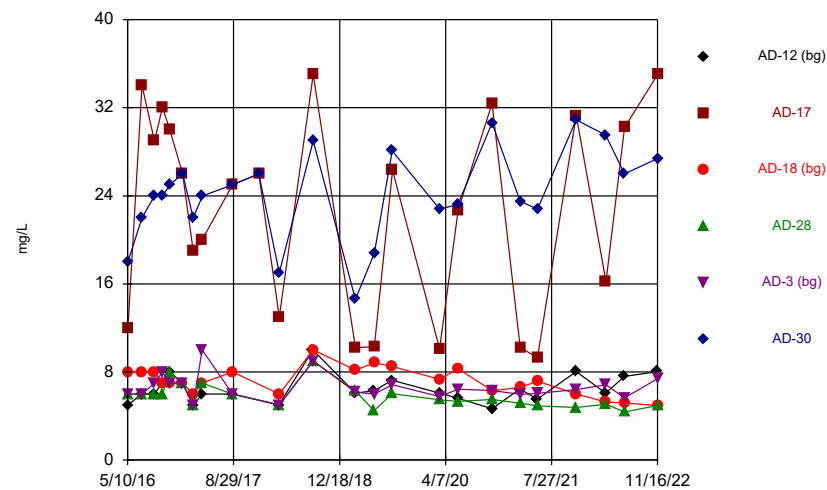
Constituent: Cadmium, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



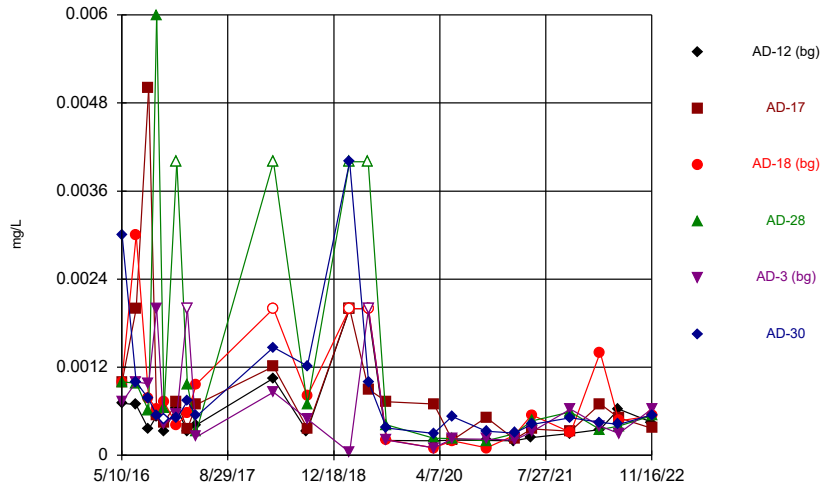
Constituent: Calcium, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



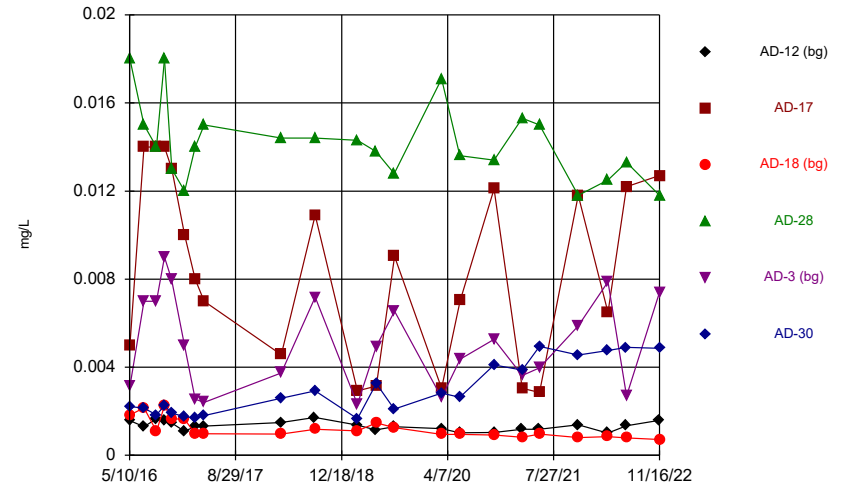
Constituent: Chloride, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



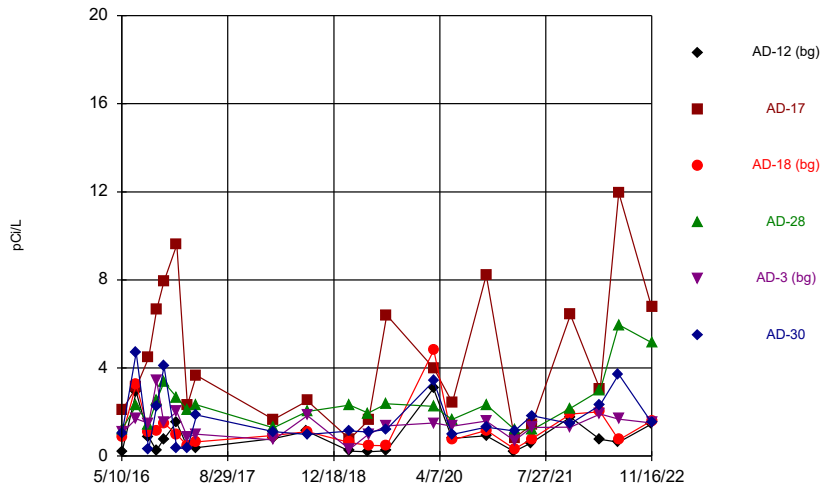
Constituent: Chromium, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



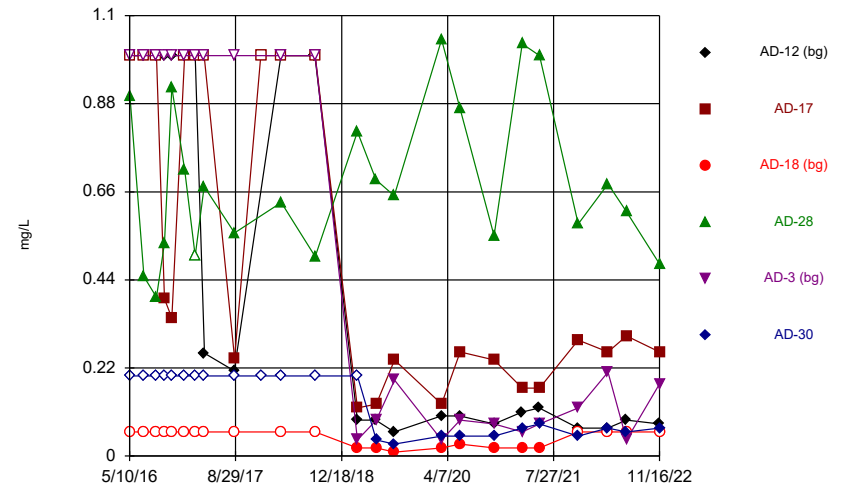
Constituent: Cobalt, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



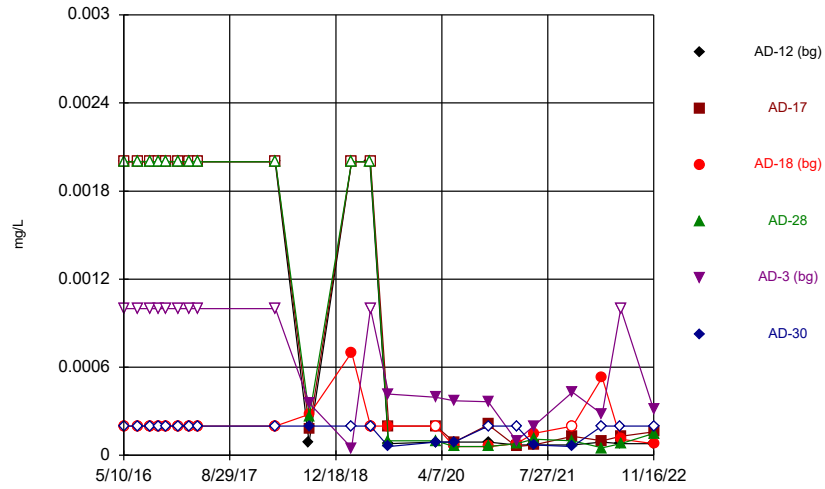
Constituent: Combined Radium 226 + 228 Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



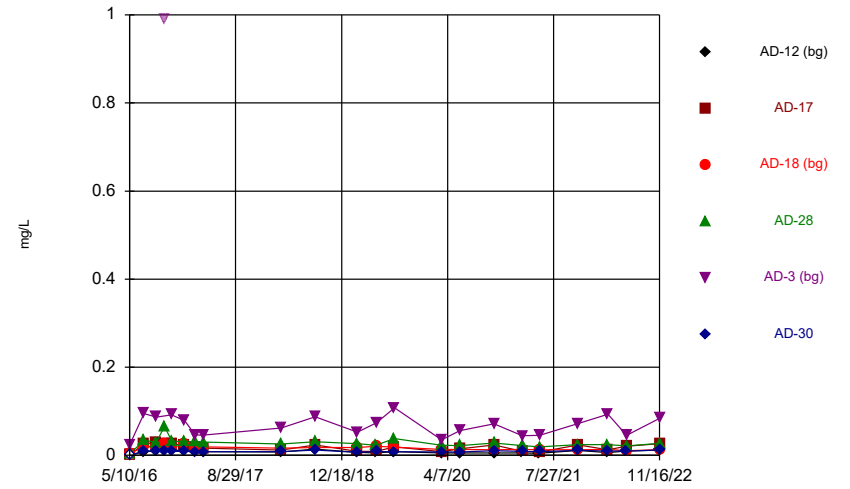
Constituent: Fluoride, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



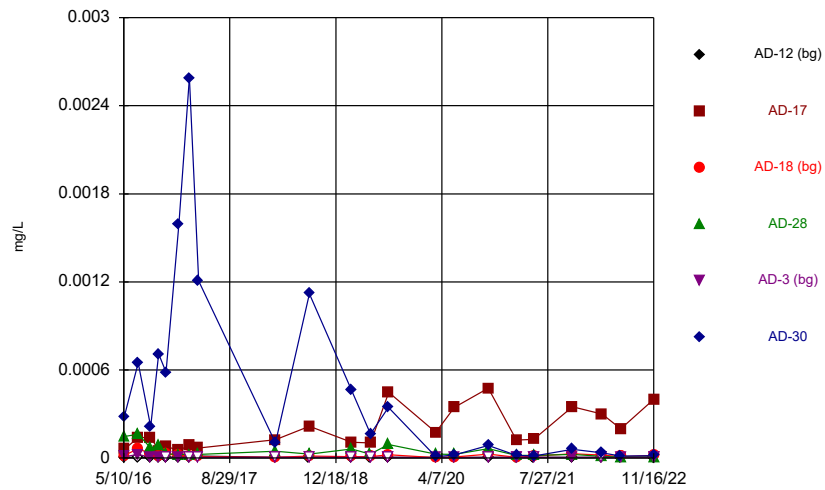
Constituent: Lead, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



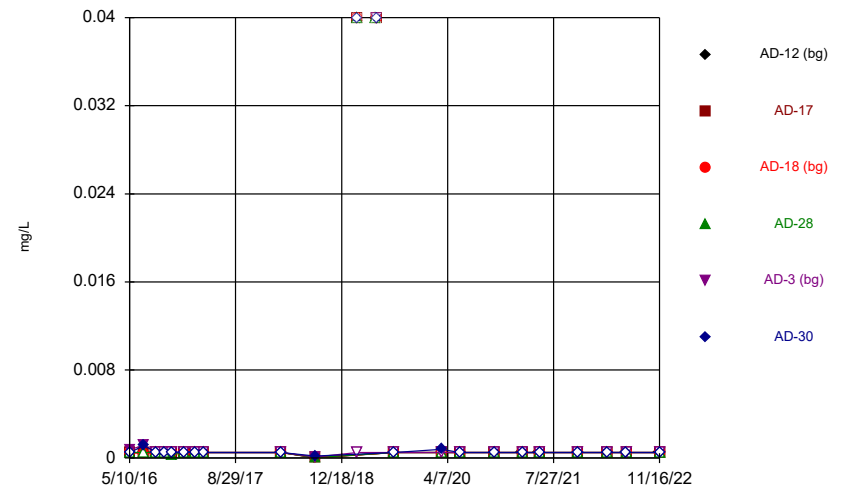
Constituent: Lithium, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



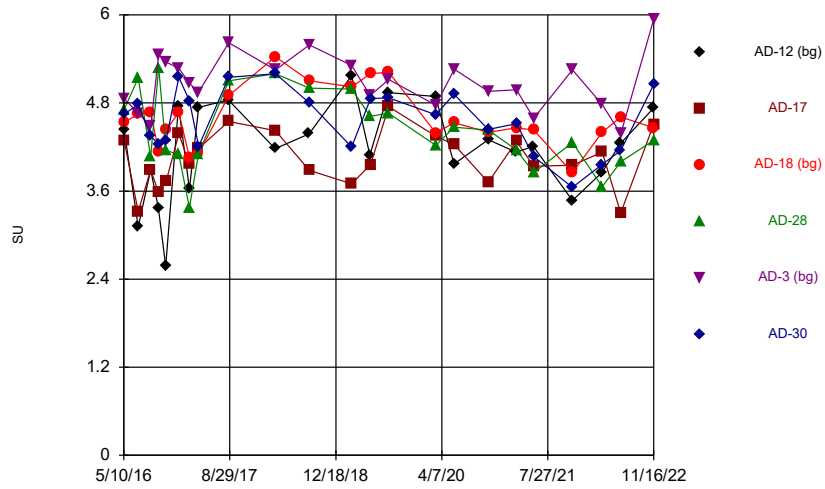
Constituent: Mercury, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



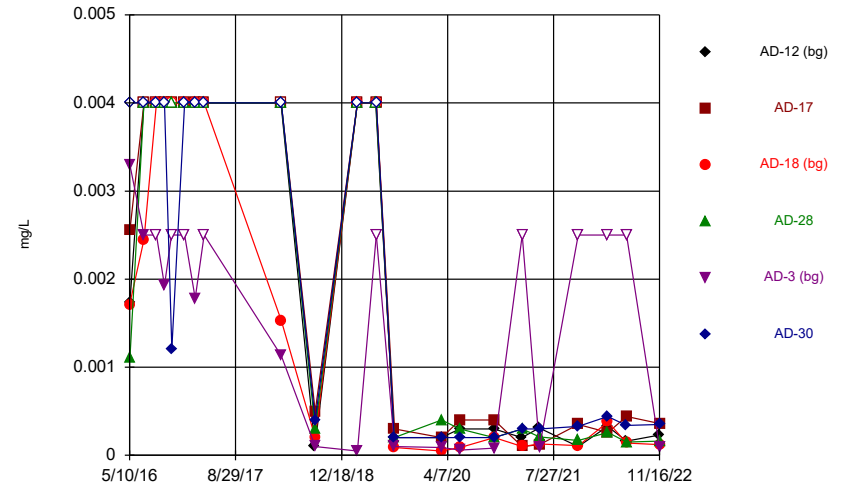
Constituent: Molybdenum, total Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



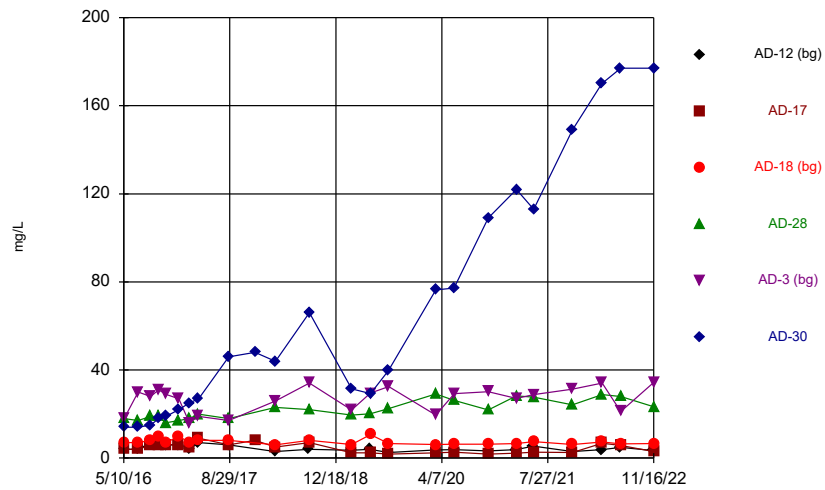
Constituent: pH, field Analysis Run 2/3/2023 7:35 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



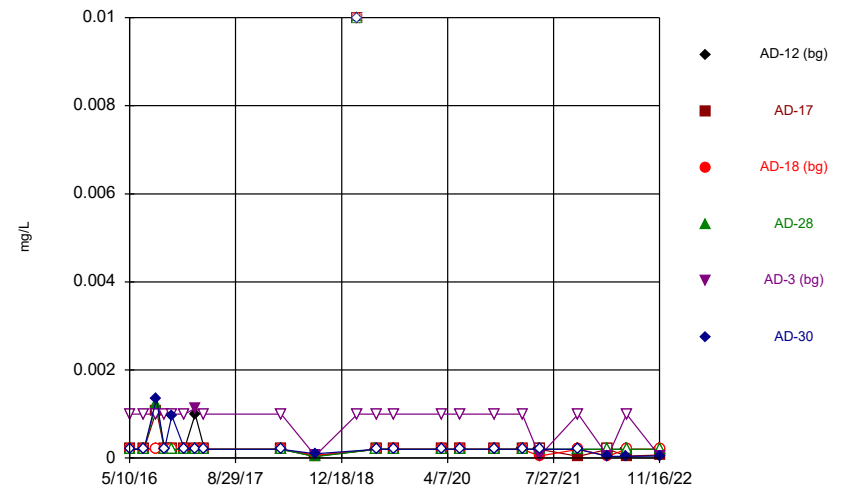
Constituent: Selenium, total Analysis Run 2/3/2023 7:35 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



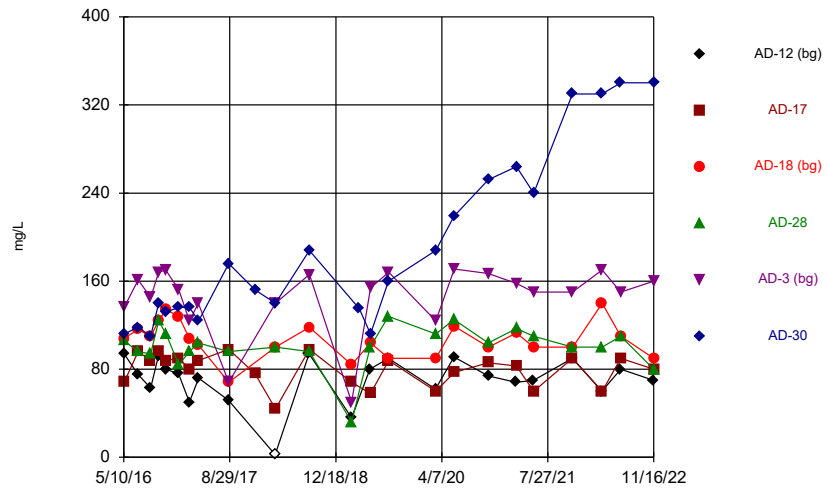
Constituent: Sulfate, total Analysis Run 2/3/2023 7:35 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



Constituent: Thallium, total Analysis Run 2/3/2023 7:35 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

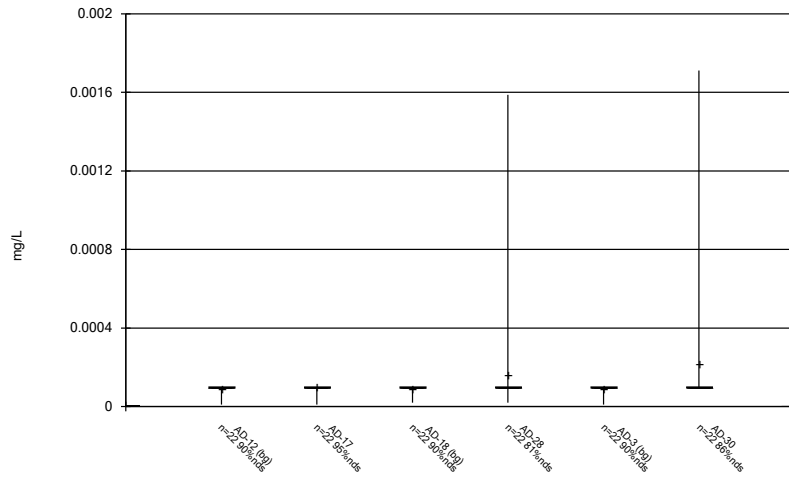
Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:35 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

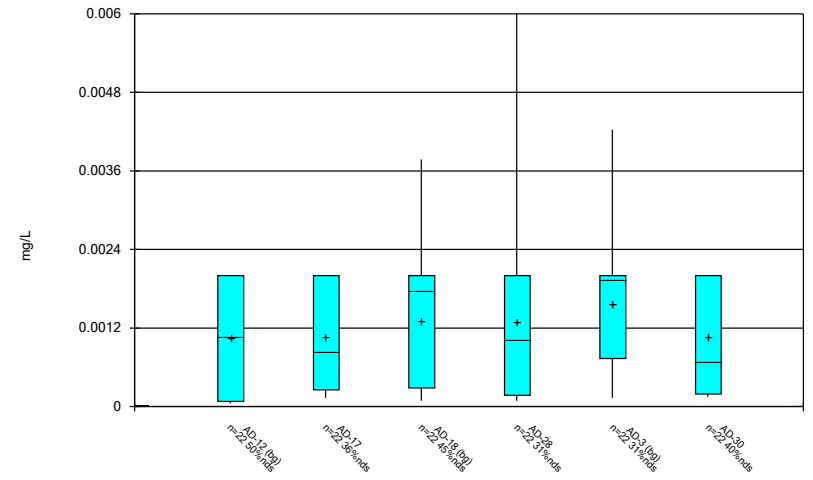
FIGURE B
Box Plots

Box & Whiskers Plot



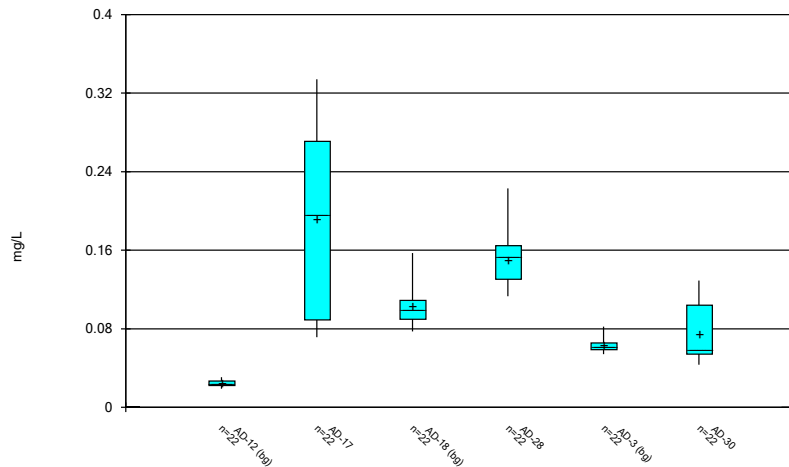
Constituent: Antimony, total Analysis Run 2/3/2023 7:36 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



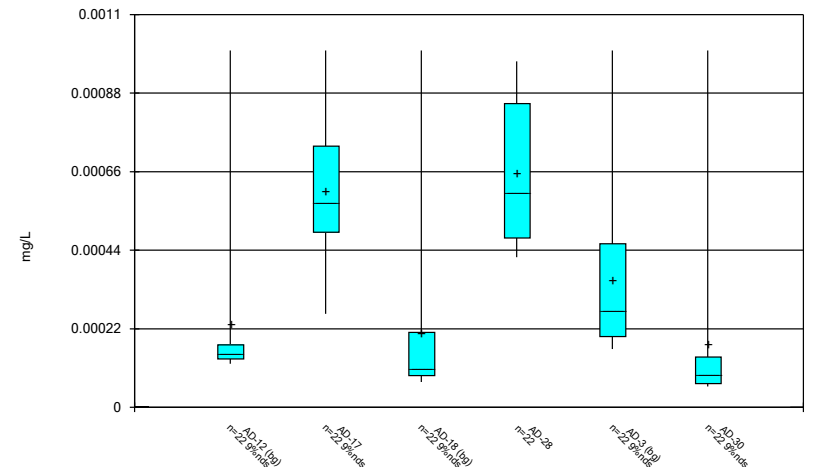
Constituent: Arsenic, total Analysis Run 2/3/2023 7:36 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



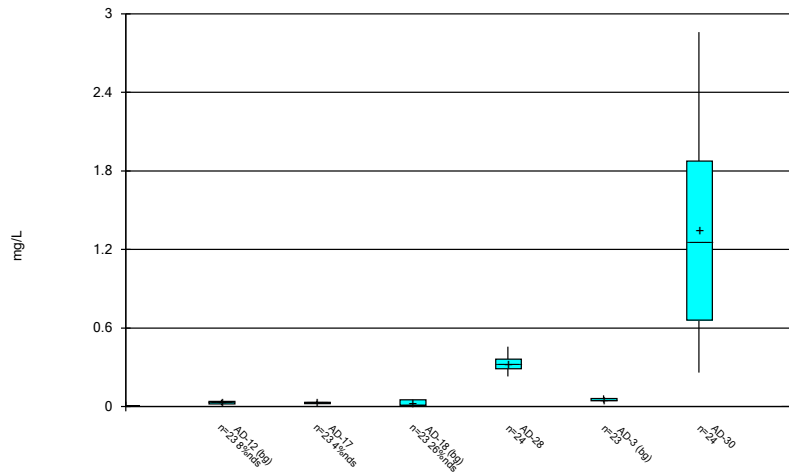
Constituent: Barium, total Analysis Run 2/3/2023 7:36 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



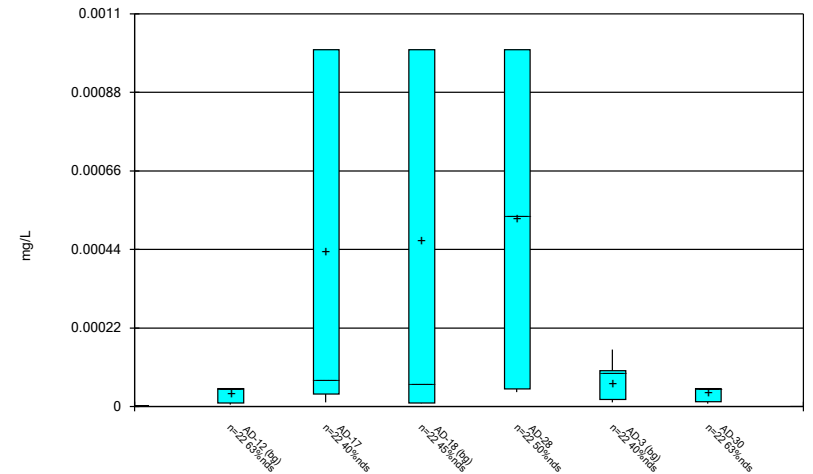
Constituent: Beryllium, total Analysis Run 2/3/2023 7:36 AM
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



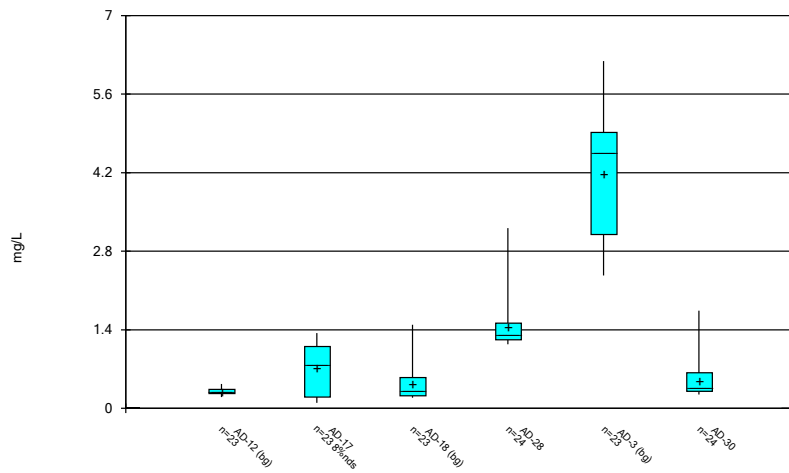
Constituent: Boron, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



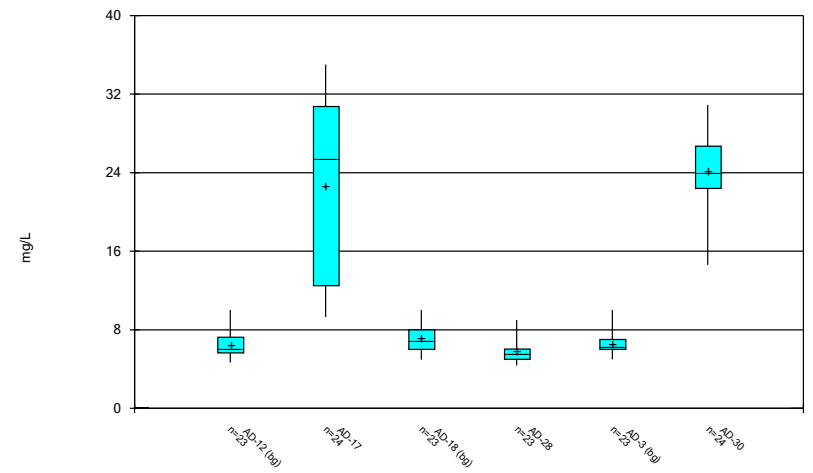
Constituent: Cadmium, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



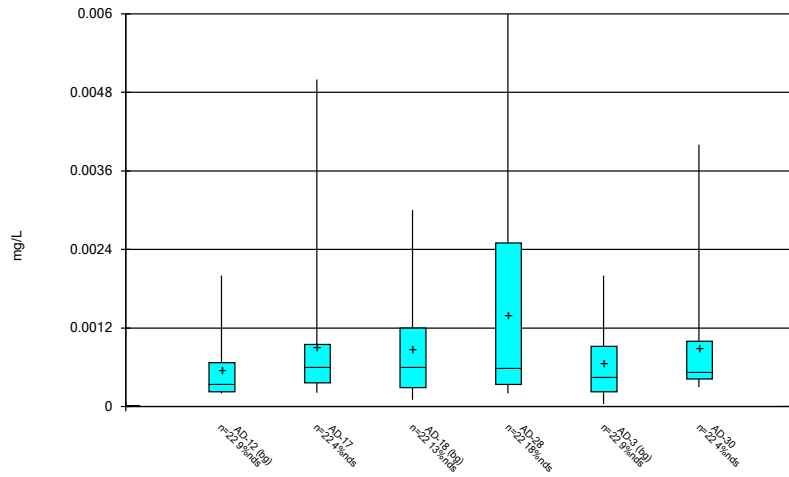
Constituent: Calcium, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



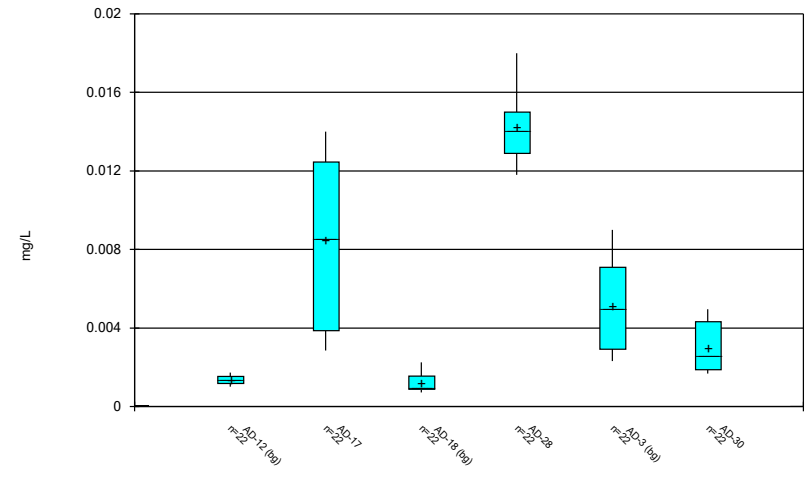
Constituent: Chloride, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



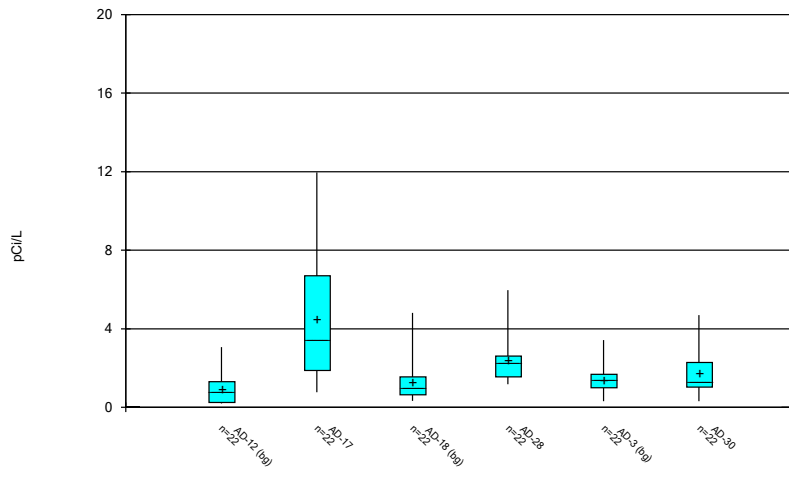
Constituent: Chromium, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



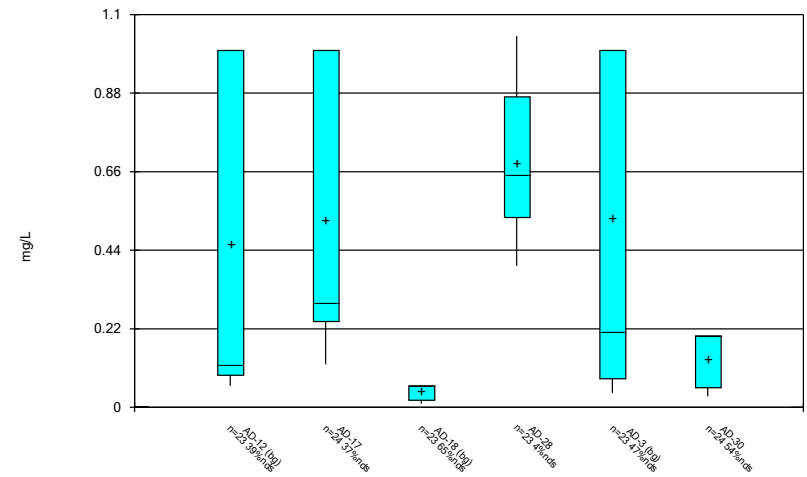
Constituent: Cobalt, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



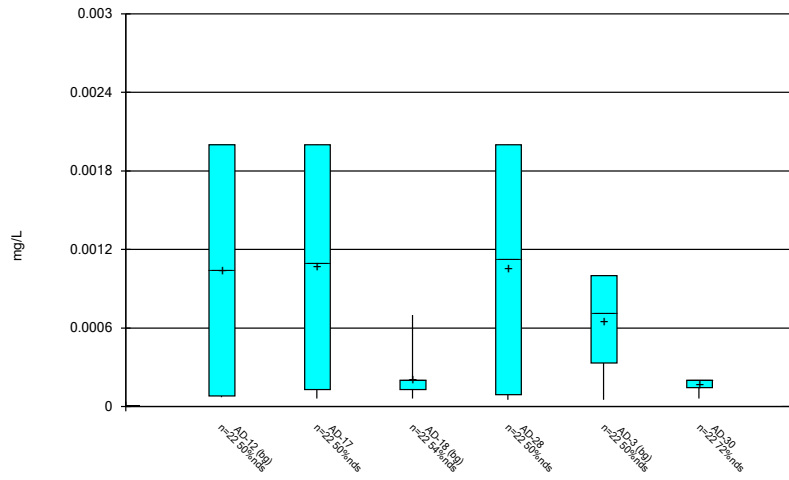
Constituent: Combined Radium 226 + 228 Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



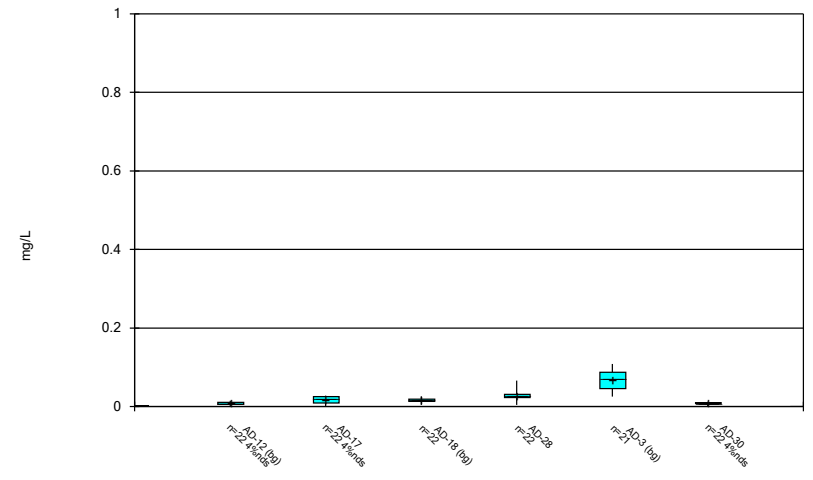
Constituent: Fluoride, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



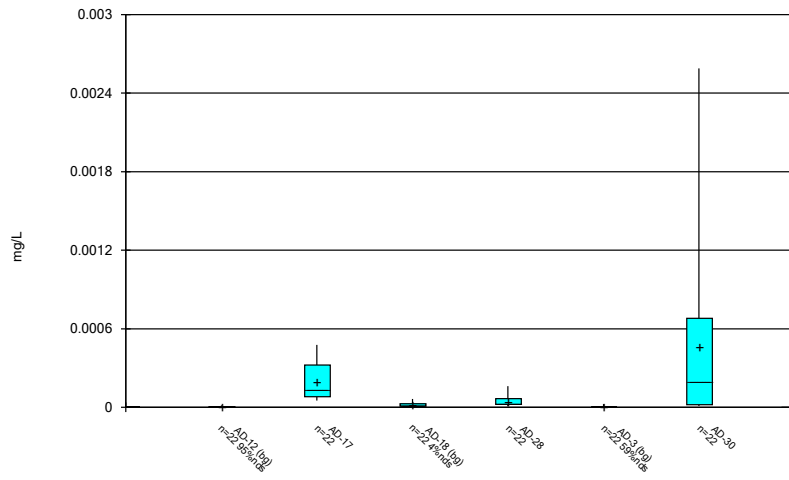
Constituent: Lead, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



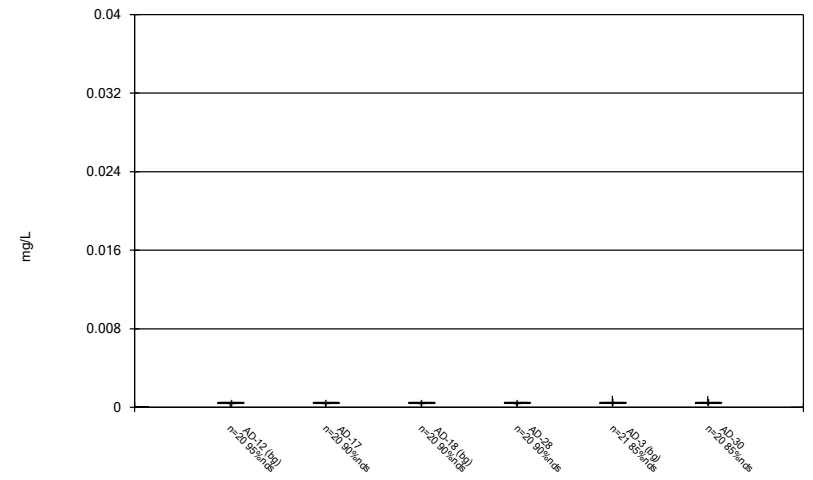
Constituent: Lithium, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



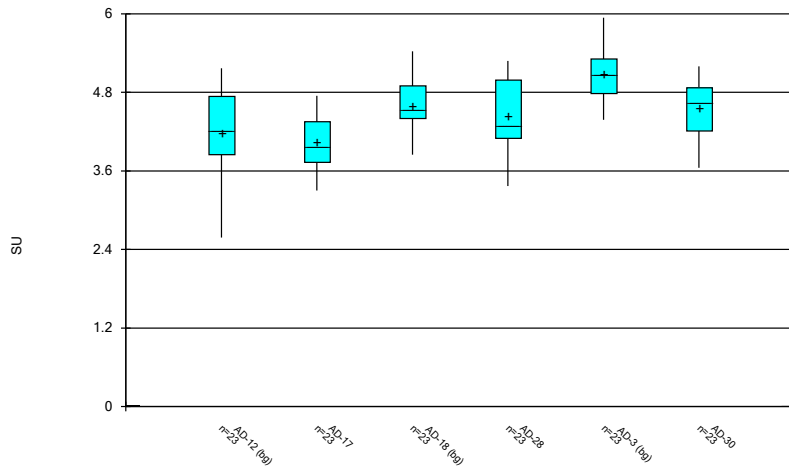
Constituent: Mercury, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



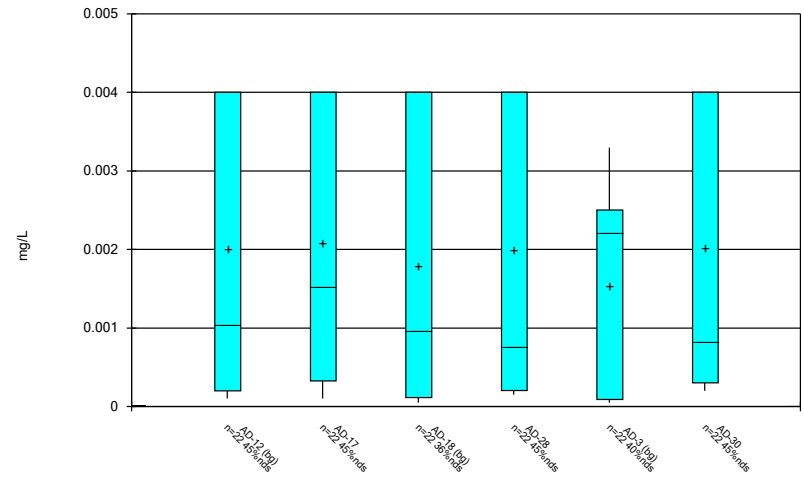
Constituent: Molybdenum, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



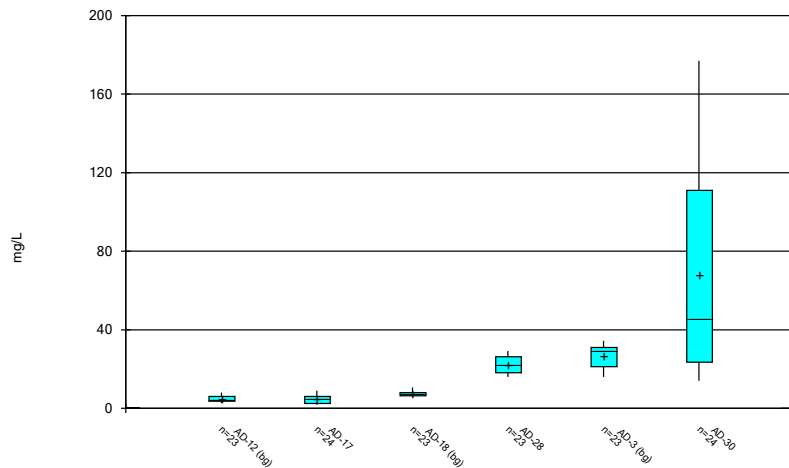
Constituent: pH, field Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



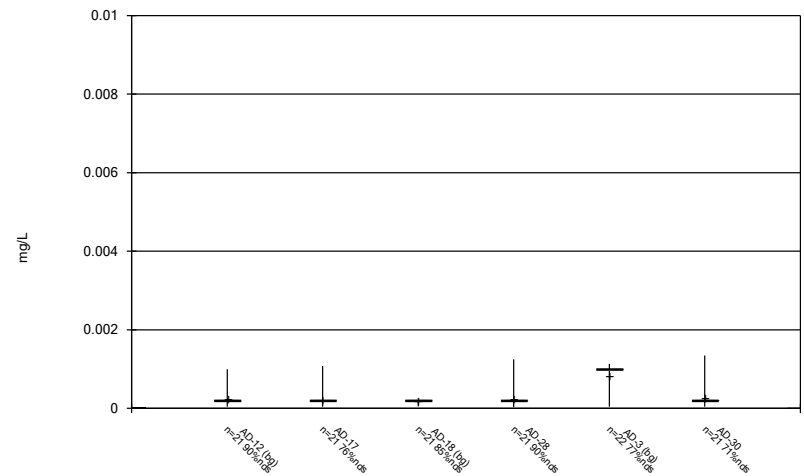
Constituent: Selenium, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



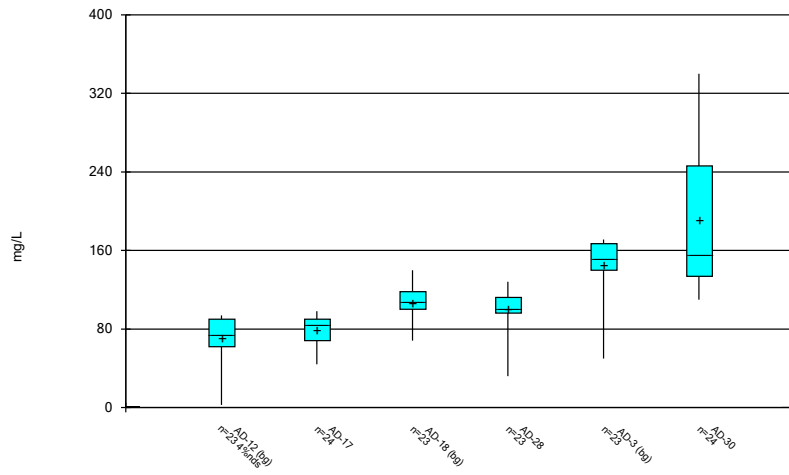
Constituent: Sulfate, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 2/3/2023 7:36 AM
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:36 AM

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

FIGURE C

Outlier Summary and Tukey's Outlier Test

Outlier Summary

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:40 AM

	AD-3 Lithium, total (mg/L)	AD-12 Molybdenum, total (mg/L)	AD-17 Molybdenum, total (mg/L)	AD-18 Molybdenum, total (mg/L)	AD-28 Molybdenum, total (mg/L)	AD-3 Molybdenum, total (mg/L)	AD-30 Molybdenum, total (mg/L)	AD-12 Thallium, total (mg/L)	AD-17 Thallium, total (mg/L)	AD-18 Thallium, total (mg/L)
10/13/2016	0.991 (o)									
2/27/2019		<0.04 (o)			<0.04 (o)			<0.01 (o)		
2/28/2019			<0.04 (o)	<0.04 (o)			<0.04 (o)		<0.01 (o)	<0.01 (o)
5/21/2019		<0.04 (o)								
5/22/2019					<0.04 (o)					
5/23/2019			<0.04 (o)	<0.04 (o)		<0.04 (o)	<0.04 (o)			

	AD-28 Thallium, total (mg/L)	AD-30 Thallium, total (mg/L)
10/13/2016		
2/27/2019	<0.01 (o)	
2/28/2019		<0.01 (o)
5/21/2019		
5/22/2019		
5/23/2019		

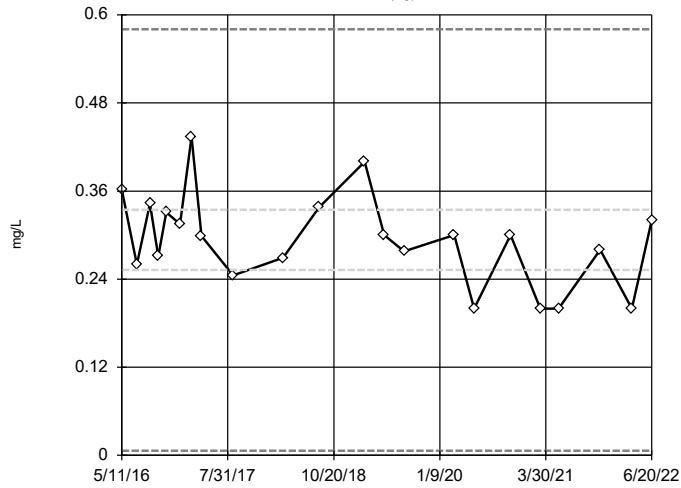
Tukey's Outlier Test - All Results (No Significant)

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 8:04 AM

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-17	No	n/a	NP	NaN	22	0.6921	0.4568	normal	ShapiroWilk
Calcium, total (mg/L)	AD-18 (bg)	No	n/a	NP	NaN	22	0.4269	0.2823	ln(x)	ShapiroWilk
Calcium, total (mg/L)	AD-28	No	n/a	NP	NaN	23	1.46	0.4527	ln(x)	ShapiroWilk
Calcium, total (mg/L)	AD-3 (bg)	No	n/a	NP	NaN	22	4.121	1.095	normal	ShapiroWilk
Calcium, total (mg/L)	AD-30	No	n/a	NP	NaN	23	0.491	0.3158	ln(x)	ShapiroWilk
pH, field (SU)	AD-12 (bg)	No	n/a	NP	NaN	22	4.145	0.6423	x^2	ShapiroWilk
pH, field (SU)	AD-17	No	n/a	NP	NaN	22	4.023	0.3753	x^2	ShapiroWilk
pH, field (SU)	AD-18 (bg)	No	n/a	NP	NaN	22	4.6	0.4076	ln(x)	ShapiroWilk
pH, field (SU)	AD-28	No	n/a	NP	NaN	22	4.434	0.5294	sqrt(x)	ShapiroWilk
pH, field (SU)	AD-3 (bg)	No	n/a	NP	NaN	22	5.039	0.3448	x^2	ShapiroWilk
pH, field (SU)	AD-30	No	n/a	NP	NaN	22	4.542	0.4193	x^2	ShapiroWilk
Sulfate, total (mg/L)	AD-12 (bg)	No	n/a	NP	NaN	22	4.585	1.484	ln(x)	ShapiroWilk
Sulfate, total (mg/L)	AD-17	No	n/a	NP	NaN	23	4.591	2.138	normal	ShapiroWilk
Sulfate, total (mg/L)	AD-18 (bg)	No	n/a	NP	NaN	22	7.367	1.329	ln(x)	ShapiroWilk
Sulfate, total (mg/L)	AD-28	No	n/a	NP	NaN	22	21.97	4.332	ln(x)	ShapiroWilk
Sulfate, total (mg/L)	AD-3 (bg)	No	n/a	NP	NaN	22	26.36	5.672	x^3	ShapiroWilk
Sulfate, total (mg/L)	AD-30	No	n/a	NP	NaN	23	63.13	51.95	ln(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-17	No	n/a	NP	NaN	23	79.57	15.15	x^3	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-18 (bg)	No	n/a	NP	NaN	22	107.5	16.62	normal	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-28	No	n/a	NP	NaN	22	102.1	19.17	x^3	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-3 (bg)	No	n/a	NP	NaN	22	144.6	31.25	x^5	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	AD-30	No	n/a	NP	NaN	23	184.1	74.29	ln(x)	ShapiroWilk

Tukey's Outlier Screening

AD-12 (bg)

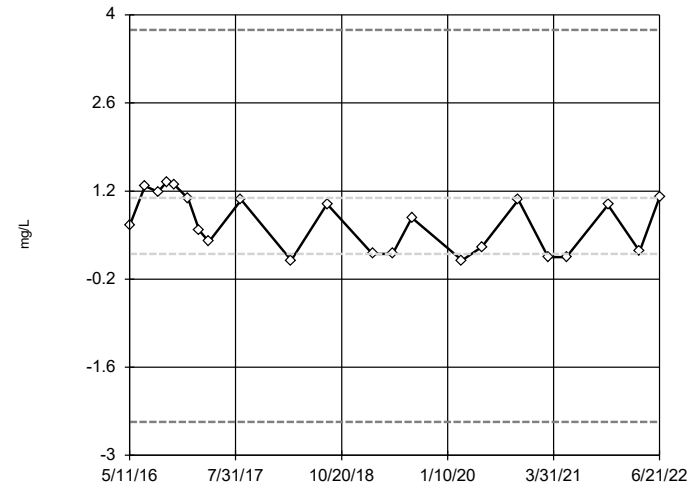


n = 22
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.5805, low cutoff = 0.00665, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-17

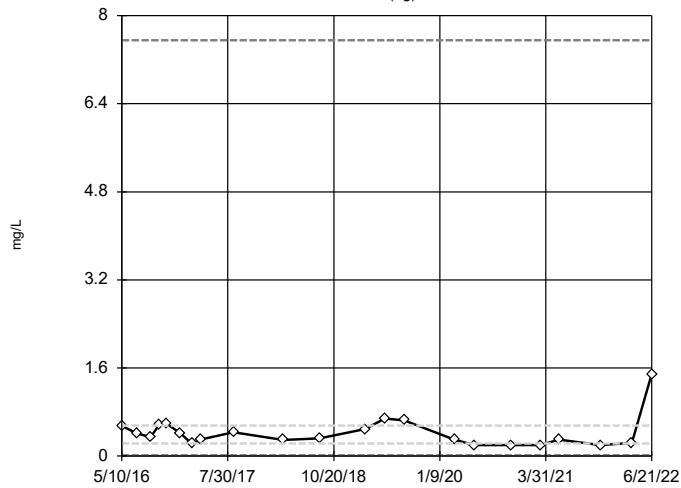


n = 22
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 3.76, low cutoff = -2.47, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-18 (bg)

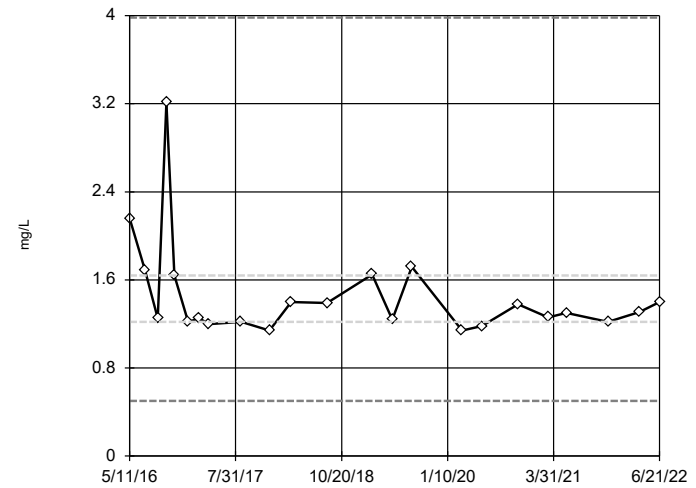


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 7.555, low cutoff = 0.017, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-28

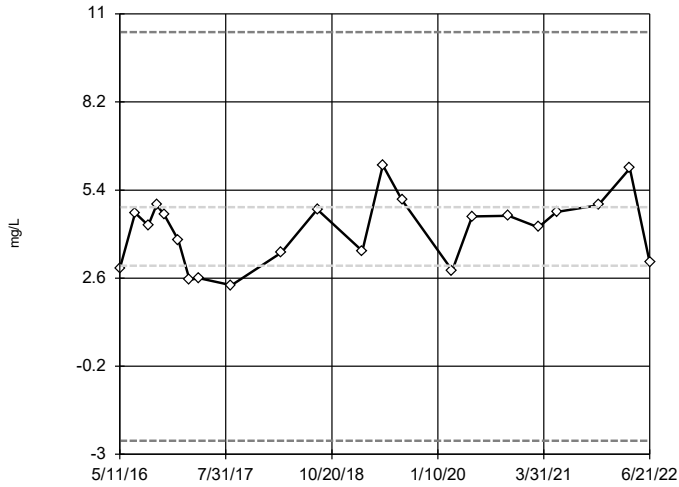


n = 23
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 3.984, low cutoff = 0.5022, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-3 (bg)

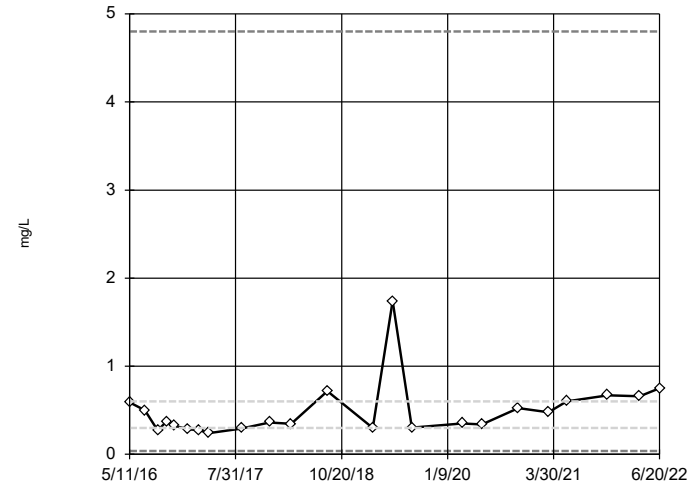


n = 22
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 10.42, low cutoff = -2.565, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-30

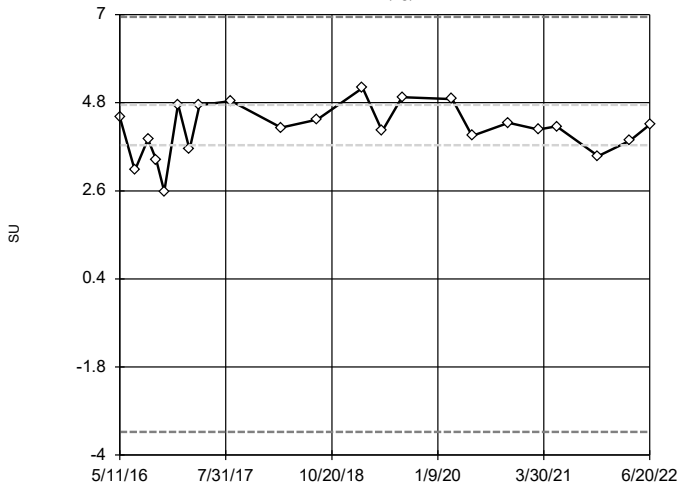


n = 23
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 4.8, low cutoff = 0.0375, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-12 (bg)

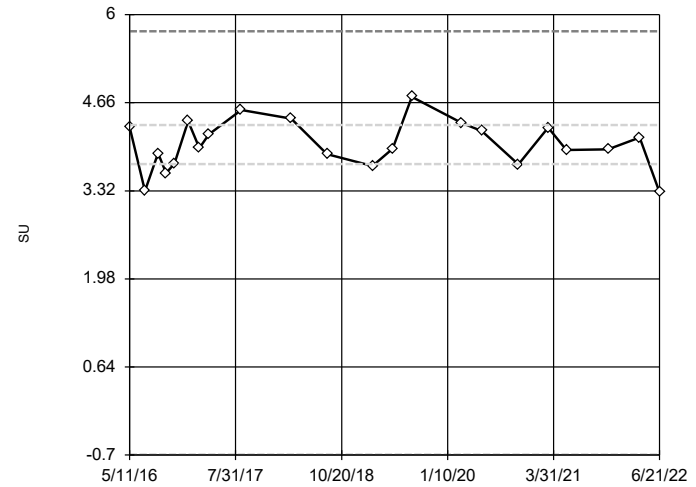


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.946, low cutoff = -3.419, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-17

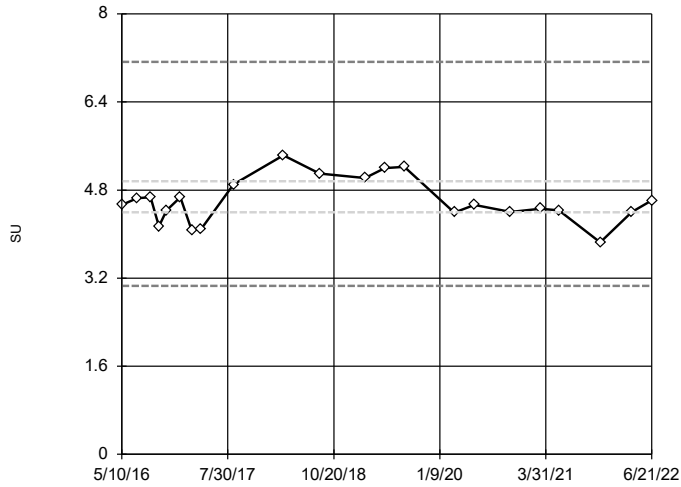


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 5.747, low cutoff = -0.6981, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-18 (bg)

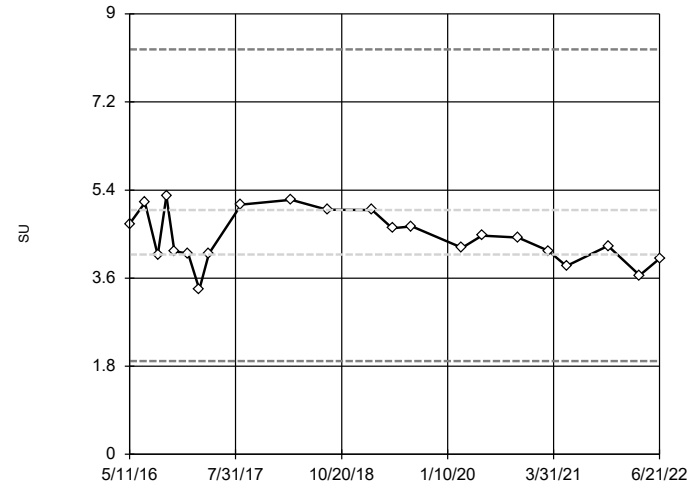


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 7.127, low cutoff = 3.058, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-28

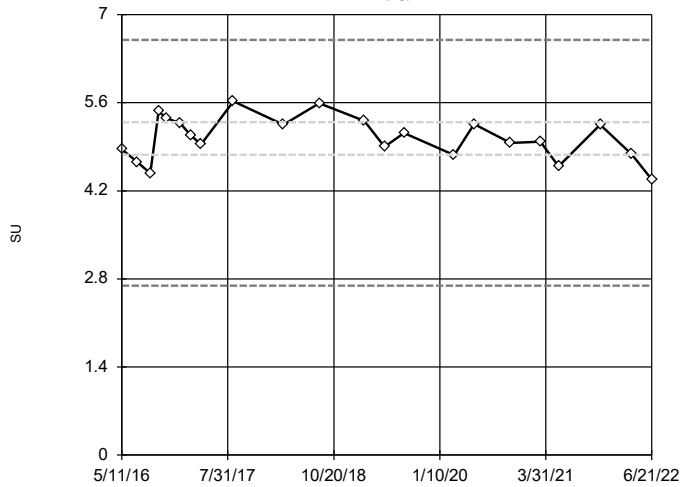


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 8.274, low cutoff = 1.904, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-3 (bg)

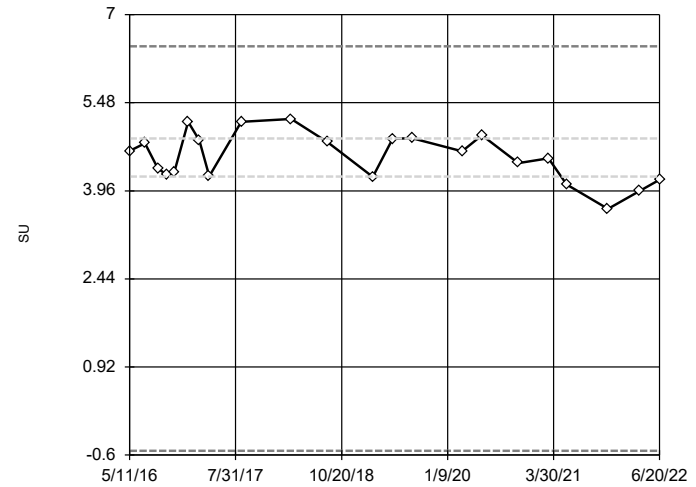


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.598, low cutoff = 2.692, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-30

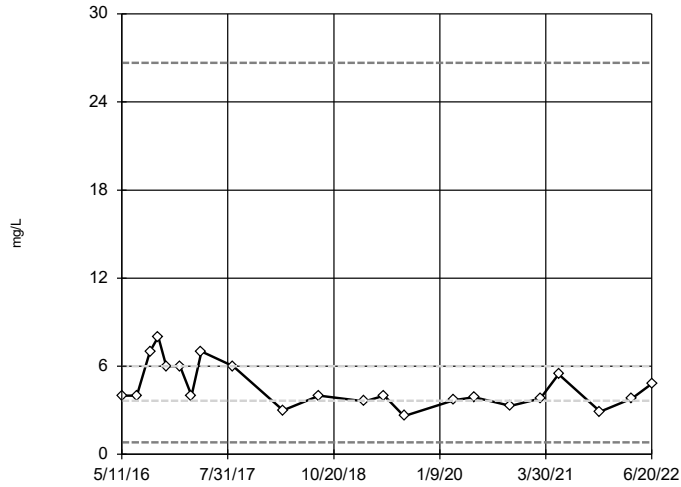


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.452, low cutoff = -0.5259, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-12 (bg)

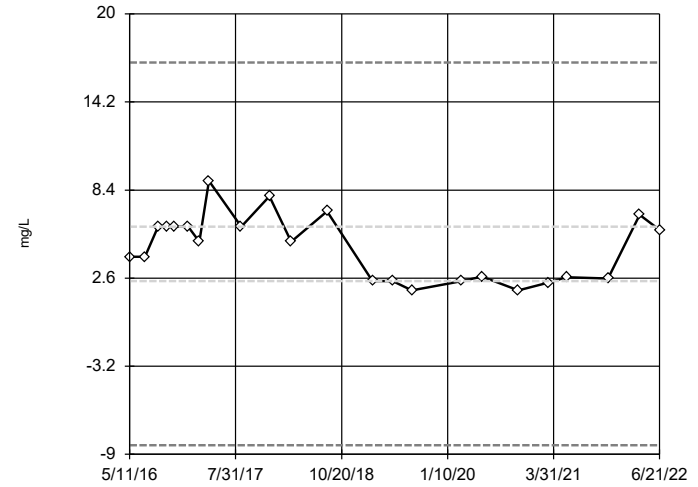


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 26.66, low cutoff = 0.8214, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-17

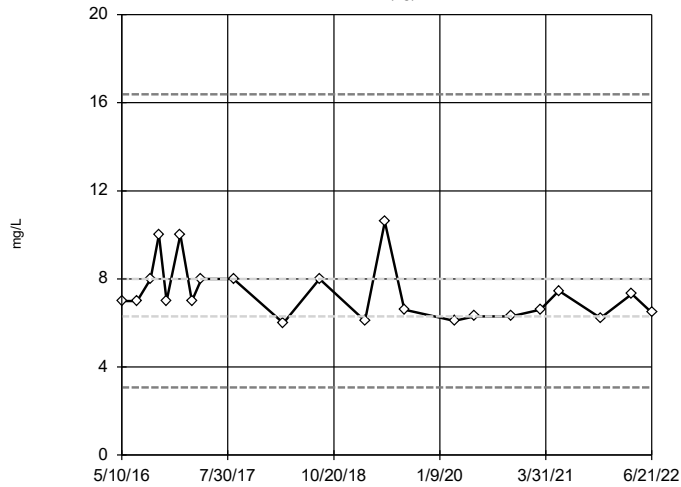


n = 23
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 16.8, low cutoff = -8.4, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-18 (bg)

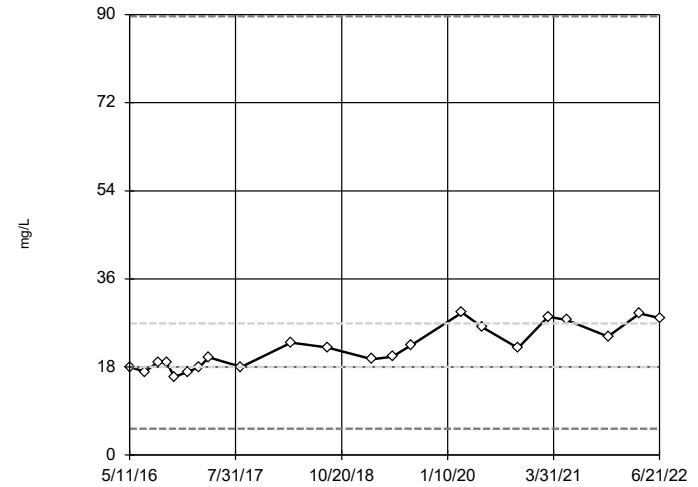


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 16.38, low cutoff = 3.077, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-28

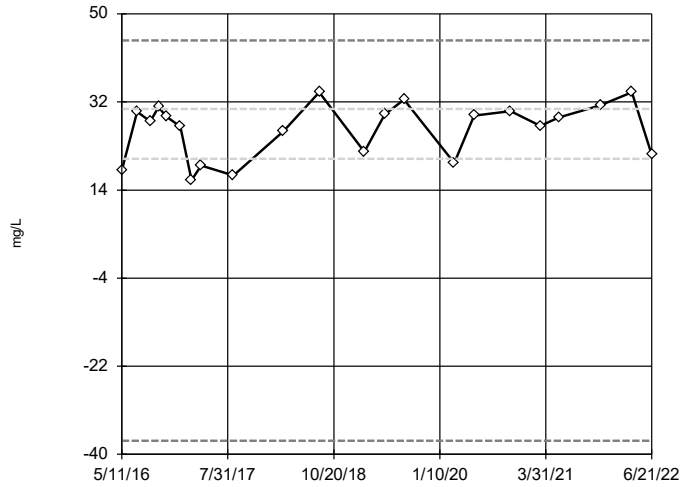


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 89.66, low cutoff = 5.399, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-3 (bg)

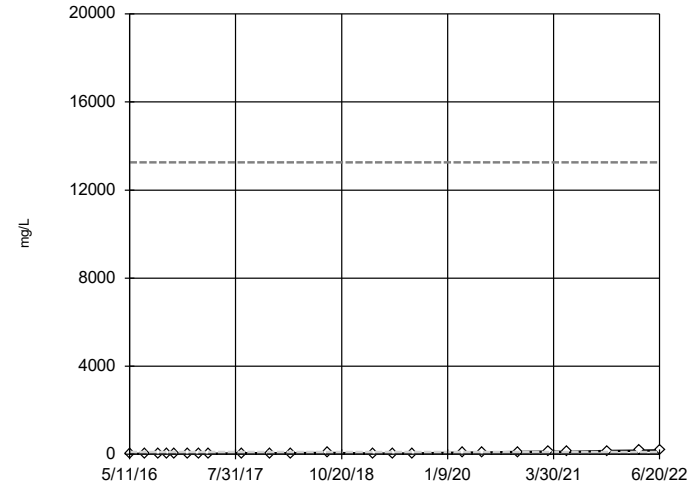


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 44.6, low cutoff = -37.25, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-30

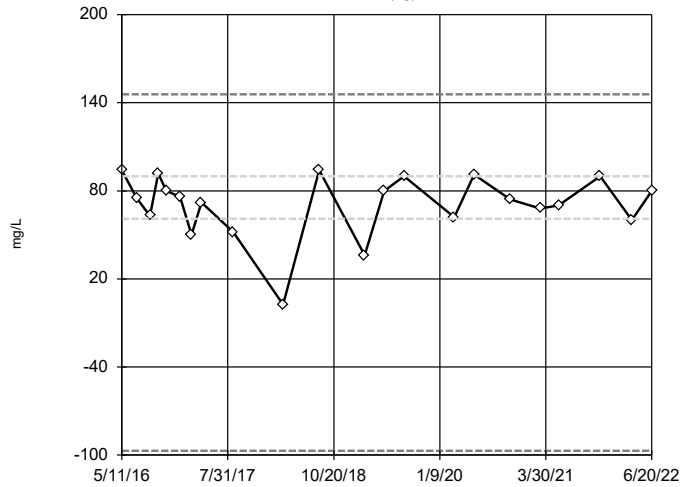


n = 23
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 13257, low cutoff = 0.1809, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-12 (bg)

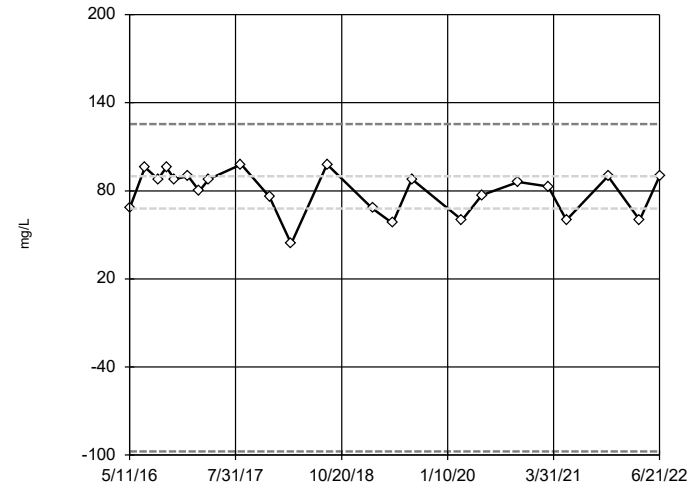


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 145.7, low cutoff = -97.02, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-17

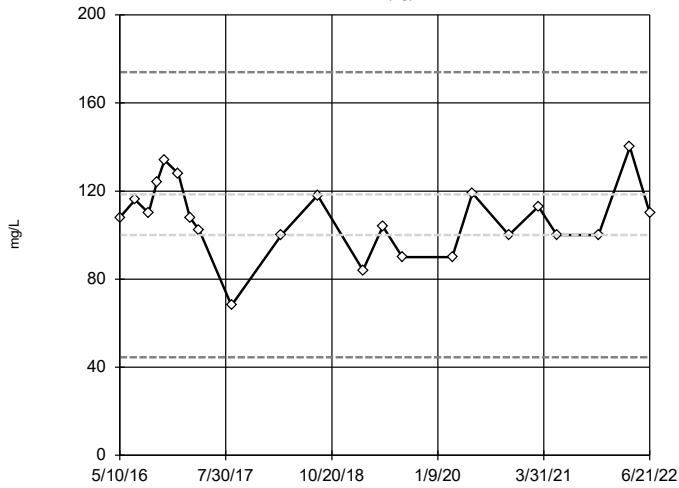


n = 23
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 125.4, low cutoff = -97.58, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-18 (bg)

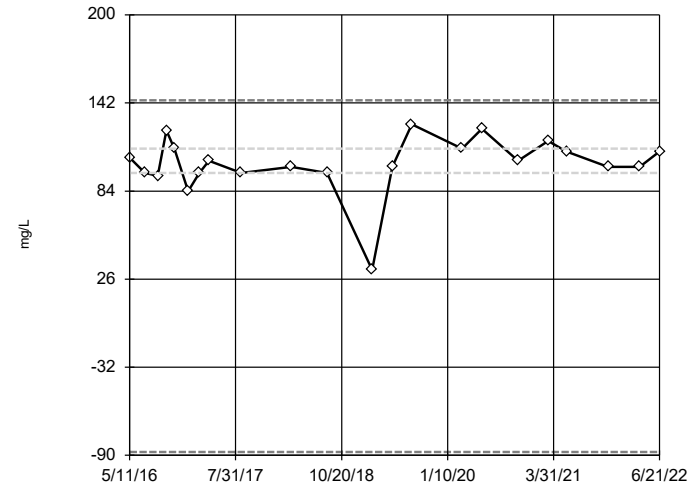


n = 22
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 174, low cutoff = 44.5, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-28

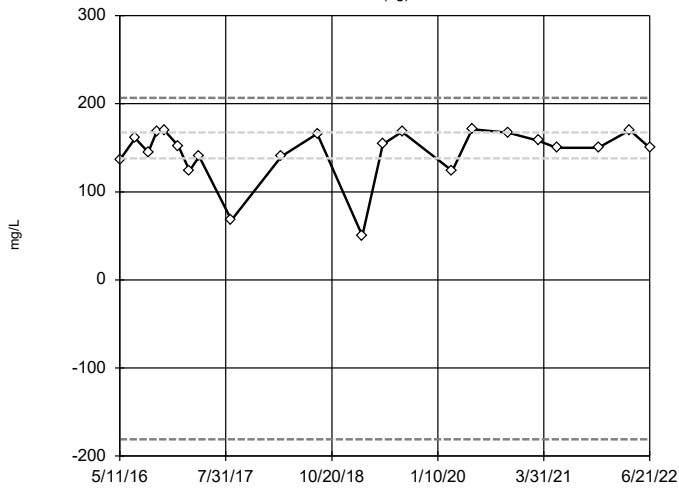


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 143.7, low cutoff = -87.76, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-3 (bg)

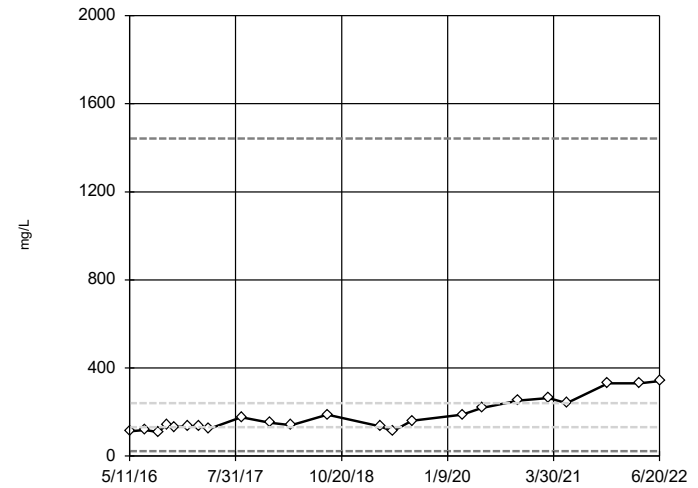


n = 22
 No outliers found.
 Tukey's method selected by user.
 Data were x*5 transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 206.7, low cutoff = -181.1, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening

AD-30



n = 23
 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 = 1443, low cutoff = 21.96, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 8:02 AM View: Outlier
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Test - Upgradient Wells - Significant Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:21 AM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Fluoride, total (mg/L)	AD-12,AD-18,AD-3	Yes	0.2565,0.213,0.02,0.02,0.02,0.02,0.02,0.02,0.01,0	NP	NaN	69	0.0726	0.04509	In(x)	ShapiroFrancia

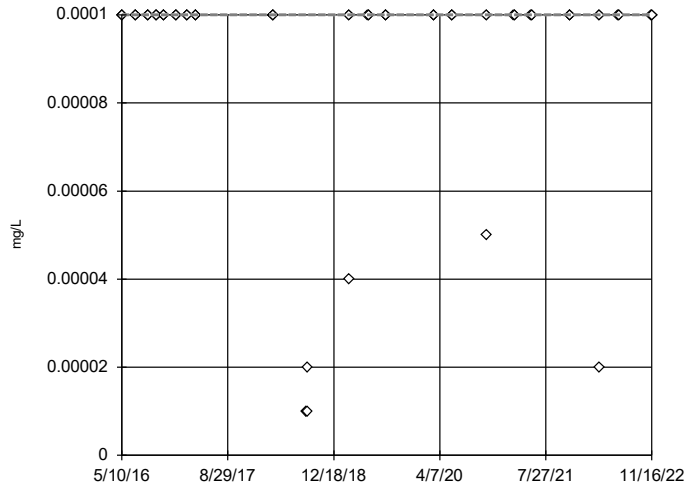
Tukey's Outlier Test - Upgradient Wells - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:21 AM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	AD-12,AD-18,AD-3	n/a	n/a	NP	NaN	66	0.00009318	0.0000222	unknown	ShapiroFrancia
Arsenic, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.001305	0.0009749	sqrt(x)	ShapiroFrancia
Barium, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.06343	0.03426	sqrt(x)	ShapiroFrancia
Beryllium, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.0002647	0.0002567	ln(x)	ShapiroFrancia
Boron, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	69	0.03284	0.01902	x^(1/3)	ShapiroFrancia
Cadmium, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.00006397	0.00004464	ln(x)	ShapiroFrancia
Chloride, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	69	6.742	1.249	ln(x)	ShapiroFrancia
Chromium, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.0006966	0.0006382	ln(x)	ShapiroFrancia
Cobalt, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.002547	0.002207	ln(x)	ShapiroFrancia
Combined Radium 226 + 228 (pCi/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	1.197	0.8514	x^(1/3)	ShapiroFrancia
Fluoride, total (mg/L)	AD-12,AD-18,AD-3	Yes	0.2565,0.213,0.02,0.02,0.02,0.02,0.02,0.02,0.01,0	NP	NaN	69	0.0726	0.04509	ln(x)	ShapiroFrancia
Lead, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.0006125	0.0004188	ln(x)	ShapiroFrancia
Lithium, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.04429	0.1218	ln(x)	ShapiroFrancia
Mercury, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.000009676	0.000009846	ln(x)	ShapiroFrancia
Molybdenum, total (mg/L)	AD-12,AD-18,AD-3	n/a	n/a	NP	NaN	66	0.0004935	0.000128	unknown	ShapiroFrancia
Selenium, total (mg/L)	AD-12,AD-18,AD-3	No	n/a	NP	NaN	66	0.001368	0.001149	ln(x)	ShapiroFrancia
Thallium, total (mg/L)	AD-12,AD-18,AD-3	n/a	n/a	NP	NaN	66	0.0002079	0.0001605	unknown	ShapiroFrancia

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

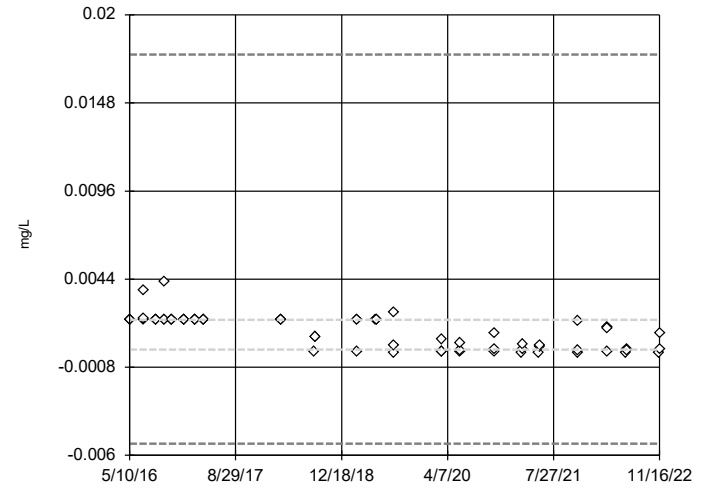


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Antimony, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

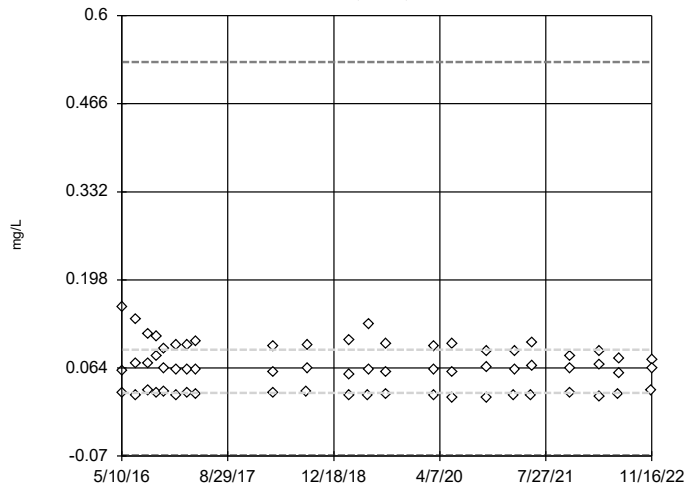


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01767,
 low cutoff = -0.005311,
 based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

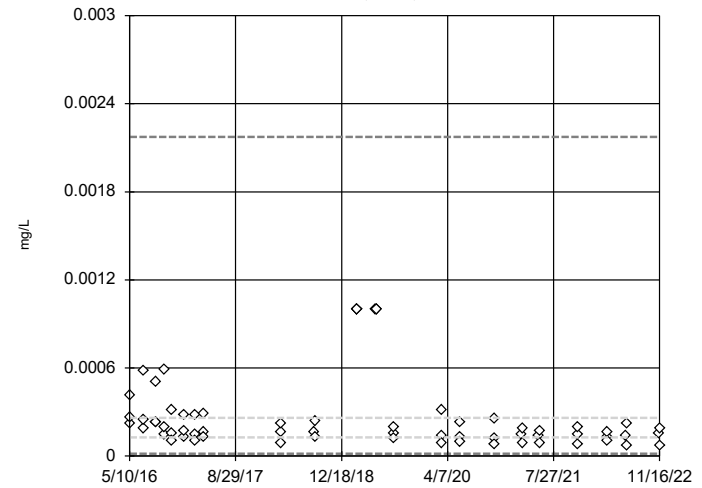


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.5292,
 low cutoff = -0.06868,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

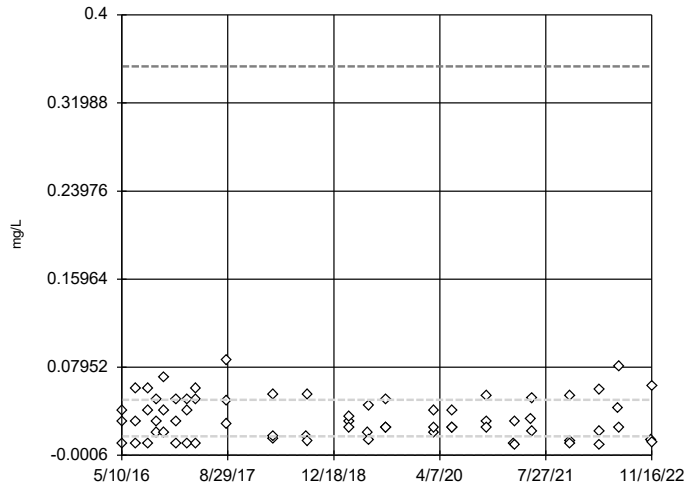


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.002175,
 low cutoff = 0.0000153,
 based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

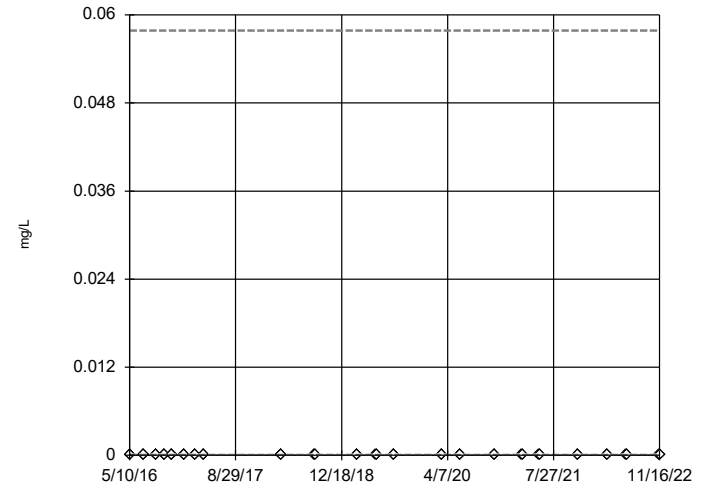


n = 69
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.3531,
 low cutoff = -0.0005681,
 based on IQR multiplier of 3.

Constituent: Boron, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

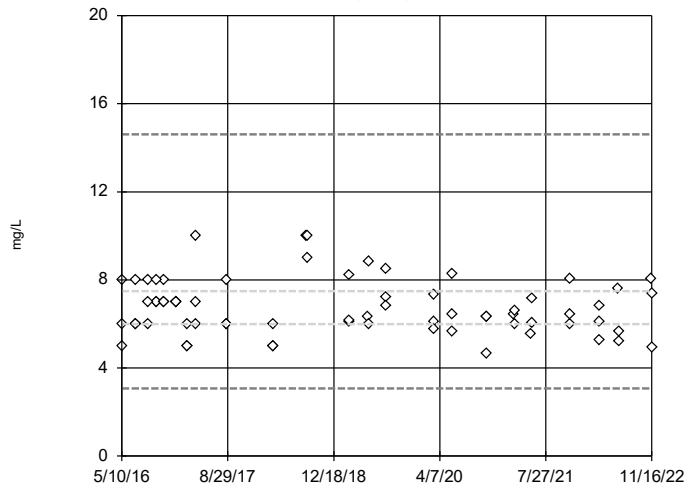


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.05787,
 low cutoff = 2.1e-8,
 based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

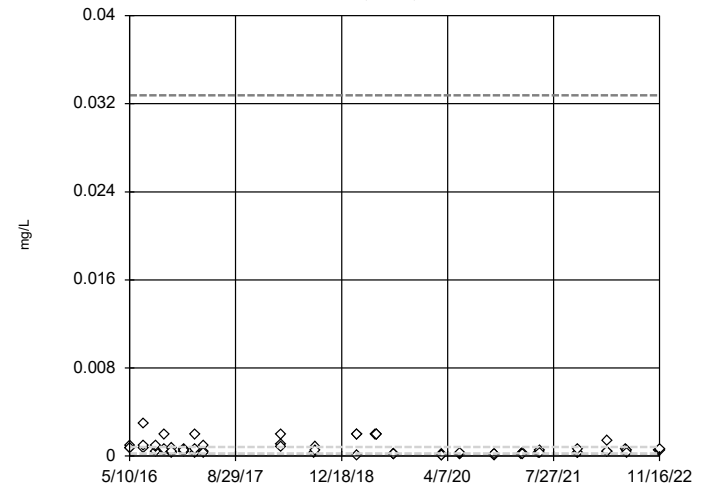


n = 69
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 14.6, low cutoff = 3.079,
 based on IQR multiplier of 3.

Constituent: Chloride, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

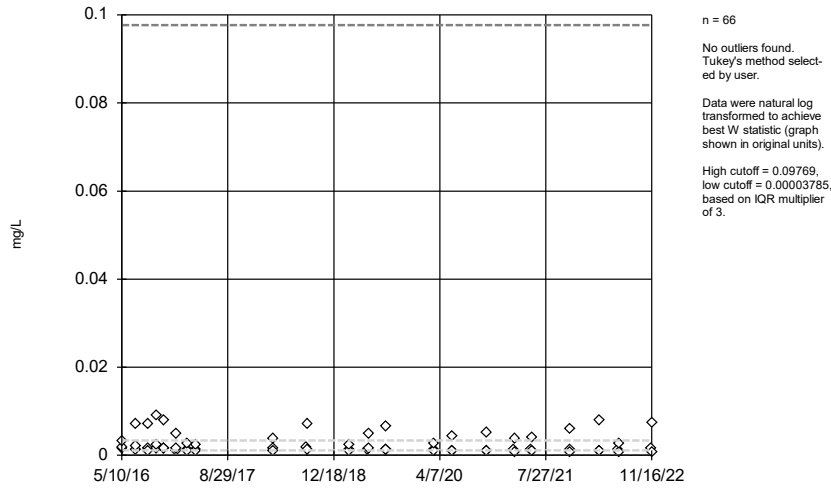


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.03277,
 low cutoff = 0.000006246,
 based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

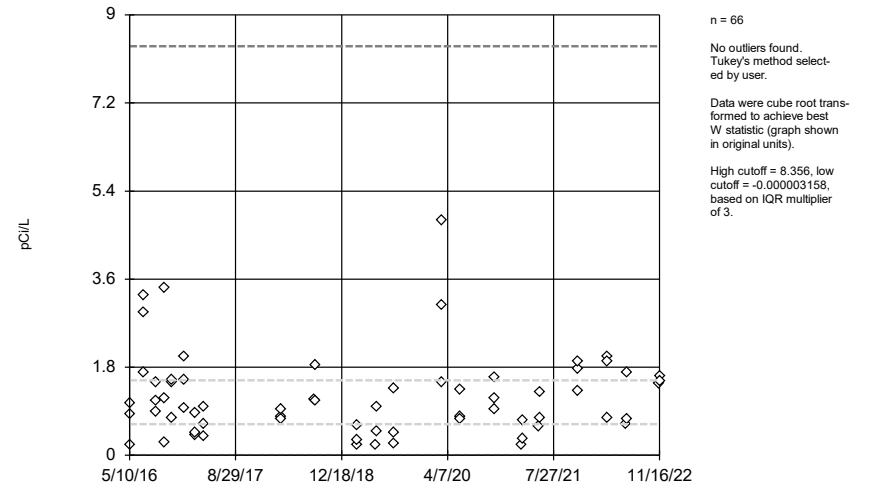
AD-12,AD-18,AD-3



Constituent: Cobalt, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

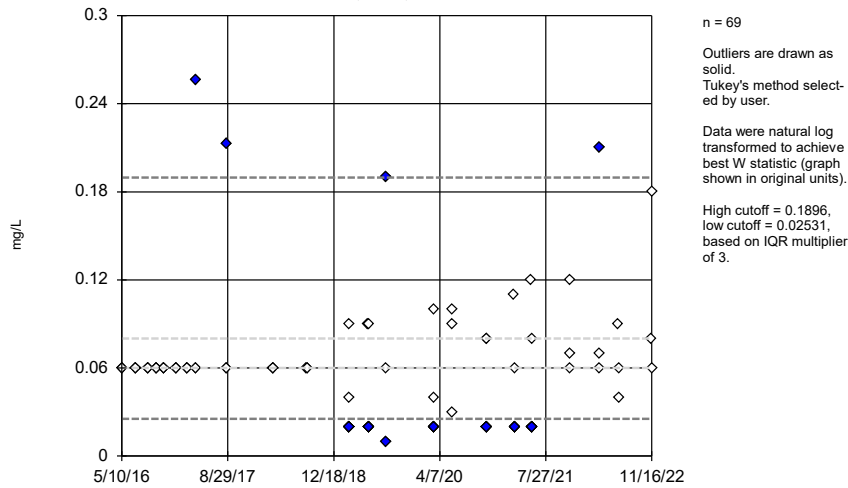
AD-12,AD-18,AD-3



Constituent: Combined Radium 226 + 228 Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

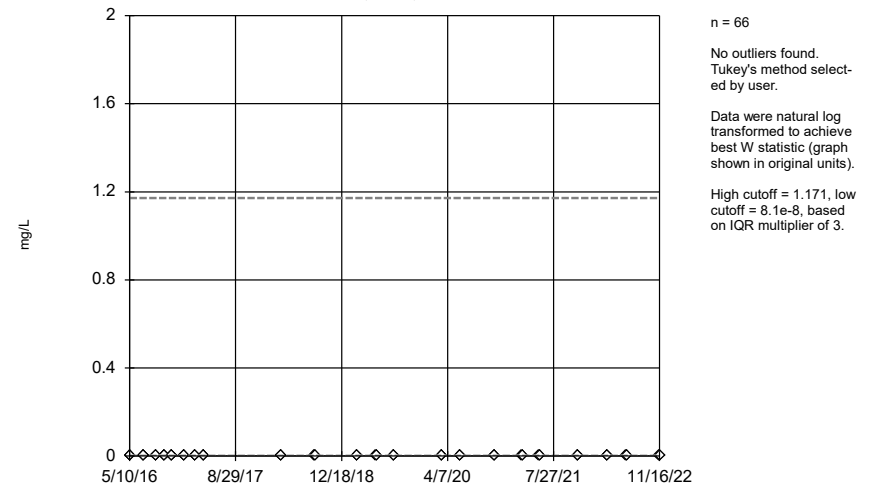
AD-12,AD-18,AD-3



Constituent: Fluoride, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

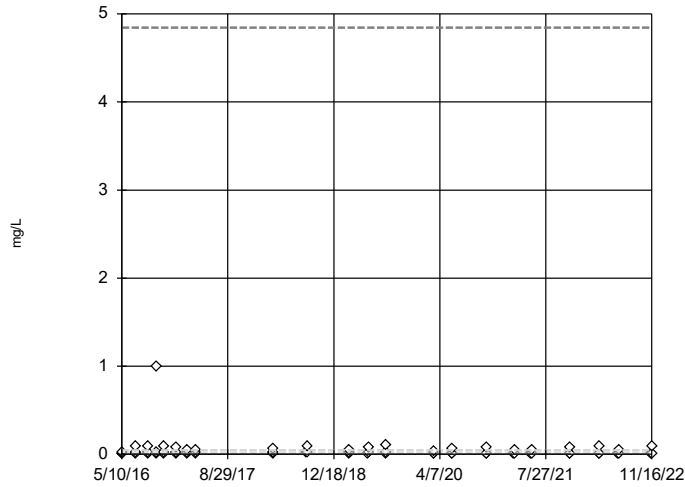
AD-12,AD-18,AD-3



Constituent: Lead, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

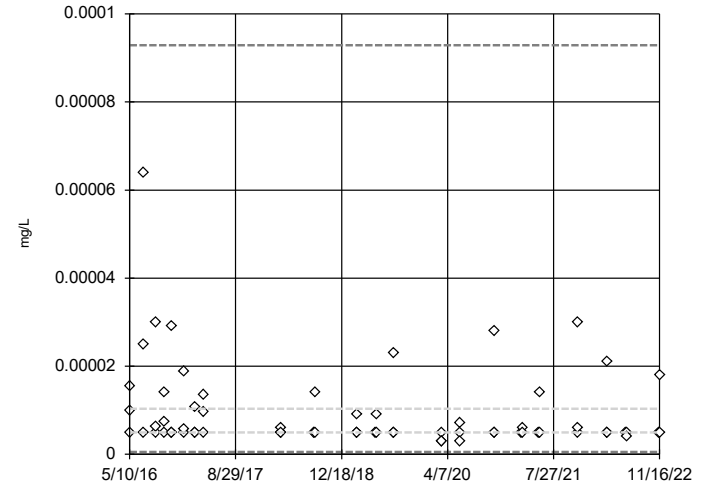


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 4.843, low cutoff = 0.00009252, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

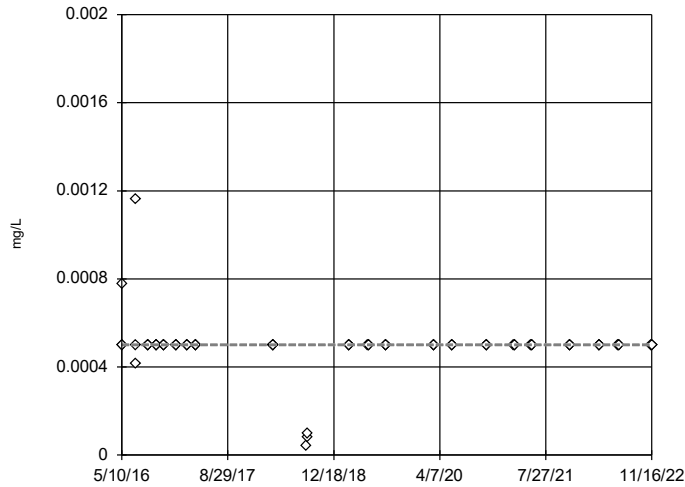


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.00009285, low cutoff = 5.6e-7, based on IQR multiplier of 3.

Constituent: Mercury, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

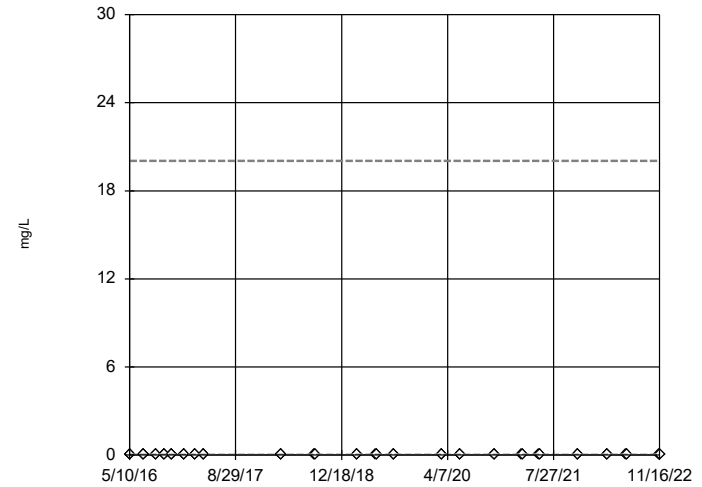


n = 66
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality, analysis run on raw data.
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Molybdenum, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3

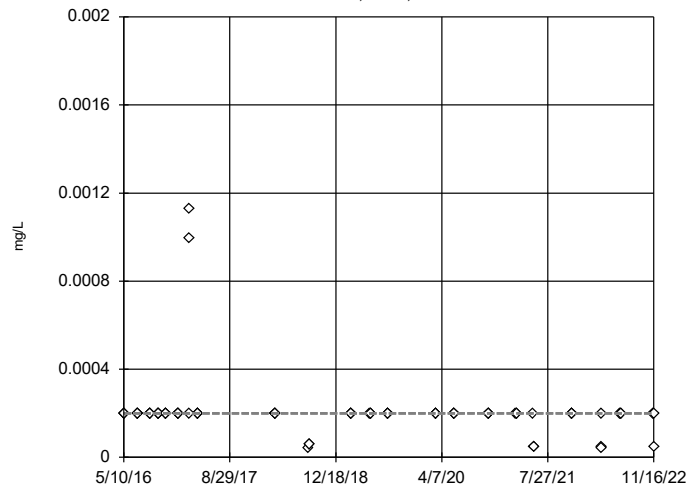


n = 66
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 20.05, low cutoff = 1.6e-8, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 2/3/2023 7:20 AM View: Outlier Upgradient
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tukey's Outlier Screening, Pooled Background

AD-12,AD-18,AD-3



n = 66
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 2/3/2023 7:20 AM View: Outlier Upgradient
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

FIGURE D
Mann-Whitney

Welch's t-test/Mann-Whitney - Significant Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:44 AM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
pH, field (SU)	AD-30	-2.839	Yes	Mann-W
Sulfate, total (mg/L)	AD-28	2.695	Yes	Mann-W
Sulfate, total (mg/L)	AD-30	3.842	Yes	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-30	3.54	Yes	Mann-W

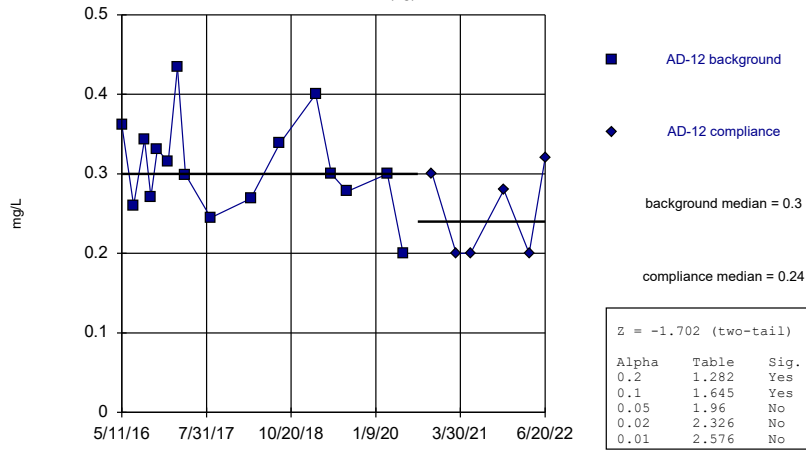
Welch's t-test/Mann-Whitney - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:44 AM

<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-17	-0.6641	No	Mann-W
Calcium, total (mg/L)	AD-18 (bg)	-1.886	No	Mann-W
Calcium, total (mg/L)	AD-28	0	No	Mann-W
Calcium, total (mg/L)	AD-3 (bg)	1.069	No	Mann-W
Calcium, total (mg/L)	AD-30	2.556	No	Mann-W
pH, field (SU)	AD-12 (bg)	-0.7741	No	Mann-W
pH, field (SU)	AD-17	-1.143	No	Mann-W
pH, field (SU)	AD-18 (bg)	-1.771	No	Mann-W
pH, field (SU)	AD-28	-2.102	No	Mann-W
pH, field (SU)	AD-3 (bg)	-1.77	No	Mann-W
pH, field (SU)	AD-30	-2.839	Yes	Mann-W
Sulfate, total (mg/L)	AD-12 (bg)	-1.3	No	Mann-W
Sulfate, total (mg/L)	AD-17	-1.339	No	Mann-W
Sulfate, total (mg/L)	AD-18 (bg)	-1.15	No	Mann-W
Sulfate, total (mg/L)	AD-28	2.695	Yes	Mann-W
Sulfate, total (mg/L)	AD-3 (bg)	1.18	No	Mann-W
Sulfate, total (mg/L)	AD-30	3.842	Yes	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-12 (bg)	-0.2954	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-17	-0.3871	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-18 (bg)	0.037	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-28	0.8905	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-3 (bg)	0.8867	No	Mann-W
Total Dissolved Solids [TDS] (mg/L)	AD-30	3.54	Yes	Mann-W

Mann-Whitney (Wilcoxon Rank Sum)

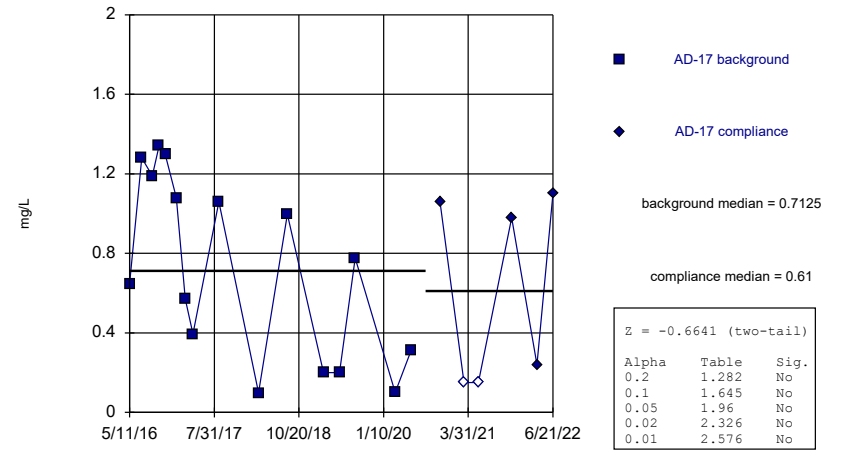
AD-12 (bg)



Constituent: Calcium, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

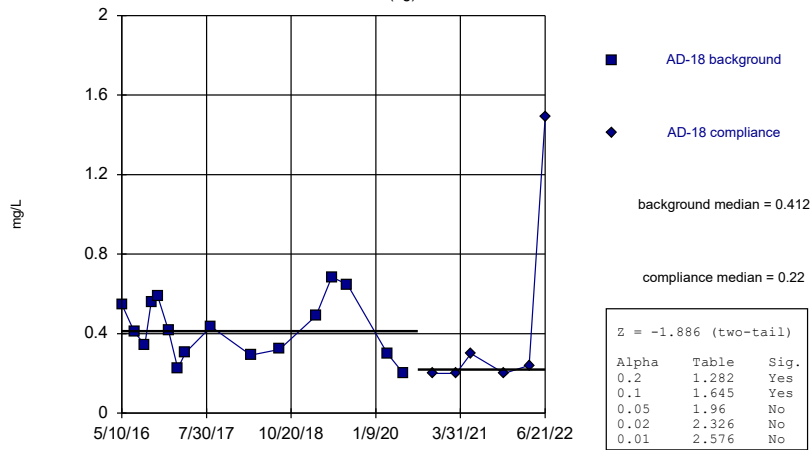
AD-17



Constituent: Calcium, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

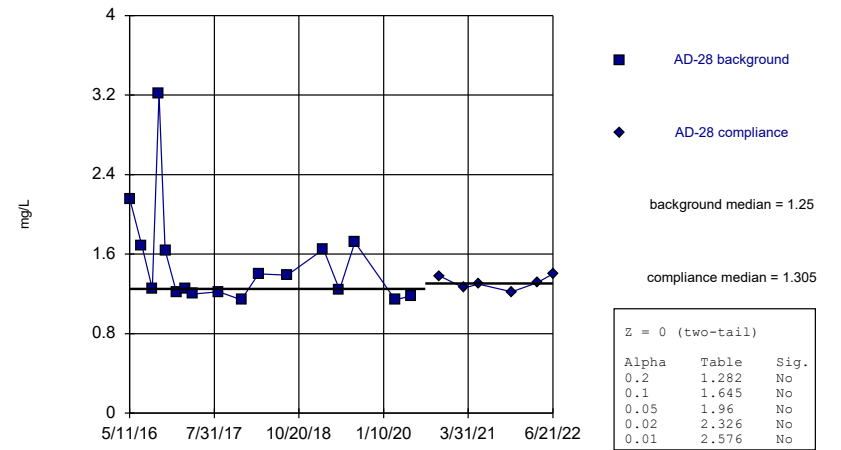
AD-18 (bg)



Constituent: Calcium, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

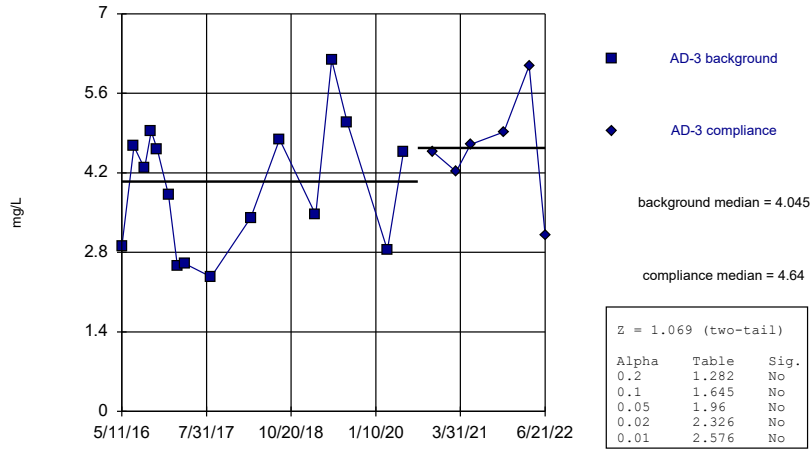
AD-28



Constituent: Calcium, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

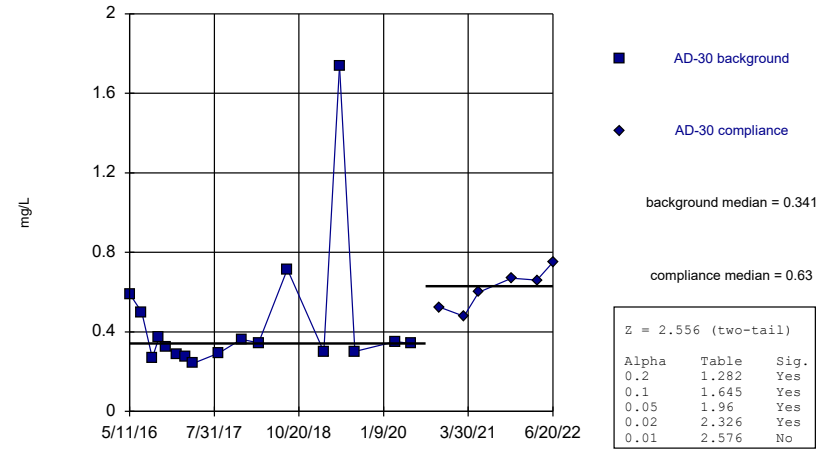
AD-3 (bg)



Constituent: Calcium, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

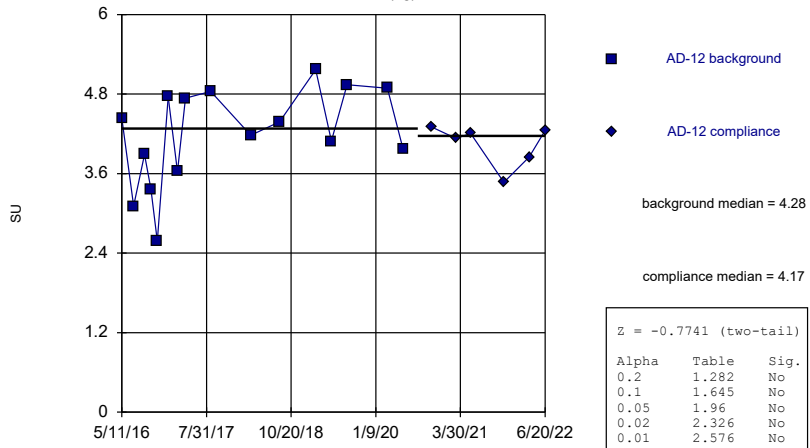
AD-30



Constituent: Calcium, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

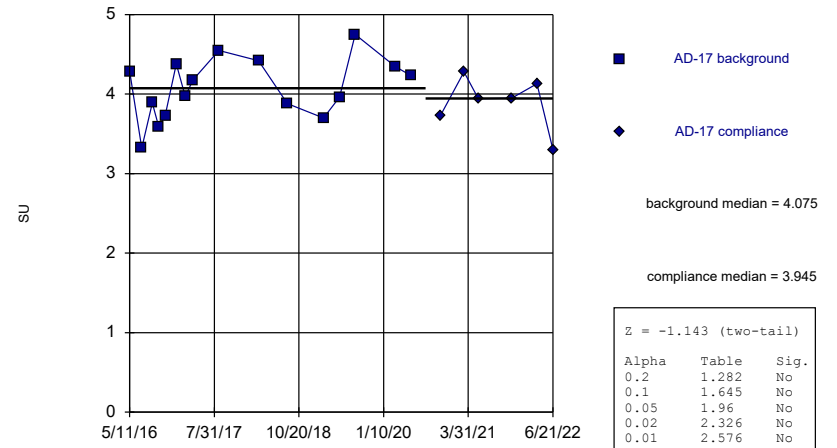
AD-12 (bg)



Constituent: pH, field Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

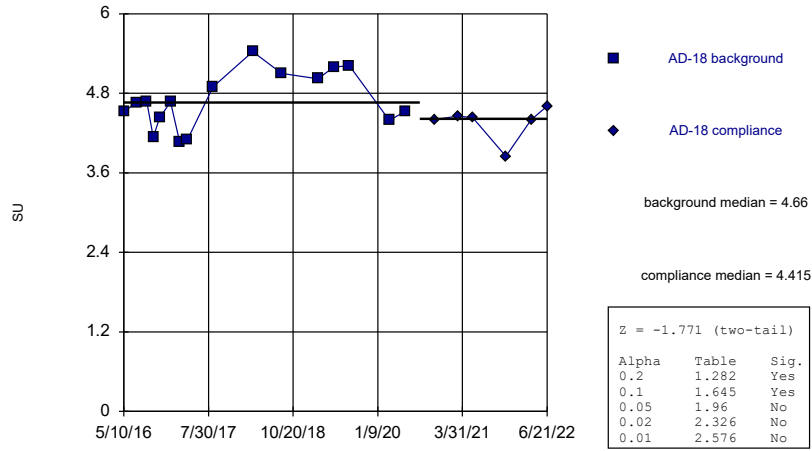
AD-17



Constituent: pH, field Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

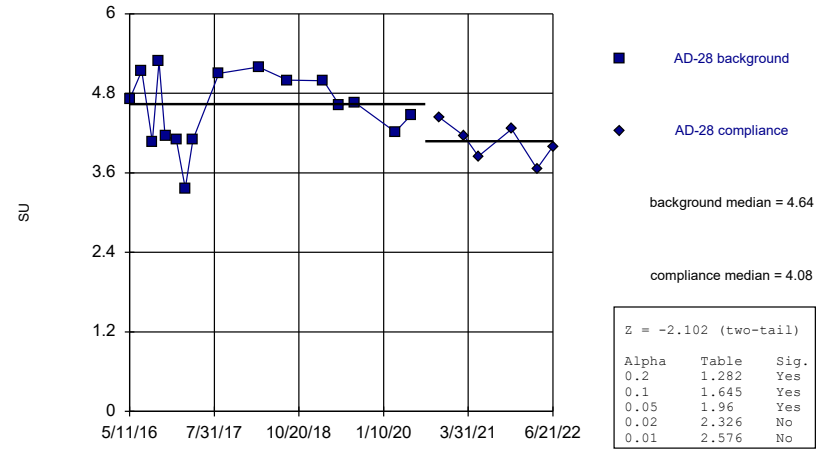
AD-18 (bg)



Constituent: pH, field Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

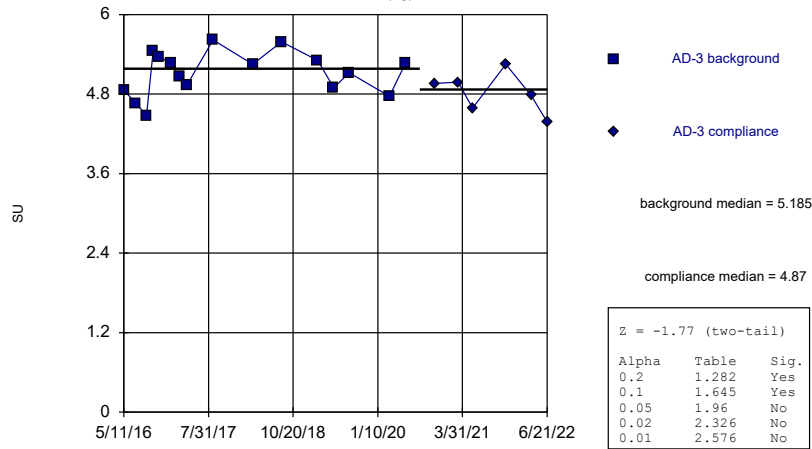
AD-28



Constituent: pH, field Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

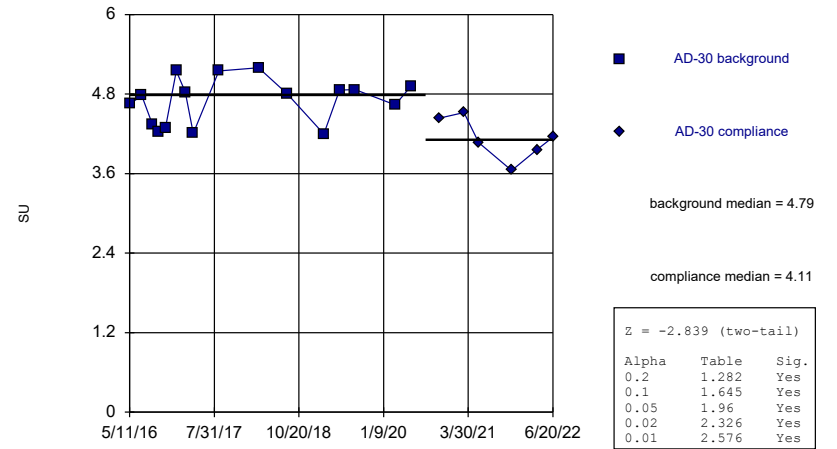
AD-3 (bg)



Constituent: pH, field Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

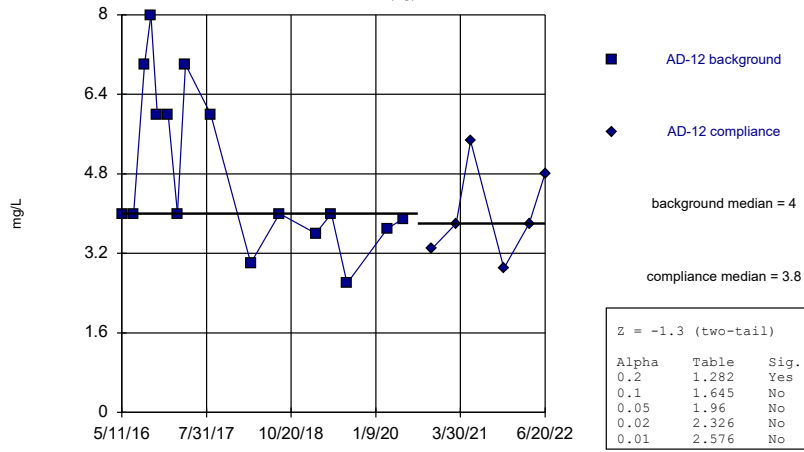
AD-30



Constituent: pH, field Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

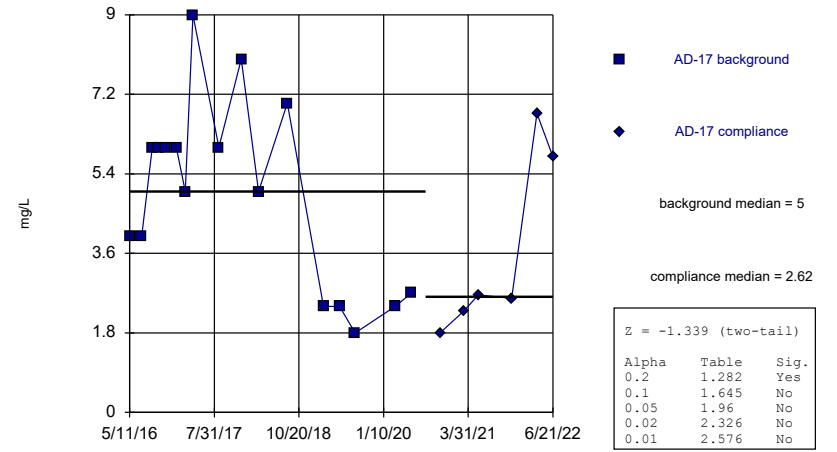
AD-12 (bg)



Constituent: Sulfate, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

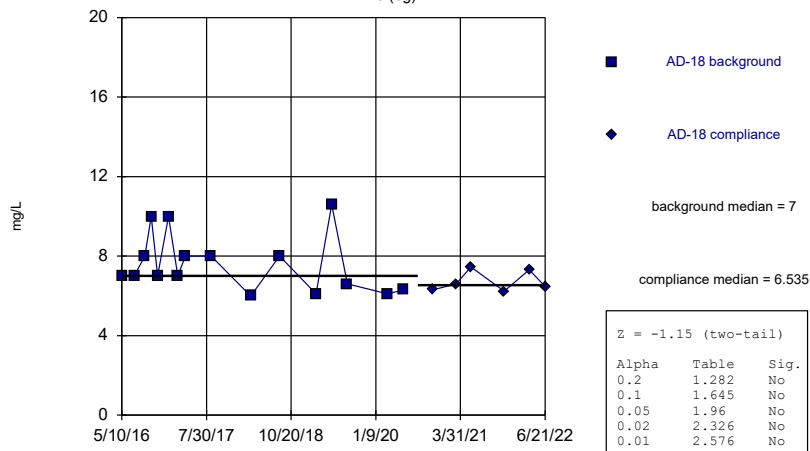
AD-17



Constituent: Sulfate, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

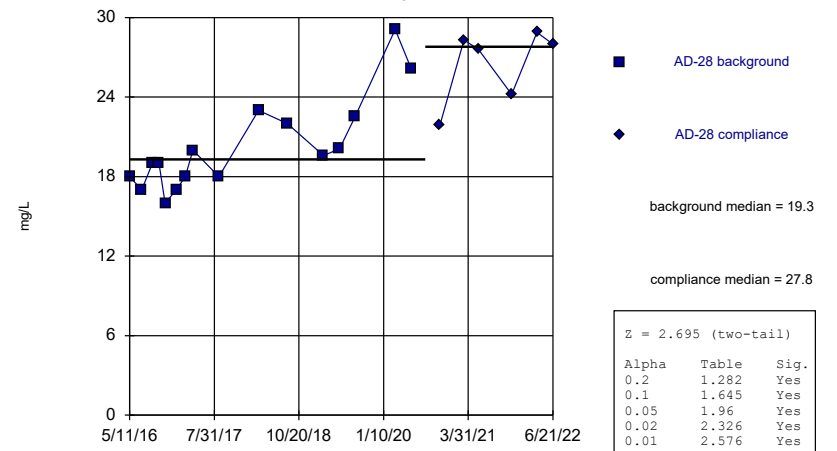
AD-18 (bg)



Constituent: Sulfate, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

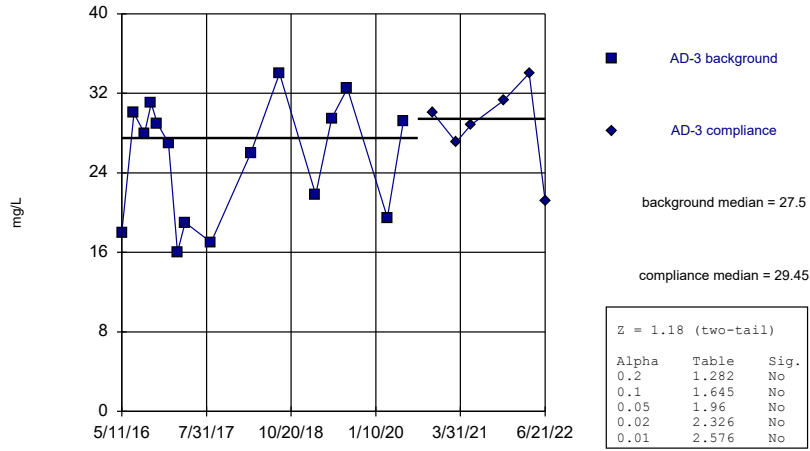
AD-28



Constituent: Sulfate, total Analysis Run 2/3/2023 7:42 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

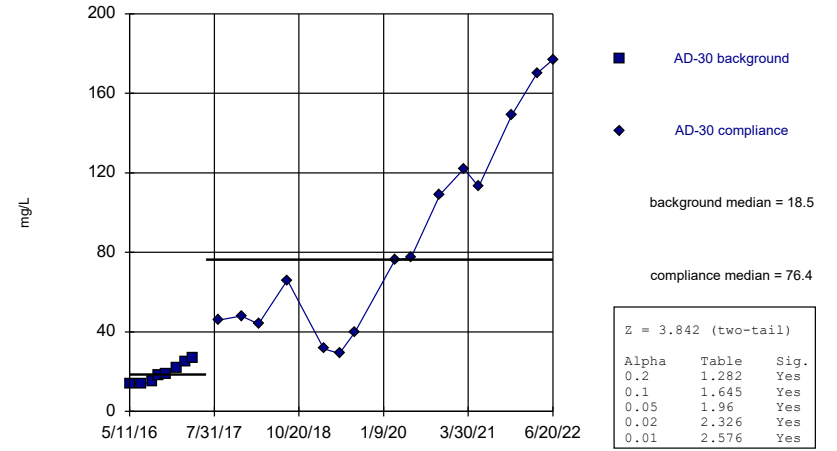
AD-3 (bg)



Constituent: Sulfate, total Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

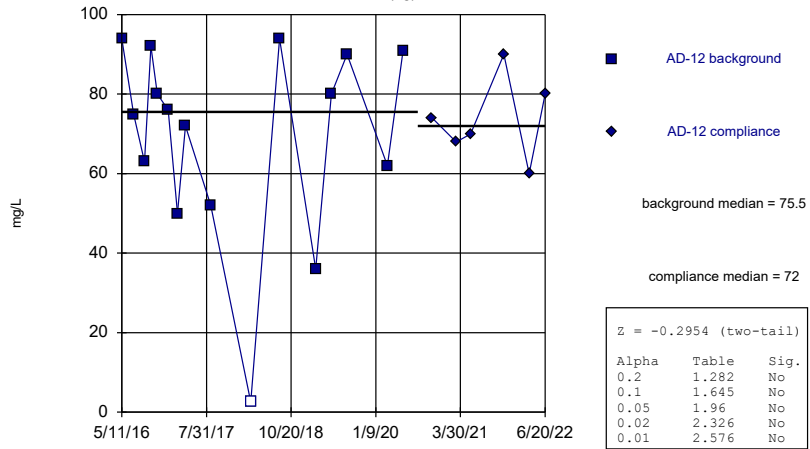
AD-30



Constituent: Sulfate, total Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

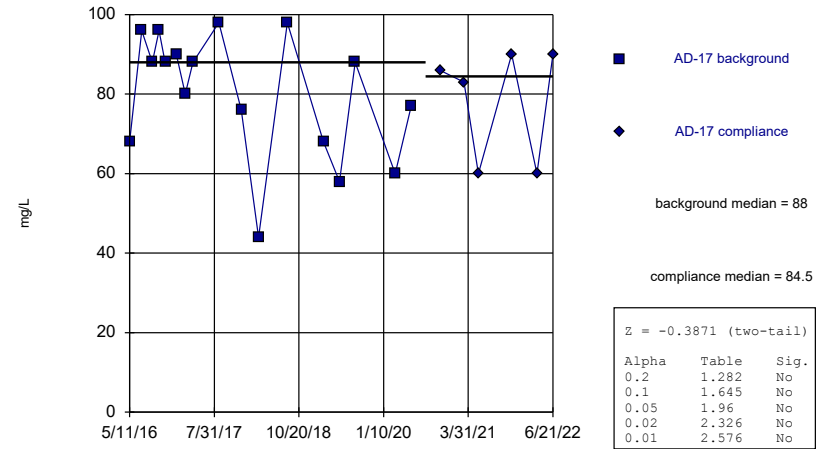
AD-12 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

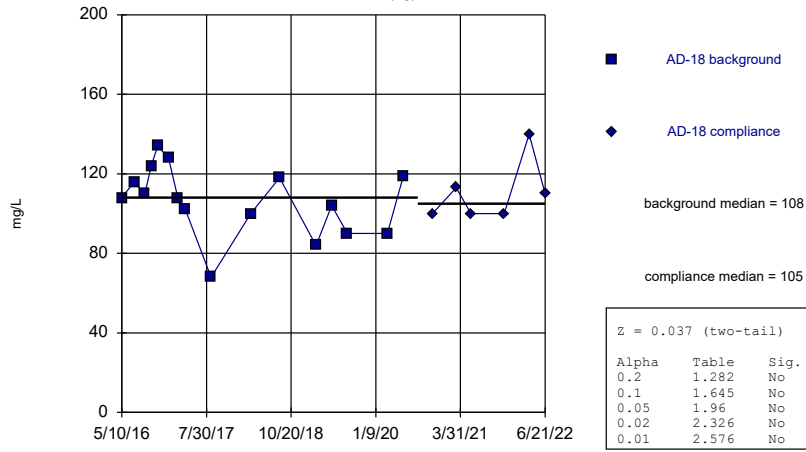
AD-17



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

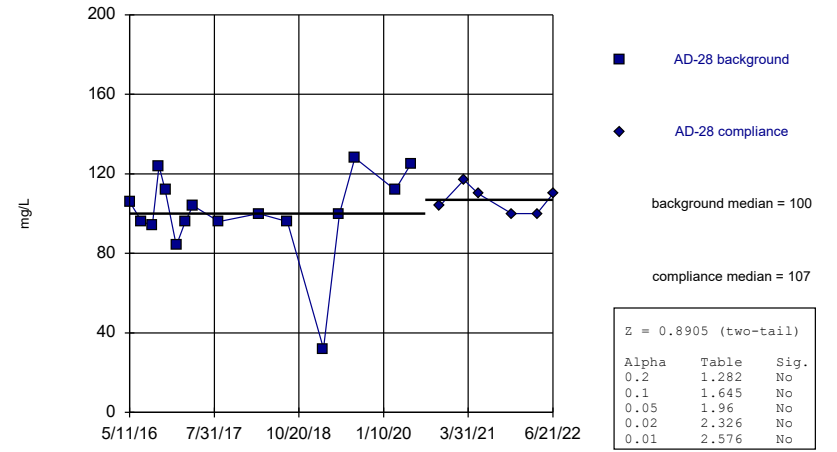
AD-18 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

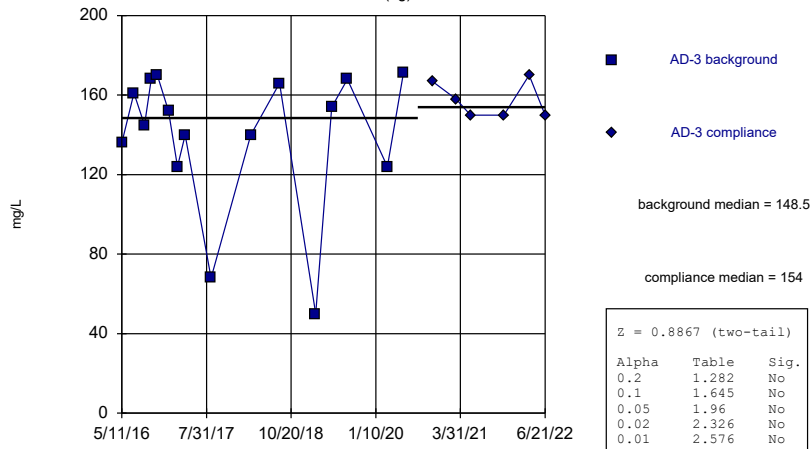
AD-28



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

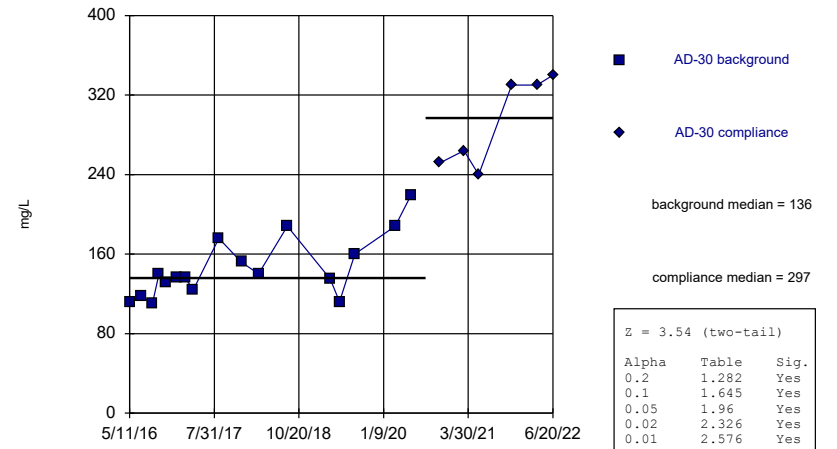
AD-3 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Mann-Whitney (Wilcoxon Rank Sum)

AD-30



Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:43 AM View: Mann-Whitney
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

FIGURE E
Intrawell PL

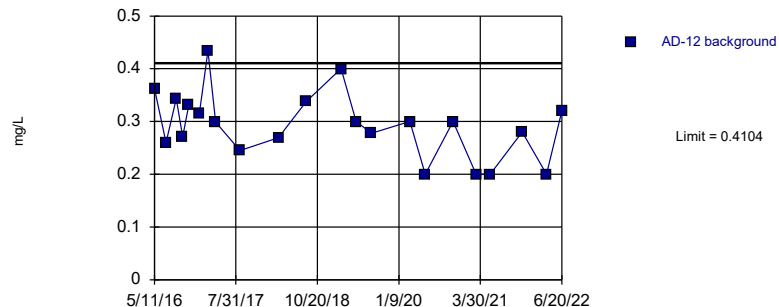
Intrawell Prediction Limits - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:51 AM

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-17	1.34	n/a	n/a	1 future	n/a	22	n/a	n/a	9.091	n/a	n/a	0.003707	NP Intra (normality) 1 of 2
Calcium, total (mg/L)	AD-18	0.9612	n/a	n/a	1 future	n/a	22	-0.9928	0.5101	0	None	ln(x)	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-28	3.21	n/a	n/a	1 future	n/a	23	n/a	n/a	0	n/a	n/a	0.003415	NP Intra (normality) 1 of 2
Calcium, total (mg/L)	AD-3	6.168	n/a	n/a	1 future	n/a	22	4.121	1.095	0	None	No	0.002505	Param Intra 1 of 2
Calcium, total (mg/L)	AD-30	1.03	n/a	n/a	1 future	n/a	23	-0.8354	0.4658	0	None	ln(x)	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-17	4.725	3.322	n/a	1 future	n/a	22	4.023	0.3753	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-18	5.361	3.838	n/a	1 future	n/a	22	4.6	0.4076	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-28	5.423	3.444	n/a	1 future	n/a	22	4.434	0.5294	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-3	5.683	4.395	n/a	1 future	n/a	22	5.039	0.3448	0	None	No	0.001253	Param Intra 1 of 2
pH, field (SU)	AD-30	5.326	3.759	n/a	1 future	n/a	22	4.542	0.4193	0	None	No	0.001253	Param Intra 1 of 2
Sulfate, total (mg/L)	AD-12	7.359	n/a	n/a	1 future	n/a	22	4.585	1.484	0	None	No	0.002505	Param Intra 1 of 2
Sulfate, total (mg/L)	AD-17	8.562	n/a	n/a	1 future	n/a	23	4.591	2.138	0	None	No	0.002505	Param Intra 1 of 2
Sulfate, total (mg/L)	AD-18	10.6	n/a	n/a	1 future	n/a	22	n/a	n/a	0	n/a	n/a	0.003707	NP Intra (normality) 1 of 2
Sulfate, total (mg/L)	AD-28	30.07	n/a	n/a	1 future	n/a	22	21.97	4.332	0	None	No	0.002505	Param Intra 1 of 2
Sulfate, total (mg/L)	AD-3	36.96	n/a	n/a	1 future	n/a	22	26.36	5.672	0	None	No	0.002505	Param Intra 1 of 2
Sulfate, total (mg/L)	AD-30	31.56	n/a	n/a	1 future	n/a	8	19.25	5.007	0	None	No	0.002505	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-17	107.7	n/a	n/a	1 future	n/a	23	79.57	15.15	0	None	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-18	138.6	n/a	n/a	1 future	n/a	22	107.5	16.62	0	None	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-28	129.7	n/a	n/a	1 future	n/a	22	10773	3232	0	None	x^2	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-3	181.6	n/a	n/a	1 future	n/a	22	3375121	1399507	0	None	x^3	0.002505	Param Intra 1 of 2
Total Dissolved Solids [TDS] (mg/L)	AD-30	206.4	n/a	n/a	1 future	n/a	17	145.8	31.08	0	None	No	0.002505	Param Intra 1 of 2

Prediction Limit

Intrawell Parametric, AD-12 (bg)

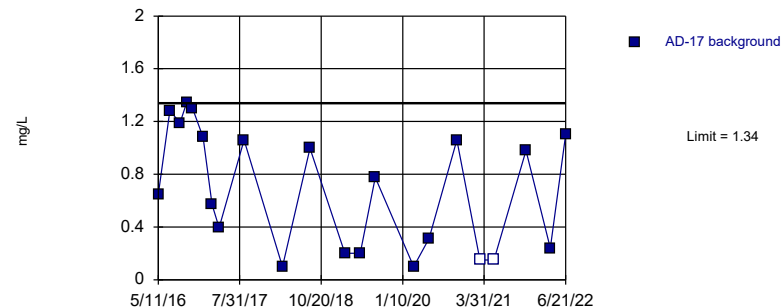


Background Data Summary: Mean=0.293, Std. Dev.=0.06283, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9534, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Non-parametric, AD-17

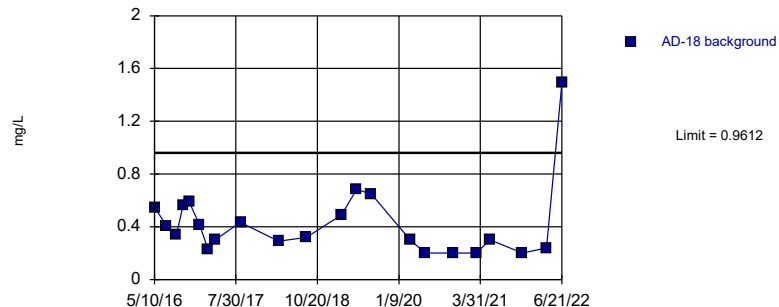


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 22 background values. 9.091% NDs. Well-constituent pair annual alpha = 0.007401. Individual comparison alpha = 0.003707 (1 of 2). Assumes 1 future value.

Constituent: Calcium, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-18 (bg)

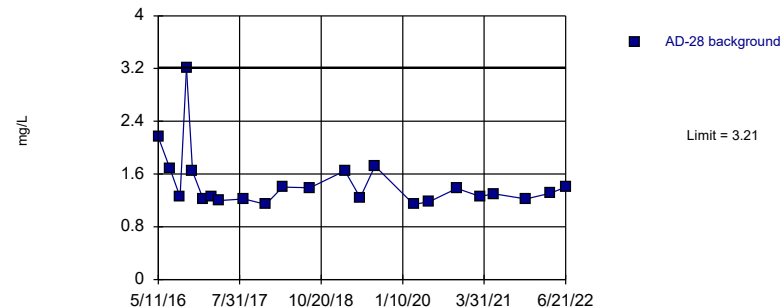


Background Data Summary (based on natural log transformation): Mean=-0.9928, Std. Dev.=0.5101, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.924, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Non-parametric, AD-28

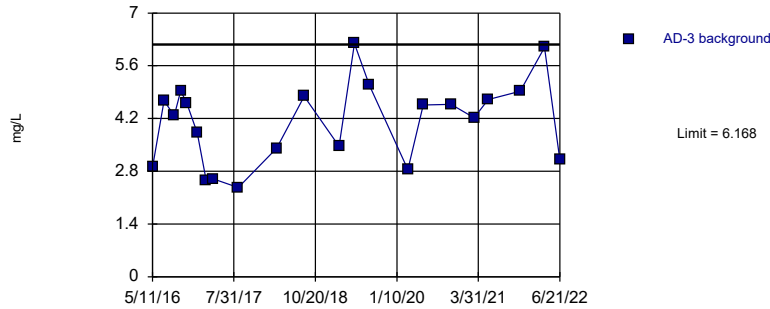


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 23 background values. Well-constituent pair annual alpha = 0.006819. Individual comparison alpha = 0.003415 (1 of 2). Assumes 1 future value.

Constituent: Calcium, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-3 (bg)

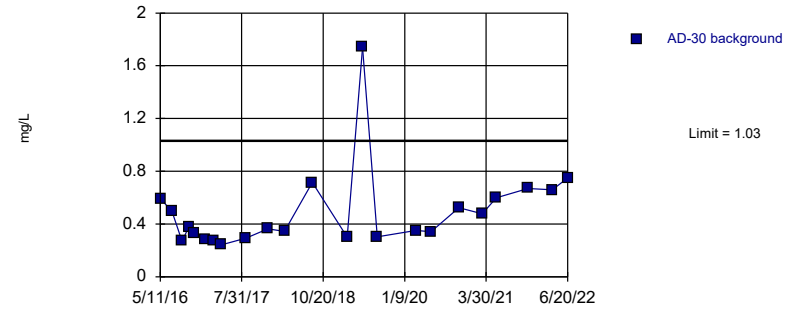


Background Data Summary: Mean=4.121, Std. Dev.=1.095, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9431, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-30

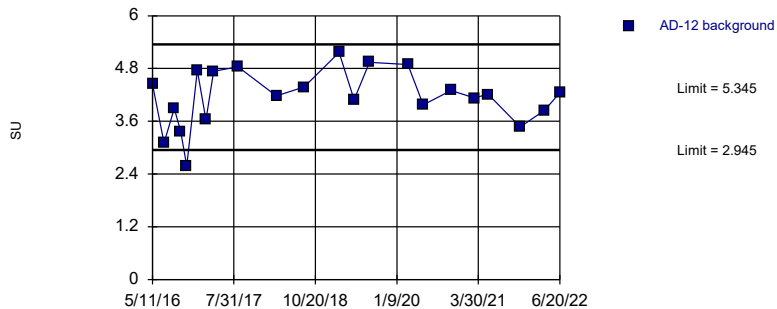


Background Data Summary (based on natural log transformation): Mean=-0.8354, Std. Dev.=0.4658, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8887, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Calcium, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-12 (bg)

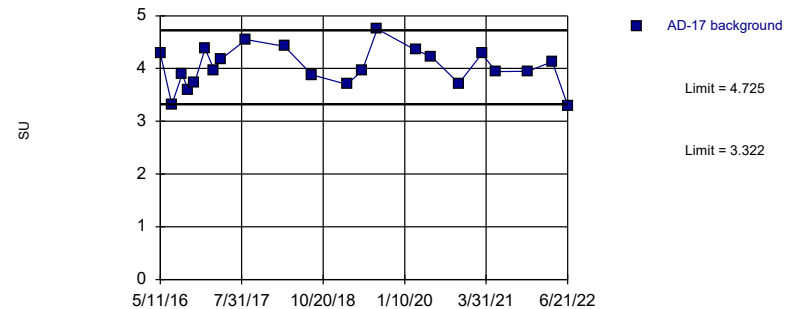


Background Data Summary: Mean=4.145, Std. Dev.=0.6423, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9666, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-17

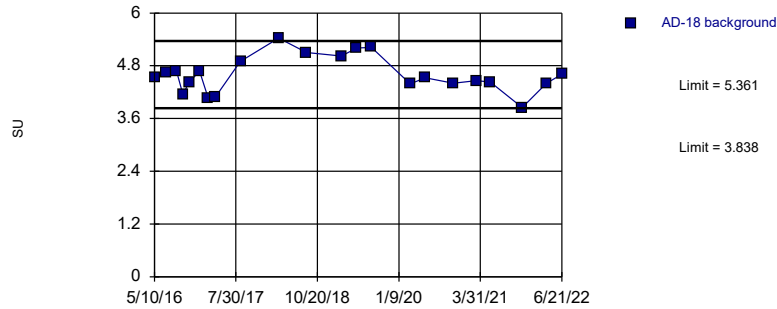


Background Data Summary: Mean=4.023, Std. Dev.=0.3753, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9786, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-18 (bg)

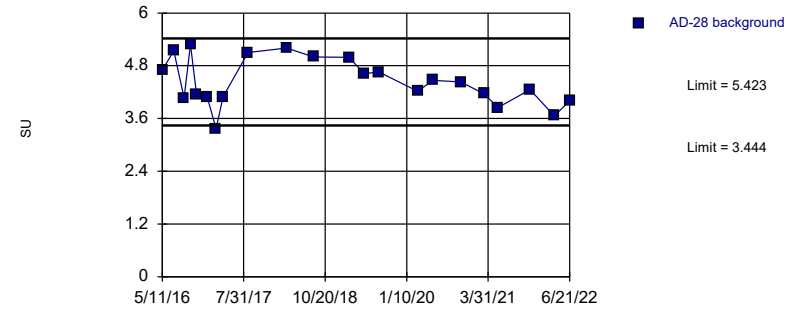


Background Data Summary: Mean=4.6, Std. Dev.=0.4076, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9632, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-28

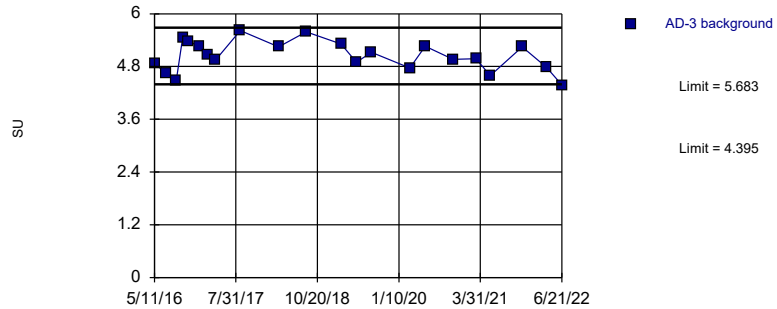


Background Data Summary: Mean=4.434, Std. Dev.=0.5294, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9592, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-3 (bg)

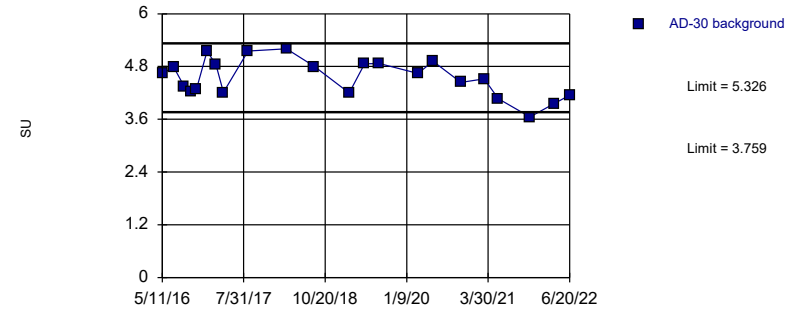


Background Data Summary: Mean=5.039, Std. Dev.=0.3448, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9765, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-30

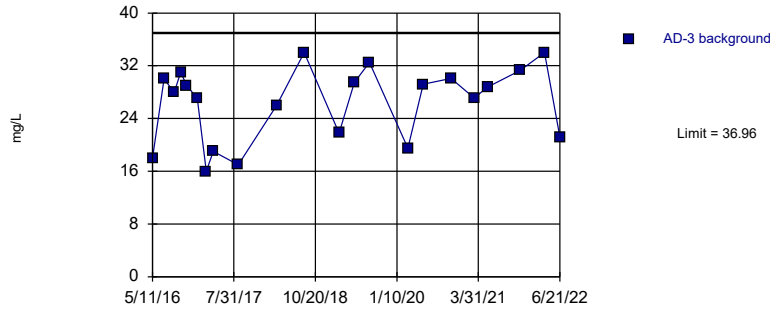


Background Data Summary: Mean=4.542, Std. Dev.=0.4193, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9667, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: pH, field Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-3 (bg)

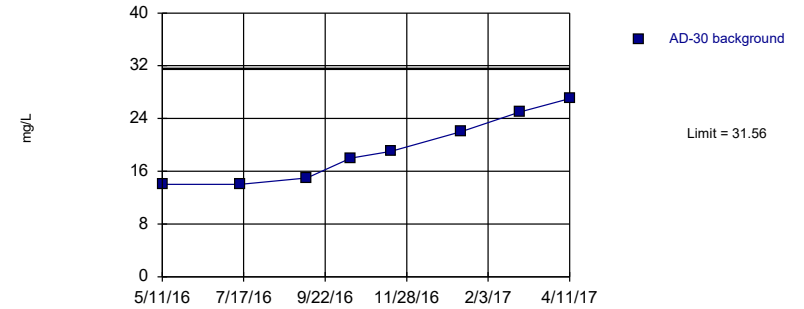


Background Data Summary: Mean=26.36, Std. Dev.=5.672, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9069, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-30

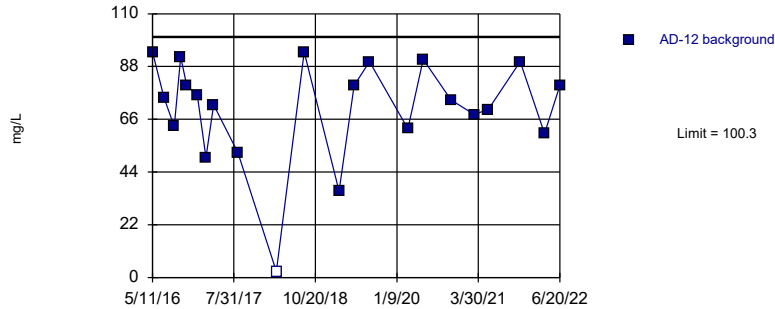


Background Data Summary: Mean=19.25, Std. Dev.=5.007, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9081, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Sulfate, total Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-12 (bg)

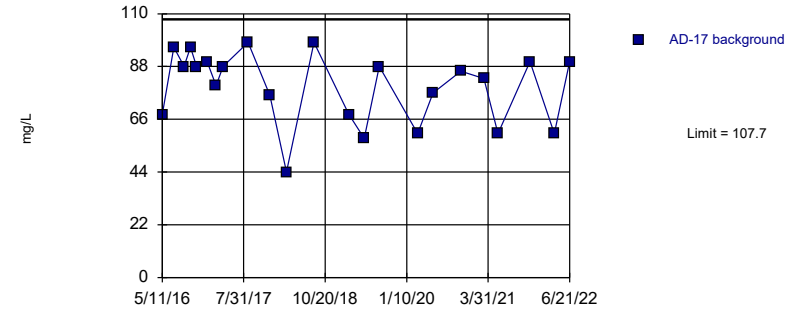


Background Data Summary (based on square transformation): Mean=5424, Std. Dev.=2481, n=22, 4.545% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9554, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-17

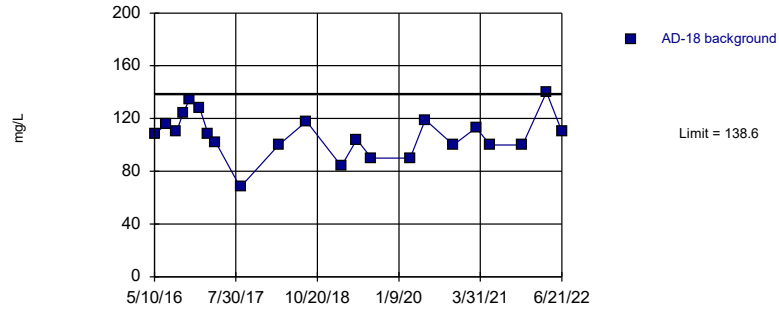


Background Data Summary: Mean=79.57, Std. Dev.=15.15, n=23. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9048, critical = 0.881. Kappa = 1.857 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:50 AM View: Intrawell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-18 (bg)

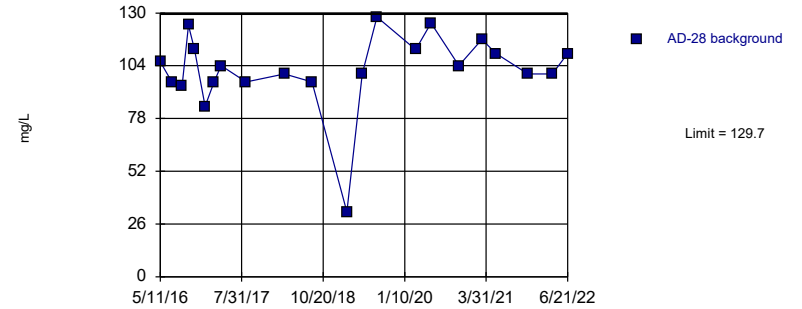


Background Data Summary: Mean=107.5, Std. Dev.=16.62, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9823, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-28

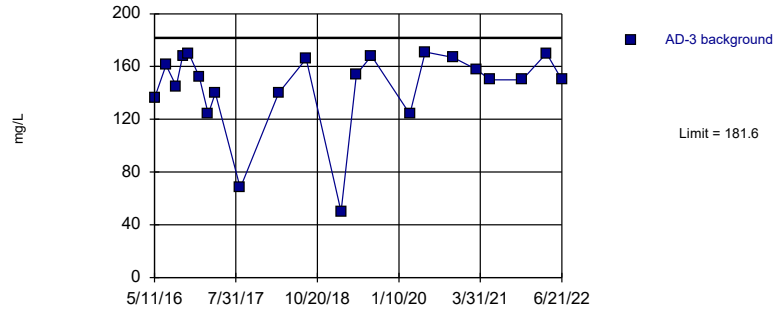


Background Data Summary (based on square transformation): Mean=107.73, Std. Dev.=3232, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9046, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-3 (bg)

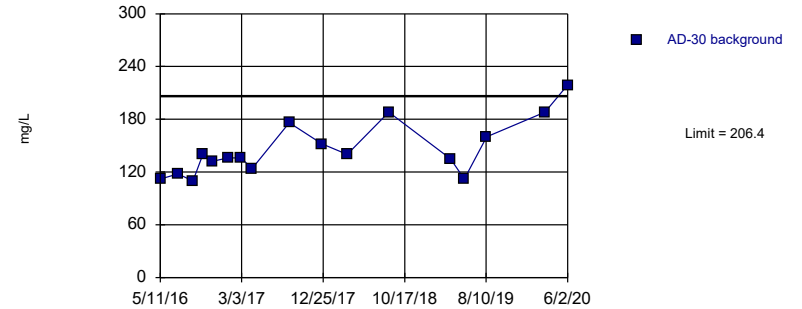


Background Data Summary (based on cube transformation): Mean=337.5121, Std. Dev.=1399507, n=22. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9021, critical = 0.878. Kappa = 1.869 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Constituent: Total Dissolved Solids [TDS] Analysis Run 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit

Intrawell Parametric, AD-30



Background Data Summary: Mean=145.8, Std. Dev.=31.08, n=17. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9021, critical = 0.851. Kappa = 1.951 (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 2/3/2023 7:50 AM View: Intrawell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

FIGURE F
Upgradient Well Trend Test

Trend Tests - Upgradient Wells - Significant Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:54 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
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-3 (bg)	-0.1403	-119	-98	Yes	23	47.83	n/a	n/a	0.01	NP

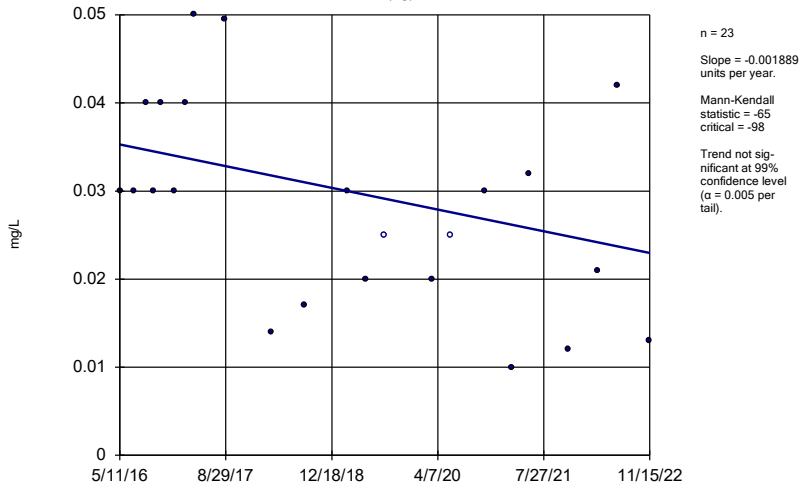
Trend Tests - Upgradient Wells - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:54 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-18 (bg)	0.000171	45	98	No	23	26.09	n/a	n/a	0.01	NP
Boron, total (mg/L)	AD-3 (bg)	0	0	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-18 (bg)	-0.3088	-82	-98	No	23	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	AD-3 (bg)	-0.005564	-16	-98	No	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-18 (bg)	0	-53	-98	No	23	65.22	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	AD-3 (bg)	-0.1403	-119	-98	Yes	23	47.83	n/a	n/a	0.01	NP

Sen's Slope Estimator

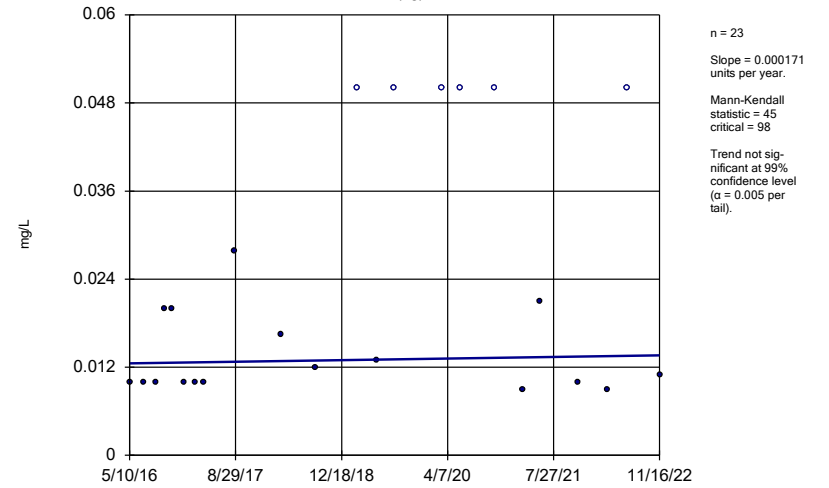
AD-12 (bg)



Constituent: Boron, total Analysis Run 2/3/2023 7:53 AM View: Interwell Trend Tests
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Sen's Slope Estimator

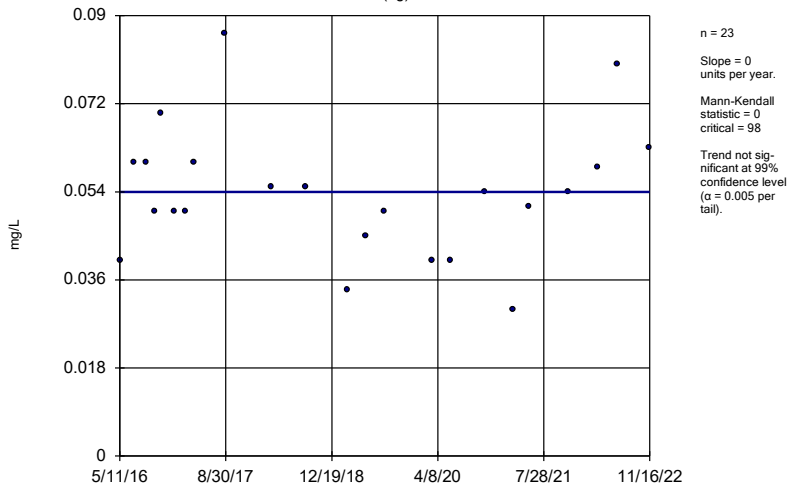
AD-18 (bg)



Constituent: Boron, total Analysis Run 2/3/2023 7:53 AM View: Interwell Trend Tests
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Sen's Slope Estimator

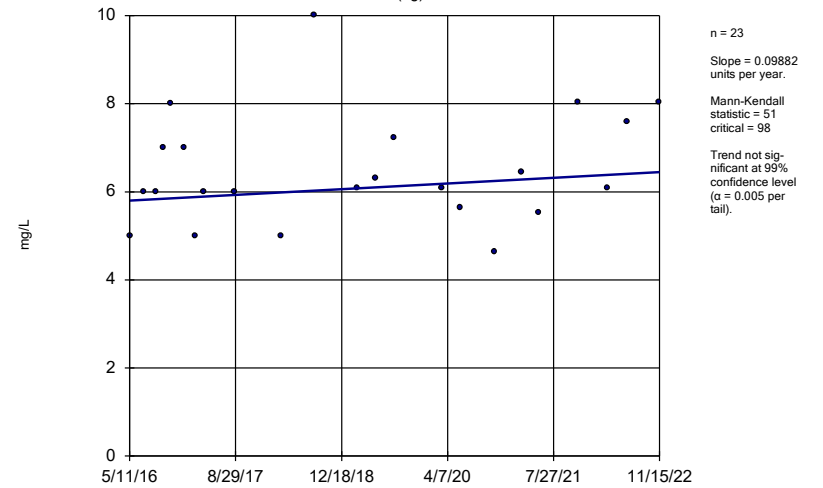
AD-3 (bg)



Constituent: Boron, total Analysis Run 2/3/2023 7:53 AM View: Interwell Trend Tests
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Sen's Slope Estimator

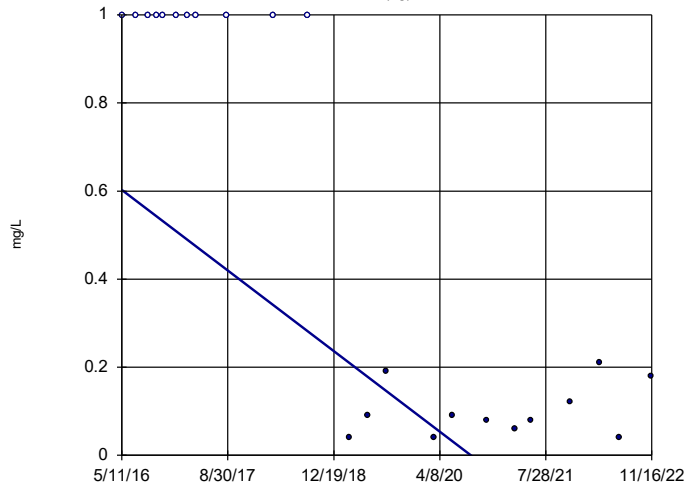
AD-12 (bg)



Constituent: Chloride, total Analysis Run 2/3/2023 7:53 AM View: Interwell Trend Tests
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Sen's Slope Estimator

AD-3 (bg)



n = 23
Slope = -0.1403
units per year.
Mann-Kendall
statistic = -119
critical = -98
Decreasing trend
significant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Fluoride, total Analysis Run 2/3/2023 7:53 AM View: Interwell Trend Tests
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

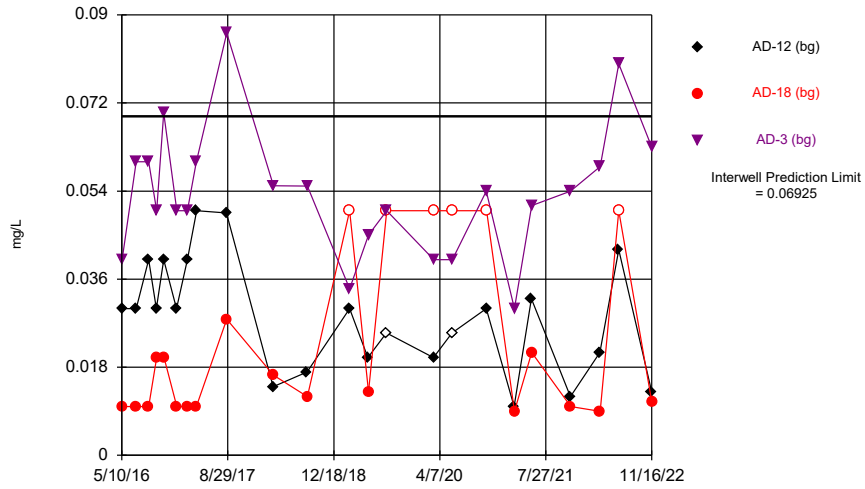
FIGURE G
Interwell PL

Interwell Prediction Limits - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 7:58 AM

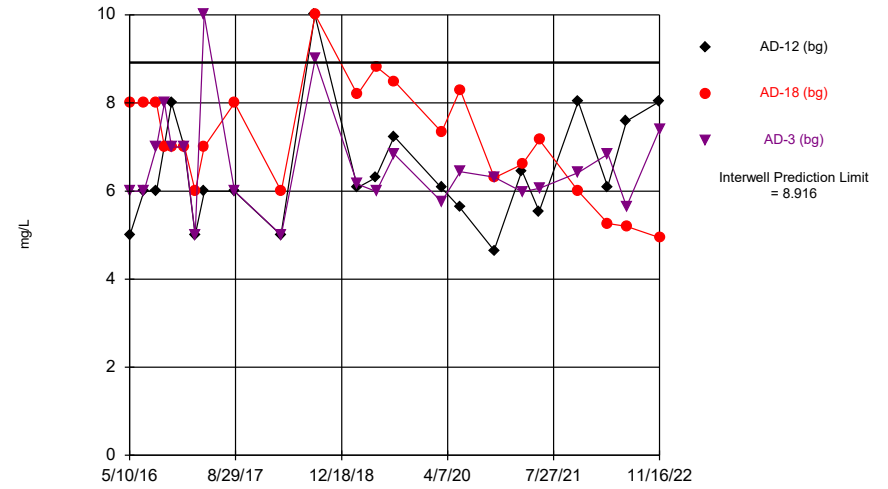
<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Boron, total (mg/L)	n/a	0.06925	n/a	n/a	3 future	n/a	69	0.1735	0.05286	11.59	None	sqrt(x)	0.002505	Param Inter 1 of 2
Chloride, total (mg/L)	n/a	8.916	n/a	n/a	3 future	n/a	69	2.586	0.2358	0	None	sqrt(x)	0.002505	Param Inter 1 of 2
Fluoride, total (mg/L)	n/a	0.2565	n/a	n/a	3 future	n/a	69	n/a	n/a	50.72	n/a	n/a	0.000403	NP Inter (NDs) 1 of 2

Time Series



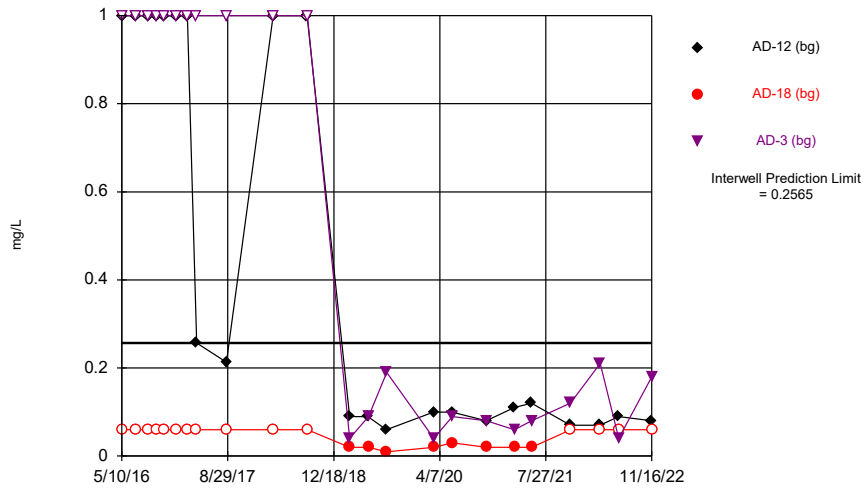
Constituent: Boron, total Analysis Run 2/3/2023 7:57 AM View: Interwell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



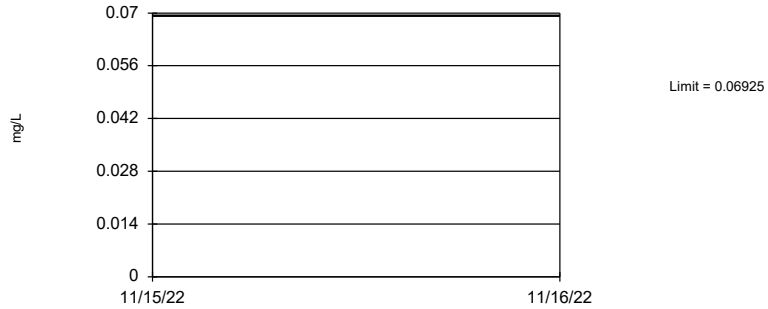
Constituent: Chloride, total Analysis Run 2/3/2023 7:58 AM View: Interwell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



Constituent: Fluoride, total Analysis Run 2/3/2023 7:58 AM View: Interwell
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

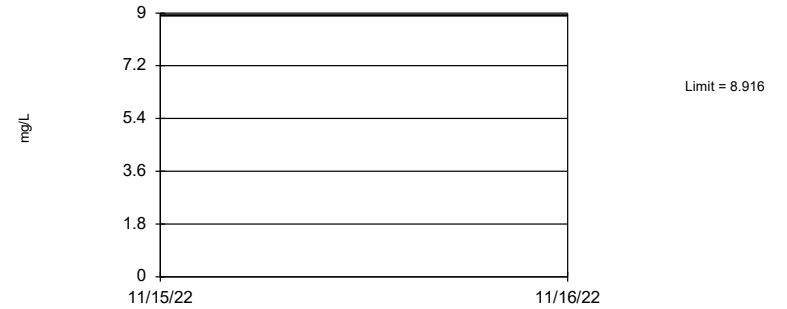
Prediction Limit
Interwell Parametric



Background Data Summary (based on square root transformation): Mean=0.1735, Std. Dev.=0.05286, n=69, 11.59% NDs. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9642, critical = 0.951. Kappa = 1.697 (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 2/3/2023 7:55 AM View: Interwell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit
Interwell Parametric



Background Data Summary (based on square root transformation): Mean=2.586, Std. Dev.=0.2358, n=69. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9623, critical = 0.951. Kappa = 1.697 (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: Chloride, total Analysis Run 2/3/2023 7:55 AM View: Interwell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Prediction Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 69 background values. 50.72% NDs. Annual per-constituent alpha = 0.002415. Individual comparison alpha = 0.000403 (1 of 2). Assumes 3 future values.

Constituent: Fluoride, total Analysis Run 2/3/2023 7:55 AM View: Interwell
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

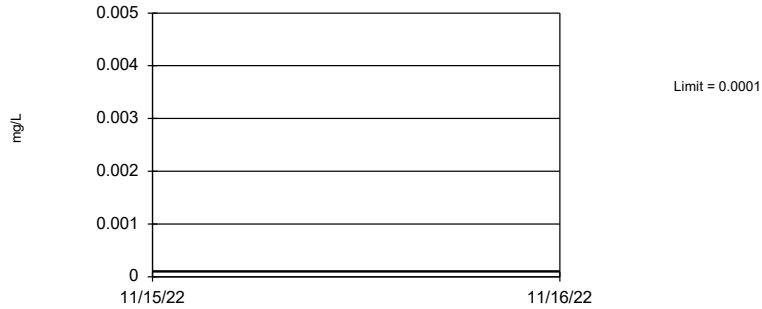
FIGURE H
UTL

Upper Tolerance Limits Summary

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 8:41 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 66	n/a	n/a	90.91	n/a	n/a	0.03387	NP Inter(NDs)
Arsenic, total (mg/L)	n/a	0.004229	n/a	n/a	n/a	n/a 66	n/a	n/a	42.42	n/a	n/a	0.03387	NP Inter(normality)
Barium, total (mg/L)	n/a	0.157	n/a	n/a	n/a	n/a 66	n/a	n/a	0	n/a	n/a	0.03387	NP Inter(normality)
Beryllium, total (mg/L)	n/a	0.001	n/a	n/a	n/a	n/a 66	n/a	n/a	9.091	n/a	n/a	0.03387	NP Inter(normality)
Cadmium, total (mg/L)	n/a	0.0001592	n/a	n/a	n/a	n/a 66	n/a	n/a	50	n/a	n/a	0.03387	NP Inter(normality)
Chromium, total (mg/L)	n/a	0.00277	n/a	n/a	n/a	n/a 66	-7.631	0.8724	10.61	None	ln(x)	0.05	Inter
Cobalt, total (mg/L)	n/a	0.009	n/a	n/a	n/a	n/a 66	n/a	n/a	0	n/a	n/a	0.03387	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	n/a	3.072	n/a	n/a	n/a	n/a 66	1.034	0.3597	0	None	sqrt(x)	0.05	Inter
Fluoride, total (mg/L)	n/a	0.2565	n/a	n/a	n/a	n/a 69	n/a	n/a	50.72	n/a	n/a	0.02904	NP Inter(NDs)
Lead, total (mg/L)	n/a	0.001	n/a	n/a	n/a	n/a 66	n/a	n/a	51.52	n/a	n/a	0.03387	NP Inter(NDs)
Lithium, total (mg/L)	n/a	0.2876	n/a	n/a	n/a	n/a 66	0.04429	0.1218	1.515	None	No	0.05	Inter
Mercury, total (mg/L)	n/a	0.000064	n/a	n/a	n/a	n/a 66	n/a	n/a	53.03	n/a	n/a	0.03387	NP Inter(NDs)
Molybdenum, total (mg/L)	n/a	0.001161	n/a	n/a	n/a	n/a 66	n/a	n/a	90.91	n/a	n/a	0.03387	NP Inter(NDs)
Selenium, total (mg/L)	n/a	0.003297	n/a	n/a	n/a	n/a 66	n/a	n/a	40.91	n/a	n/a	0.03387	NP Inter(normality)
Thallium, total (mg/L)	n/a	0.00113	n/a	n/a	n/a	n/a 66	n/a	n/a	84.85	n/a	n/a	0.03387	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 66 background values. 90.91% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Antimony, total Analysis Run 2/3/2023 8:39 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 66 background values. 42.42% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Arsenic, total Analysis Run 2/3/2023 8:39 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 66 background values. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Barium, total Analysis Run 2/3/2023 8:39 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

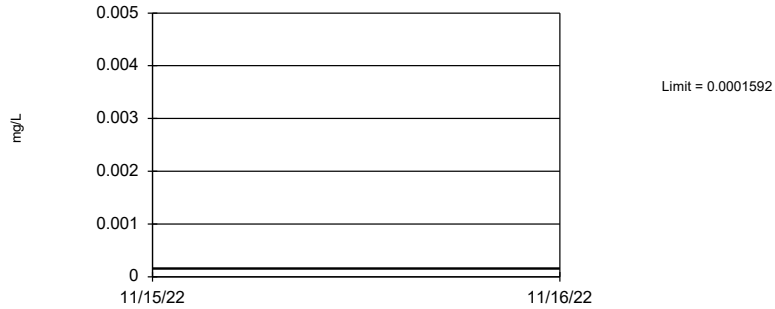
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 66 background values. 9.091% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Beryllium, total Analysis Run 2/3/2023 8:39 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

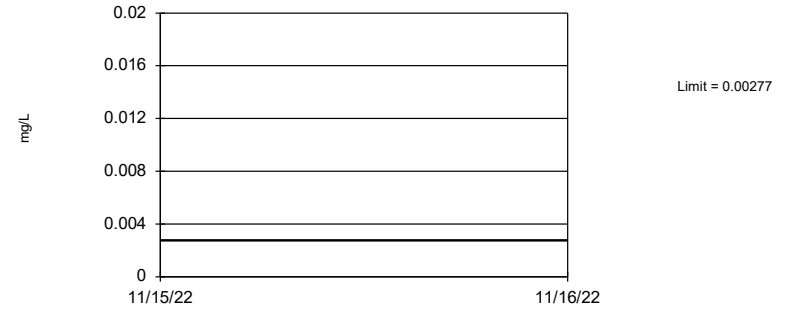
Tolerance Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 66 background values. 50% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Cadmium, total Analysis Run 2/3/2023 8:39 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tolerance Limit
Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation): Mean=-7.631, Std. Dev.=0.8724, n=66, 10.61% NDs. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9711, critical = 0.948. Report alpha = 0.05.

Constituent: Chromium, total Analysis Run 2/3/2023 8:39 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

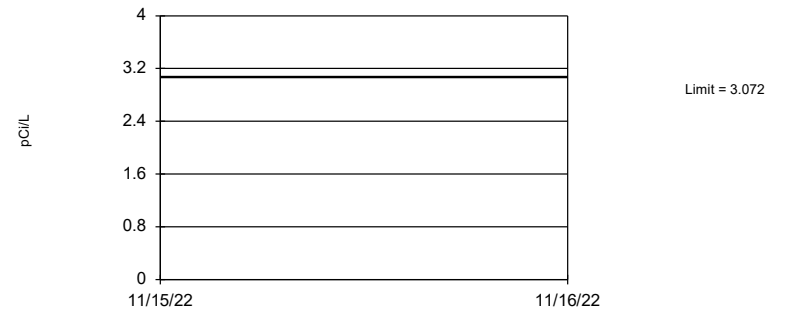
Tolerance Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 66 background values. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Cobalt, total Analysis Run 2/3/2023 8:40 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

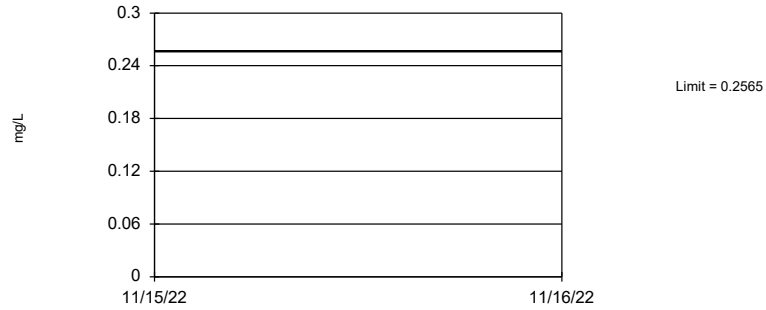
Tolerance Limit
Interwell Parametric



95% coverage. Background Data Summary (based on square root transformation): Mean=1.034, Std. Dev.=0.3597, n=66. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9584, critical = 0.948. Report alpha = 0.05.

Constituent: Combined Radium 226 + 228 Analysis Run 2/3/2023 8:40 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 69 background values. 50.72% NDs. 93.55% coverage at alpha=0.01; 95.9% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.02904.

Constituent: Fluoride, total Analysis Run 2/3/2023 8:40 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

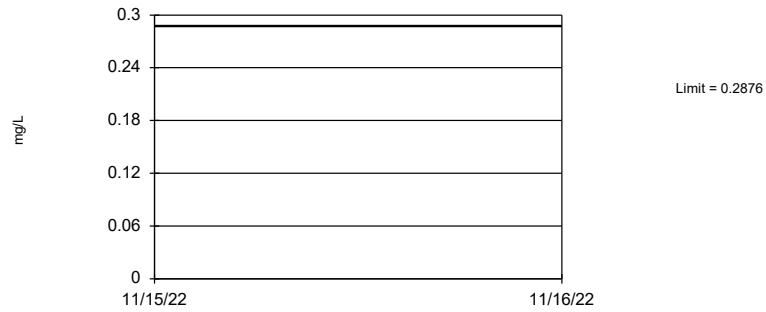
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 66 background values. 51.52% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Lead, total Analysis Run 2/3/2023 8:40 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

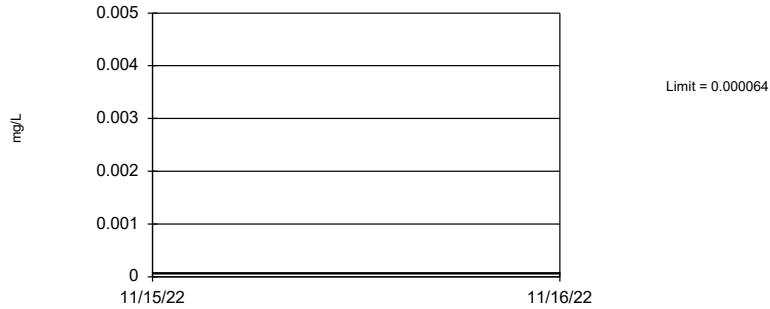
Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary: Mean=0.04429, Std. Dev.=0.1218, n=66, 1.515% NDs. Normality test was disabled. Report alpha = 0.05.

Constituent: Lithium, total Analysis Run 2/3/2023 8:40 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

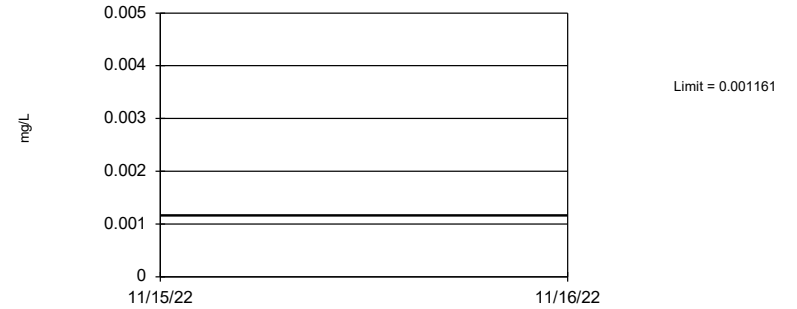
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 66 background values. 53.03% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Mercury, total Analysis Run 2/3/2023 8:41 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

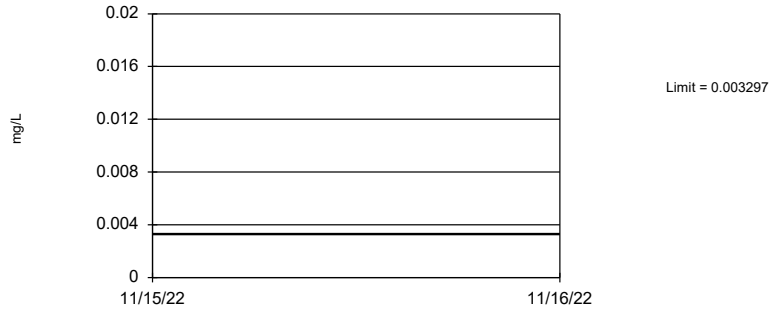
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 66 background values. 90.91% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Molybdenum, total Analysis Run 2/3/2023 8:41 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

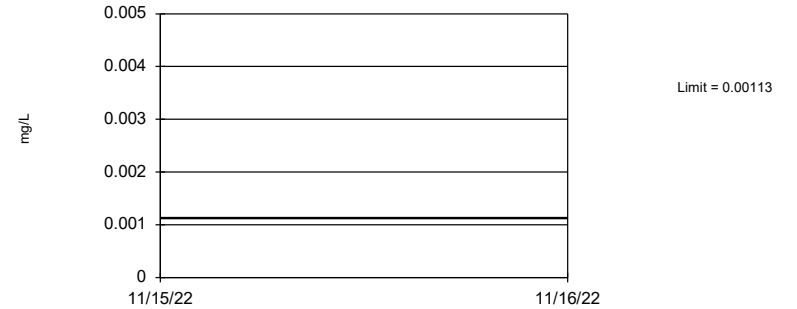
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 66 background values. 40.91% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Selenium, total Analysis Run 2/3/2023 8:41 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 66 background values. 84.85% NDs. 93.16% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.03387.

Constituent: Thallium, total Analysis Run 2/3/2023 8:41 AM View: UTLs
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

FIGURE I
GWPS

PIRKEY WBAP GWPS			
Constituent Name	MCL	Background Limit	GWPS
Antimony, Total (mg/L)	0.006	0.0001	0.006
Arsenic, Total (mg/L)	0.01	0.0042	0.01
Barium, Total (mg/L)	2	0.16	2
Beryllium, Total (mg/L)	0.004	0.001	0.004
Cadmium, Total (mg/L)	0.005	0.00016	0.005
Chromium, Total (mg/L)	0.1	0.0028	0.1
Cobalt, Total (mg/L)	n/a	0.009	0.009
Combined Radium, Total (pCi/L)	5	3.07	5
Fluoride, Total (mg/L)	4	0.26	4
Lead, Total (mg/L)	n/a	0.001	0.001
Lithium, Total (mg/L)	n/a	0.29	0.29
Mercury, Total (mg/L)	0.002	0.000064	0.002
Molybdenum, Total (mg/L)	n/a	0.0012	0.0012
Selenium, Total (mg/L)	0.05	0.0033	0.05
Thallium, Total (mg/L)	0.002	0.0011	0.002

**MCL = Maximum Contaminant Level*

**GWPS = Groundwater Protection Standard*

FIGURE J
Confidence Intervals

Confidence Intervals - Significant Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 8:46 AM

<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-28	0.01515	0.01326	0.009	Yes	22	0.0142	0.001762	0	None	No	0.01	Param.

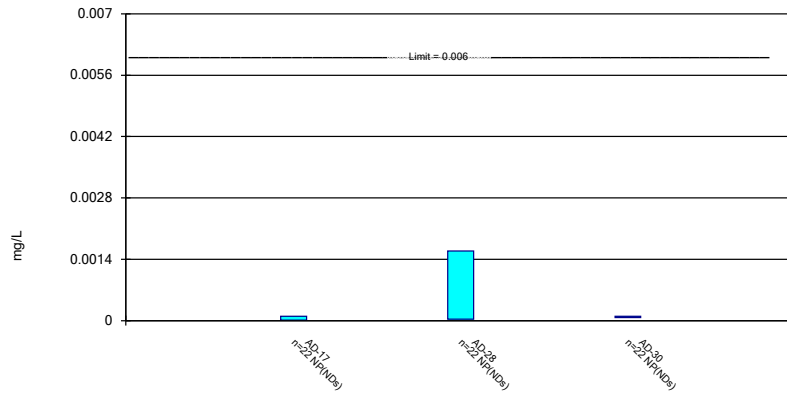
Confidence Intervals - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 8:46 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	AD-17	0.0001	0.00001	0.006	No	22	0.00009591	0.00001919	95.45	None	No	0.01	NP (NDs)
Antimony, total (mg/L)	AD-28	0.001588	0.00003	0.006	No	22	0.0001572	0.0003208	81.82	None	No	0.01	NP (NDs)
Antimony, total (mg/L)	AD-30	0.0001	0.0001	0.006	No	22	0.000214	0.0003852	86.36	None	No	0.01	NP (NDs)
Arsenic, total (mg/L)	AD-17	0.002	0.0003	0.01	No	22	0.001067	0.0008273	36.36	None	No	0.01	NP (normality)
Arsenic, total (mg/L)	AD-28	0.002	0.00018	0.01	No	22	0.001282	0.001371	31.82	None	No	0.01	NP (normality)
Arsenic, total (mg/L)	AD-30	0.002	0.00019	0.01	No	22	0.001054	0.000889	40.91	None	No	0.01	NP (normality)
Barium, total (mg/L)	AD-17	0.2415	0.1425	2	No	22	0.192	0.09225	0	None	No	0.01	Param.
Barium, total (mg/L)	AD-28	0.1633	0.1379	2	No	22	0.1506	0.02368	0	None	No	0.01	Param.
Barium, total (mg/L)	AD-30	0.104	0.054	2	No	22	0.07405	0.02634	0	None	No	0.01	NP (normality)
Beryllium, total (mg/L)	AD-17	0.0007207	0.0004934	0.004	No	22	0.000607	0.0002118	9.091	None	No	0.01	Param.
Beryllium, total (mg/L)	AD-28	0.0007464	0.0005457	0.004	No	22	0.0006551	0.0001926	0	None	sqrt(x)	0.01	Param.
Beryllium, total (mg/L)	AD-30	0.0001269	0.0000632	0.004	No	22	0.0001779	0.000268	9.091	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	AD-17	0.001	0.00003	0.005	No	22	0.000436	0.0004807	40.91	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	AD-28	0.001	0.000049	0.005	No	22	0.0005264	0.0004848	50	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	AD-30	0.00005	0.000014	0.005	No	22	0.000038	0.00001808	63.64	None	No	0.01	NP (NDs)
Chromium, total (mg/L)	AD-17	0.0009684	0.0004309	0.1	No	22	0.000904	0.001037	4.545	None	ln(x)	0.01	Param.
Chromium, total (mg/L)	AD-28	0.001	0.00035	0.1	No	22	0.001406	0.001723	18.18	None	No	0.01	NP (normality)
Chromium, total (mg/L)	AD-30	0.0009942	0.00042	0.1	No	22	0.0008846	0.0009123	4.545	None	No	0.01	NP (normality)
Cobalt, total (mg/L)	AD-17	0.01072	0.006263	0.009	No	22	0.008492	0.004152	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-28	0.01515	0.01326	0.009	Yes	22	0.0142	0.001762	0	None	No	0.01	Param.
Cobalt, total (mg/L)	AD-30	0.00349	0.002272	0.009	No	22	0.002983	0.001203	0	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-17	6.108	2.784	5	No	22	4.446	3.097	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-28	2.83	1.764	5	No	22	2.4	1.177	0	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	AD-30	2.197	1.016	5	No	22	1.737	1.217	0	None	sqrt(x)	0.01	Param.
Fluoride, total (mg/L)	AD-17	1	0.24	4	No	24	0.523	0.3826	37.5	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	AD-28	0.7867	0.584	4	No	23	0.6854	0.1938	4.348	None	No	0.01	Param.
Fluoride, total (mg/L)	AD-30	0.2	0.06	4	No	24	0.1342	0.07378	54.17	None	No	0.01	NP (NDs)
Lead, total (mg/L)	AD-17	0.002	0.00013	0.001	No	22	0.00107	0.0009531	50	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-28	0.002	0.00008	0.001	No	22	0.001053	0.0009706	50	None	No	0.01	NP (normality)
Lead, total (mg/L)	AD-30	0.0002	0.00009	0.001	No	22	0.0001714	0.00005445	72.73	None	No	0.01	NP (NDs)
Lithium, total (mg/L)	AD-17	0.02179	0.01324	0.29	No	22	0.01751	0.007967	4.545	None	No	0.01	Param.
Lithium, total (mg/L)	AD-28	0.031	0.0226	0.29	No	22	0.02783	0.01089	0	None	No	0.01	NP (normality)
Lithium, total (mg/L)	AD-30	0.01	0.008141	0.29	No	22	0.008842	0.002287	4.545	None	x^2	0.01	Param.
Mercury, total (mg/L)	AD-17	0.0002401	0.0001101	0.002	No	22	0.0001896	0.0001346	0	None	sqrt(x)	0.01	Param.
Mercury, total (mg/L)	AD-28	0.00006026	0.00002334	0.002	No	22	0.00004677	0.00004207	0	None	sqrt(x)	0.01	Param.
Mercury, total (mg/L)	AD-30	0.0005941	0.00009659	0.002	No	22	0.0004677	0.000651	0	None	sqrt(x)	0.01	Param.
Molybdenum, total (mg/L)	AD-17	0.0005	0.0004858	0.0012	No	22	0.0004775	0.0001022	90.91	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-28	0.0005	0.0002942	0.0012	No	22	0.0004702	0.0001036	90.91	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	AD-30	0.0008	0.0002	0.0012	No	22	0.0005292	0.0001652	86.36	None	No	0.01	NP (NDs)
Selenium, total (mg/L)	AD-17	0.004	0.00035	0.05	No	22	0.00209	0.001847	45.45	None	No	0.01	NP (normality)
Selenium, total (mg/L)	AD-28	0.004	0.00021	0.05	No	22	0.001989	0.001889	45.45	None	No	0.01	NP (normality)
Selenium, total (mg/L)	AD-30	0.004	0.0003	0.05	No	22	0.002021	0.00186	45.45	None	No	0.01	NP (normality)
Thallium, total (mg/L)	AD-17	0.0002	0.00007	0.002	No	22	0.000213	0.0002012	77.27	None	No	0.01	NP (NDs)
Thallium, total (mg/L)	AD-28	0.001247	0.00003	0.002	No	22	0.0002399	0.0002279	90.91	None	No	0.01	NP (NDs)
Thallium, total (mg/L)	AD-30	0.000959	0.0001	0.002	No	22	0.0002607	0.0003003	72.73	None	No	0.01	NP (NDs)

Non-Parametric Confidence Interval

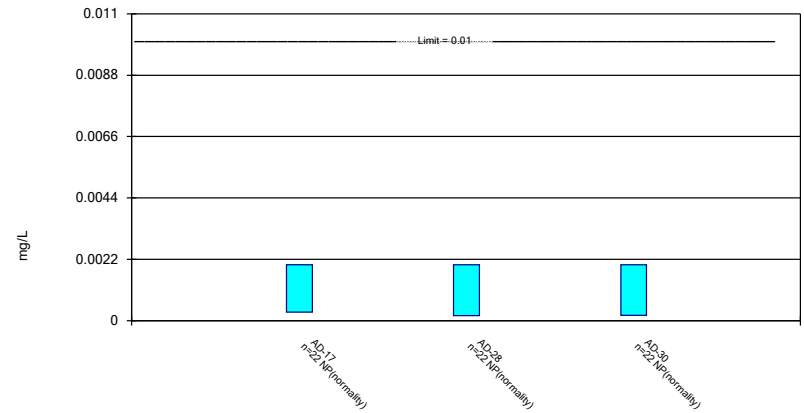
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Antimony, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

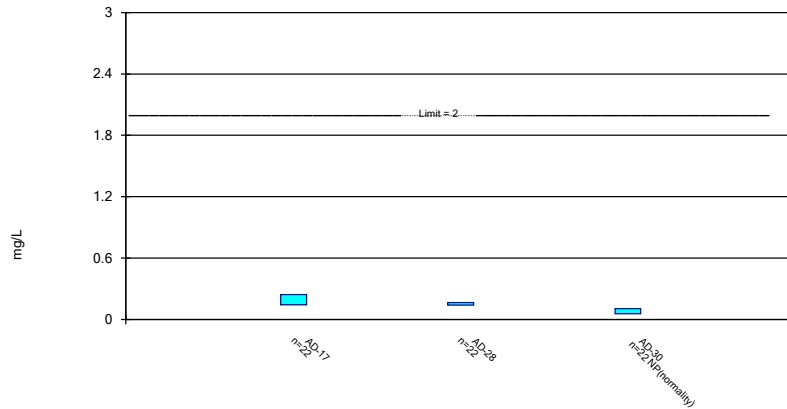
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Arsenic, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

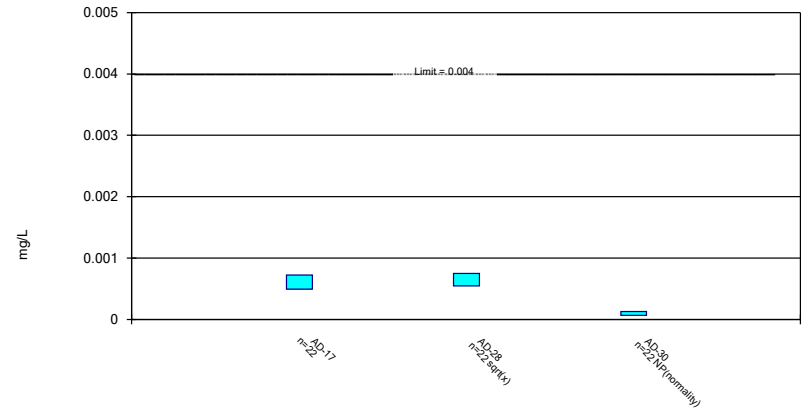
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

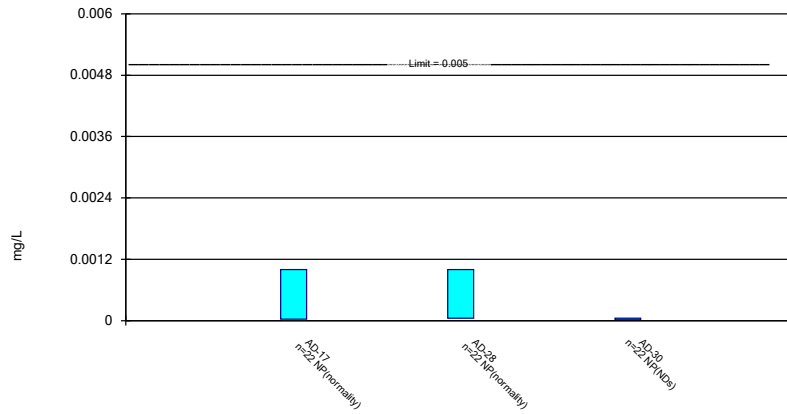
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

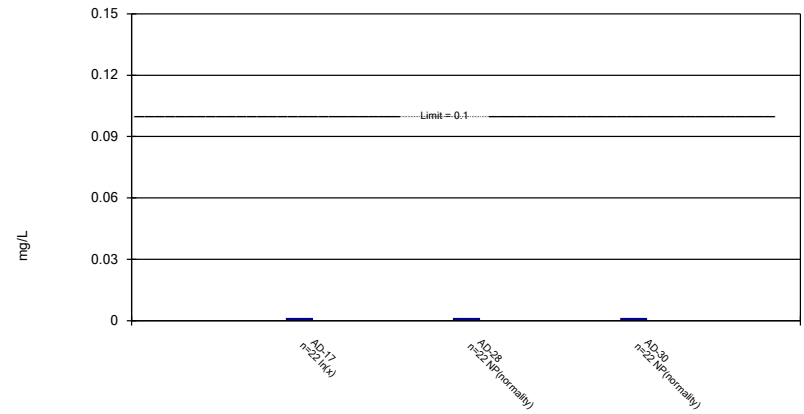
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Cadmium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

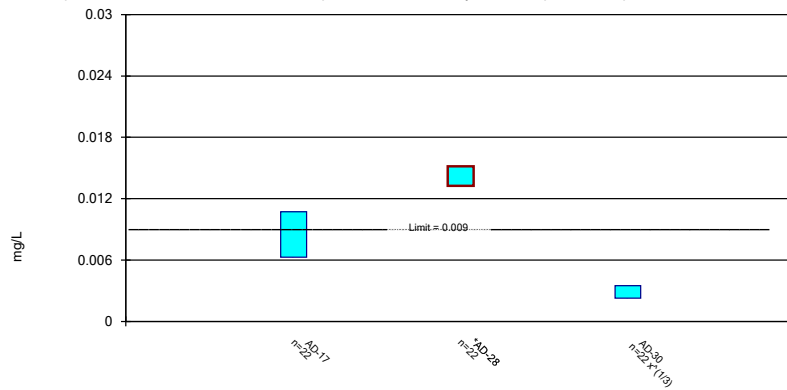
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

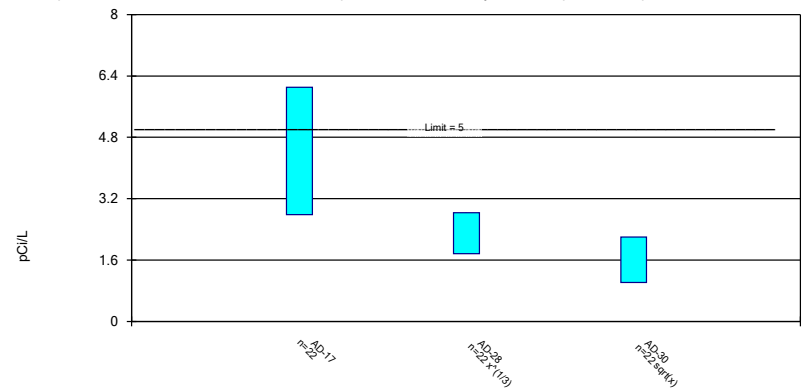
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

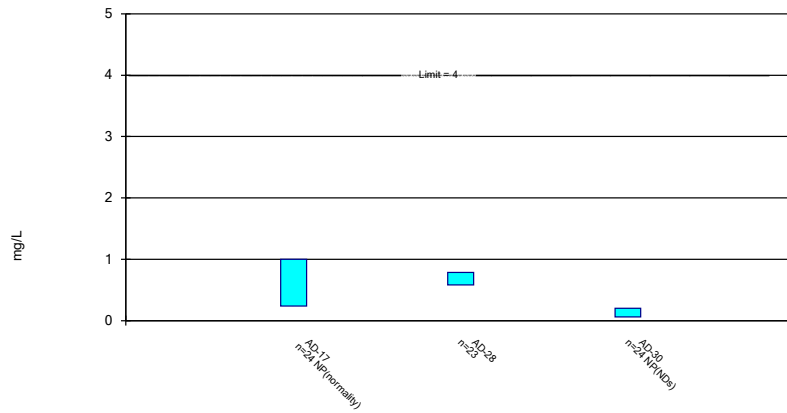
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

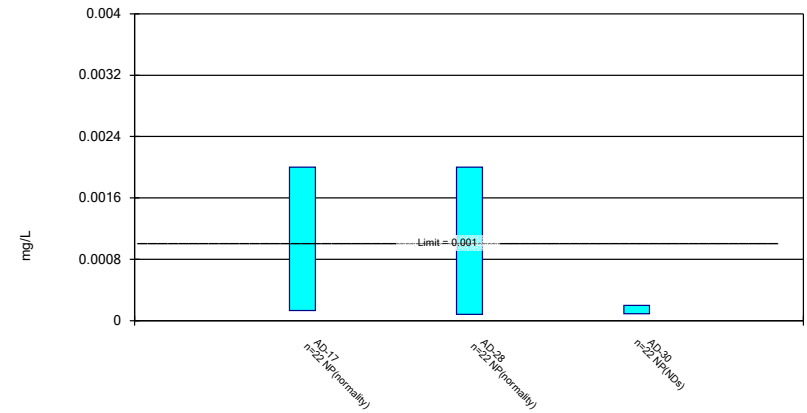
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

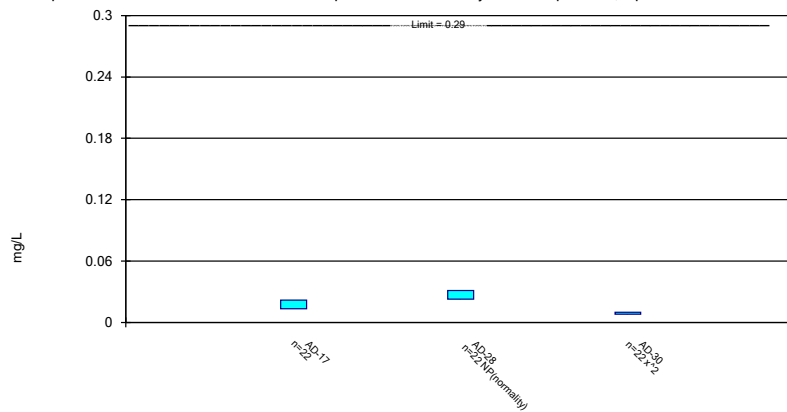
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lead, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

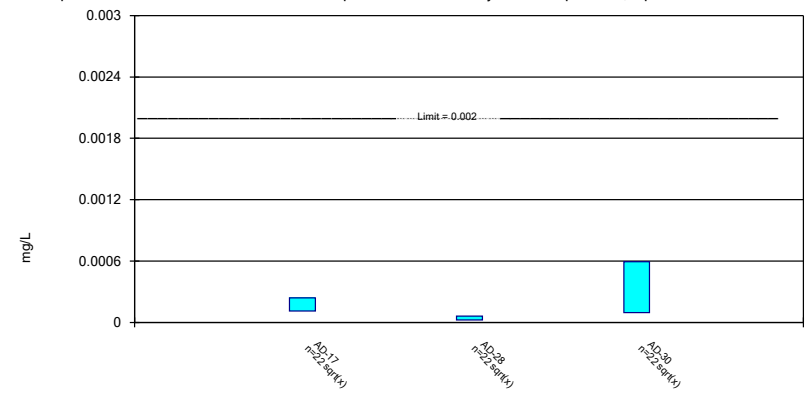
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

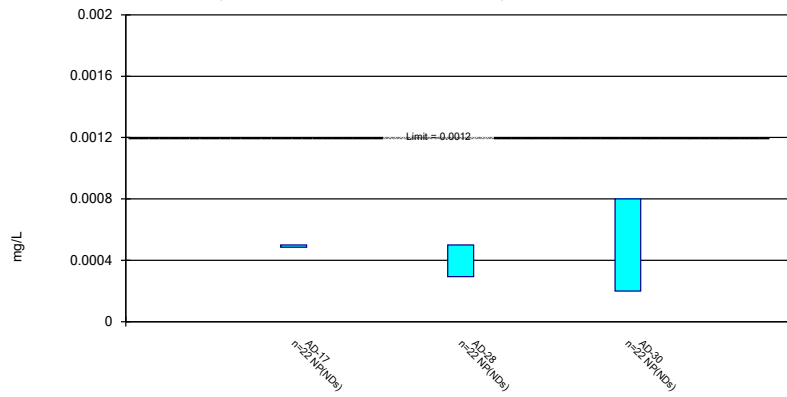
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Mercury, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

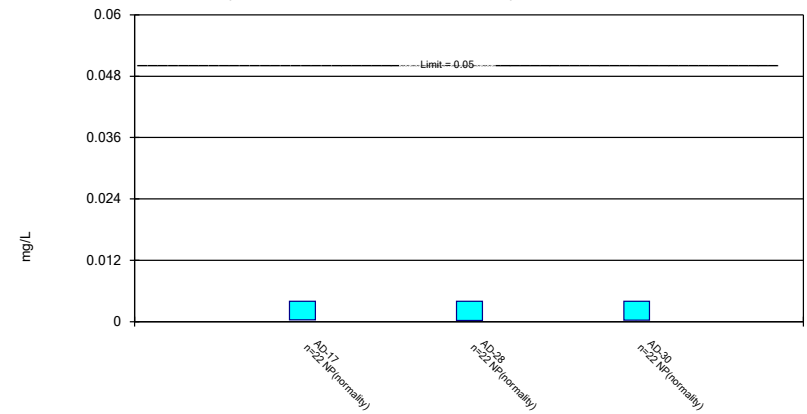
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Molybdenum, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

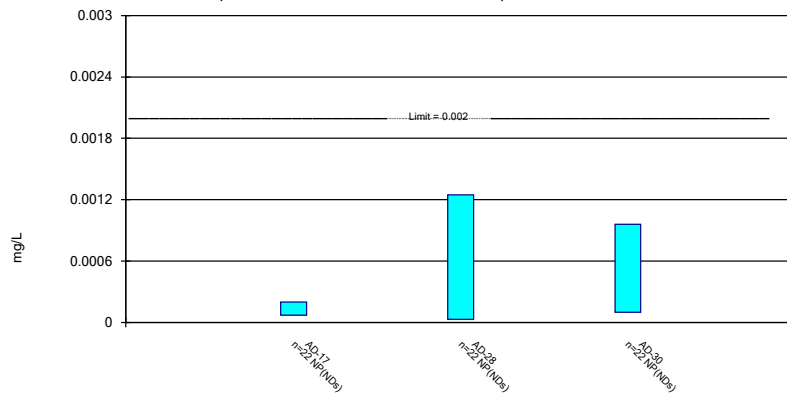
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Selenium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

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



Constituent: Thallium, total Analysis Run 2/3/2023 8:45 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

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 West Bottom Ash Pond

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 West Bottom Ash Pond, 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 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-30 were below the site-specific groundwater protection standard of 0.288 milligrams per liter, and no statistically significant levels of lithium were identified 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 values in the reissued laboratory analytical reports will be used in future reporting and statistical evaluations.

¹ Geosyntec. 2023. *Statistical Analysis Summary – West Bottom Ash Pond. H.W. Pirkey Power Plant, Hallsville, Texas.* Geosyntec Consultants, Inc. October.

**Table 1. 2023 Revised Analytical Results
H.W. Pirkey Plant - West Bottom Ash Pond**

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-30	Downgradient	Lithium	mg/L	0.009	0.00896

Notes:

1. All results are reported in milligrams per liter (mg/L).

STATISTICAL ANALYSIS SUMMARY WEST BOTTOM ASH POND

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
Worthington, Ohio 43085

Project Number: CHA8500B

October 31, 2023

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ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
CCR	coal combustion residuals
CFR	code of federal regulations
GWPS	groundwater protection standard
LCL	lower confidence 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
WBAP	West Bottom Ash Pond

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 West Bottom Ash Pond (WBAP), 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 at the WBAP. An alternative source was not identified at the time, so assessment monitoring was initiated and GWPSs were set in accordance with § 352.951(b). An assessment monitoring event was conducted at the WBAP in June 2023 in accordance with § 352.951(a). The results of this 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. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at an SSL above previously established GWPS. An SSL was identified for cobalt. 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. WEST BOTTOM ASH POND EVALUATION

2.1 Data Validation and QA/QC

During the assessment monitoring program in 2023, one set of samples was collected in June 2023 for analysis from each upgradient and downgradient well to meet the requirements of § 352.951(a).¹ Samples from the June 2023 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.

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.9.6.37 statistics software. The export file was checked against the analytical data for transcription errors and completeness.

2.2 Statistical Analysis

Statistical analyses for the WBAP 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 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). 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

¹ As only one set of samples was collected to date in 2023 during ongoing discussions with TCEQ and since all Appendix III and Appendix IV parameters were analyzed, the June 2023 sampling event also meets the requirements of 40 Code of Federal Regulations (CFR) 257.95(b) (which was adopted by reference under § 352.951(a)).

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 SSL was identified at the Pirkey WBAP:

- The LCL for cobalt was above the GWPS of 0.00900 mg/L at AD-28 (0.0133 mg/L).

As a result, the Pirkey WBAP 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 0.0693 mg/L at AD-28 (0.299 mg/L) and AD-30 (1.80 mg/L).
- Chloride concentrations were above the interwell UPL of 8.92 mg/L at AD-17 (15.4 mg/L) and AD-30 (18.2 mg/L).
- Fluoride concentrations were above the interwell UPL of 0.257 mg/L at AD-28 (0.54 mg/L).
- Sulfate concentrations were above the intrawell UPL of 31.6 mg/L at AD-30 (147 mg/L).
- TDS concentrations were above the intrawell UPL of 206 mg/L at AD-30 (300 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

A semiannual assessment monitoring event was conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that prevented data usage. A review of outliers identified no potential outliers in the 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. An SSL was identified for cobalt. Appendix III parameters were compared to previously calculated prediction limits, with exceedances identified for boron, chloride, fluoride, sulfate, and TDS.

Based on this evaluation, the Pirkey WBAP 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 – West Bottom Ash Pond, Pirkey, Hallsville, Texas. Geosyntec Consultants, Inc. March.

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

TABLES

**Table 1. Groundwater Data Summary
Statistical Analysis Summary
Pirkey Plant - West Bottom Ash Pond**

Parameter	Unit	AD-3	AD-12	AD-12	AD-17	AD-18	AD-18	AD-28	AD-30
		6/27/2023	2/27/2023	6/26/2023	6/26/2023	2/28/2023	6/27/2023	6/26/2023	6/26/2023
Antimony	µg/L	0.011 J1	0.1 U1	0.015 J1	0.008 J1	0.1 U1	0.009 J1	0.015 J1	0.010 J1
Arsenic	µg/L	0.80	0.07 J1	0.11	0.16	0.26	0.55	0.22	0.21
Barium	µg/L	52.2	27.5	16.3	112	77.9	89.0	119	76.7
Beryllium	µg/L	0.200	0.155	0.110	0.354	0.085	0.132	0.562	0.086
Boron	mg/L	0.037 J1	0.021 J1	0.019 J1	0.032 J1	0.05 U1	0.009 J1	0.299	1.80
Cadmium	µg/L	0.020	0.013 J1	0.007 J1	0.022	0.01 J1	0.013 J1	0.054	0.008 J1
Calcium	mg/L	2.95	0.34	0.21	0.23	0.18	0.23	1.48	0.54
Chloride	mg/L	5.67	6.51	4.68	15.4	5.49	5.28	4.14	18.2
Chromium	µg/L	0.31	0.36	0.45	0.49	0.38	0.57	0.47	0.57
Cobalt	µg/L	2.79	1.50	0.932	5.15	0.750	0.933	13.1	3.81
Combined Radium	pCi/L	0.91	1.17	0.45	2.9	1.1	2.53	4	1.68
Fluoride	mg/L	0.03 J1	0.07	0.06	0.19	0.06 U1	0.06 U1	0.54	0.04 J1
Lead	µg/L	0.25	0.1 J1	0.11 J1	0.13 J1	0.18 J1	0.13 J1	0.11 J1	0.08 J1
Lithium	mg/L	0.0414	0.00885	0.0049	0.0106	0.0123	0.0138	0.0235	0.0090
Mercury	µg/L	0.005 U1	0.005 U1	0.005 U1	0.297	0.006	0.010	0.013	0.130
Molybdenum	µg/L	0.5 U1	0.5 U1	0.7	0.5 U1	0.5 U1	0.5 U1	0.5 U1	0.5 U1
Selenium	µg/L	0.04 J1	0.35 J1	0.23 J1	0.17 J1	0.5 U1	0.15 J1	0.21 J1	0.45 J1
Sulfate	mg/L	22.4	3.90	2.9	2.4	7.52	8.2	25.9	147
Thallium	µg/L	0.05 J1	0.2 U1	0.2 U1	0.2 U1	0.2 U1	0.04 J1	0.03 J1	0.04 J1
Total Dissolved Solids	mg/L	150	70	80	60	100	110	120	300
pH	SU	5.84	3.77	4.6	4.48	4.35	4.4	4.23	4.98

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.

**Table 2. Appendix IV Groundwater Protection Standards
Statistical Analysis Summary
Pirkey Plant - West Bottom Ash Pond**

Constituent Name	MCL	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600	0.000100	0.00600
Arsenic, Total (mg/L)	0.0100	0.00423	0.0100
Barium, Total (mg/L)	2.00	0.157	2.00
Beryllium, Total (mg/L)	0.00400	0.00100	0.00400
Cadmium, Total (mg/L)	0.00500	0.000159	0.00500
Chromium, Total (mg/L)	0.100	0.00277	0.100
Cobalt, Total (mg/L)	n/a	0.00900	0.00900
Combined Radium, Total (pCi/L)	5.00	3.07	5.00
Fluoride, Total (mg/L)	4.00	0.257	4.00
Lead, Total (mg/L)	n/a	0.00100	0.00100
Lithium, Total (mg/L)	n/a	0.288	0.288
Mercury, Total (mg/L)	0.00200	0.0000640	0.00200
Molybdenum, Total (mg/L)	n/a	0.00116	0.00116
Selenium, Total (mg/L)	0.0500	0.00330	0.0500
Thallium, Total (mg/L)	0.00200	0.00113	0.00200

Notes:

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

MCL: Maximum Contaminant Level

mg/L: milligrams per liter

GWPS: Groundwater Protection Standard

pCi/L: picocuries per liter

**Table 3. Appendix III Data Summary
Statistical Analysis Summary
Pirkey - West Bottom Ash Pond**

Analyte	Unit	Description	AD-17	AD-28	AD-30
			6/26/2023	6/26/2023	6/26/2023
Boron	mg/L	Interwell Background Value (UPL)	0.0693		
		Analytical Result	0.032	0.299	1.80
Calcium	mg/L	Intrawell Background Value (UPL)	1.34	3.21	1.03
		Analytical Result	0.23	1.48	0.54
Chloride	mg/L	Interwell Background Value (UPL)	8.92		
		Analytical Result	15.4	4.14	18.2
Fluoride	mg/L	Interwell Background Value (UPL)	0.257		
		Analytical Result	0.19	0.54	0.04
pH	SU	Intrawell Background Value (UPL)	4.7	5.4	5.3
		Intrawell Background Value (LPL)	3.3	3.4	3.8
		Analytical Result	4.5	4.2	5.0
Sulfate	mg/L	Intrawell Background Value (UPL)	8.56	30.1	31.6
		Analytical Result	2.4	25.9	147
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	108	130	206
		Analytical Result	60	120	300

Notes:

1. Bold values exceed the background value.

2. Background values are shaded gray.

mg/L: milligrams per liter

LPL: lower prediction limit

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 West Bottom Ash Pond 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: 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.

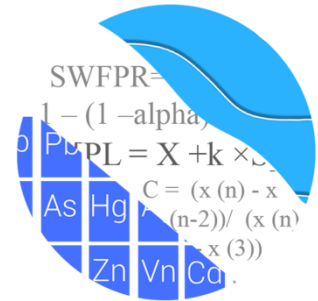
- Mercury data for SDG 231985 had an inconsistent number of significant figures reported between the electronic data deliverables and the published laboratory reports. The published laboratory report for SDG 231985 was reissued with the appropriate number of significant figures for mercury.
- As reported 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



September 26, 2023

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

Re: Pirkey West Bottom Ash Pond
Assessment Monitoring Event – February and 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 February and June 2023 Assessment Monitoring sample events for American Electric Power Inc.'s Pirkey West Bottom Ash Pond (WBAP). 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-3, AD-12, and AD-18
- **Downgradient wells:** AD-17, AD-28, and AD-30

Data were sent electronically to GSC, and the statistical analysis report was prepared according to the background screening conducted in December 2017 that was approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GSC. The statistical analysis was reviewed by Kristina Rayner, Senior Statistician and Founder of Groundwater Stats Consulting.

Note that wells AD-3, AD-17, AD-28, and AD-30 were not sampled during the February 2023 event but all wells were sampled during the June 2023 event.

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 and box plots for Appendix IV parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record (Figures A and B, respectively). The time series plots are used to evaluate concentrations over time and between wells, and to initially screen for suspected outliers and trends while the box plots provide visual representation of variation within individual wells and between 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).

Summary of Statistical Methods

Assessment monitoring for Appendix IV parameters involves the comparison of a confidence interval for each parameter 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 constructed from tolerance limits using all pooled upgradient well data.

Prior to computing tolerance limits on upgradient well data or 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 (USEPA, 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 are used on data containing greater than 50% non-detects.

Background Update Summary – Conducted in February 2023

Outlier Analysis

Prior to constructing tolerance limits, background 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 through November 2022 identified outliers for fluoride. Among these identified values, however, no new values were flagged as outliers as they were similar to concentrations at neighboring upgradient wells or were below the MCL.

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 new outliers were flagged and no changes to previously flagged outliers were made during the February 2023 screening.

During previous screenings, the reporting limit for thallium for the February 2019 event was 0.01 mg/L, which is higher than both the historical reporting limit and the GWPS of 0.002 mg/L. Therefore, this value was flagged as an outlier at wells with reported non-detects for the February 2019 event. Similarly, the reporting limit for molybdenum of 0.04 mg/L during the February and May 2019 sample events, while lower than the GWPS of 0.1 mg/L, are flagged since they are censored at a much higher level than remaining reporting limits for this constituent.

Tukey's outlier test results for Appendix IV parameters were included with the background update conducted in February 2023. As mentioned above, a list of flagged values follows this report (Figure C).

Interwell Upper Tolerance Limits

Interwell upper tolerance limits were established in February 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).

Evaluation of Appendix IV Parameters – February & June 2023

Time series plots were used to visually identify potential outliers in downgradient wells through the June 2023 sample event. 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 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. Both a tabular summary and graphical presentation of the confidence interval results follow this letter. An exceedance was noted for the following well/constituent pair:

- Cobalt: AD-28

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

For Groundwater Stats Consulting,



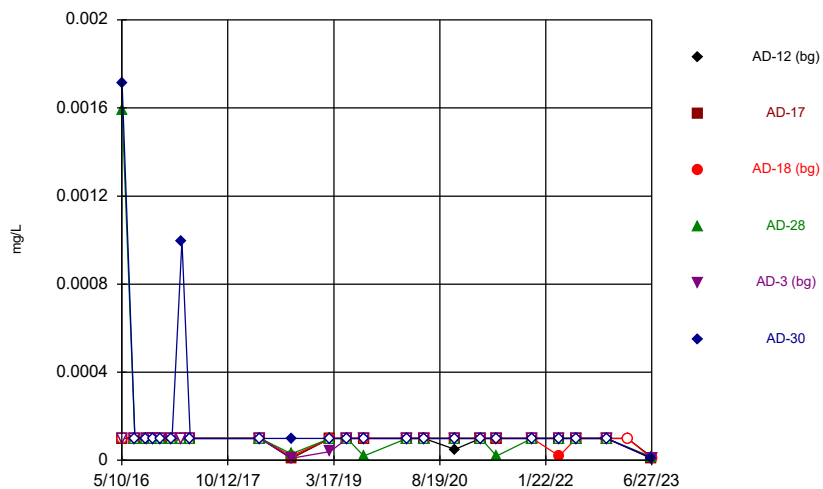
Abdul Diane
Groundwater Analyst



Andrew T. Collins
Project Manager

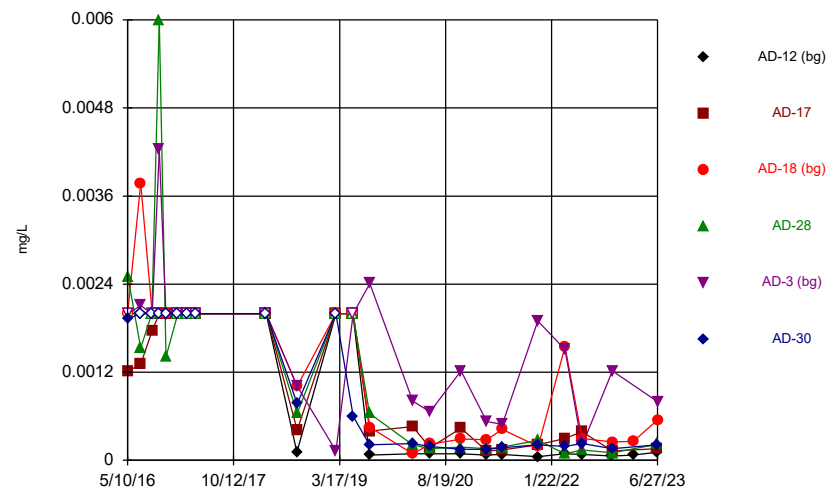
FIGURE A
Time Series

Time Series



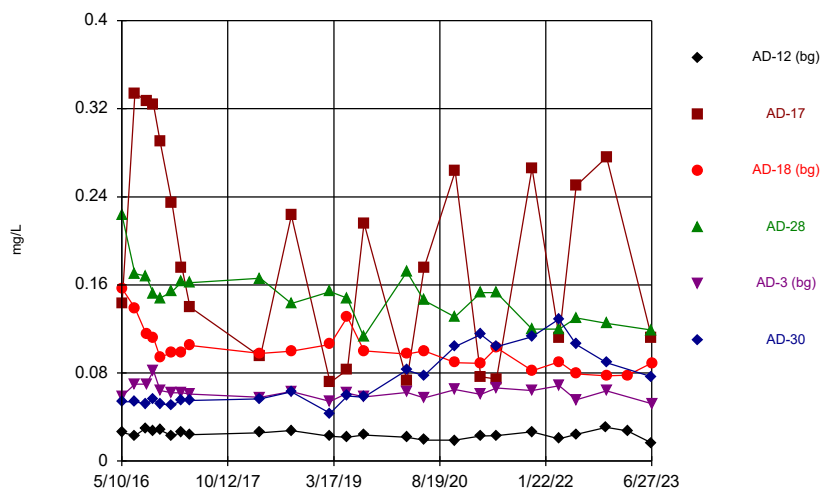
Constituent: Antimony, total Analysis Run 9/18/2023 3:26 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



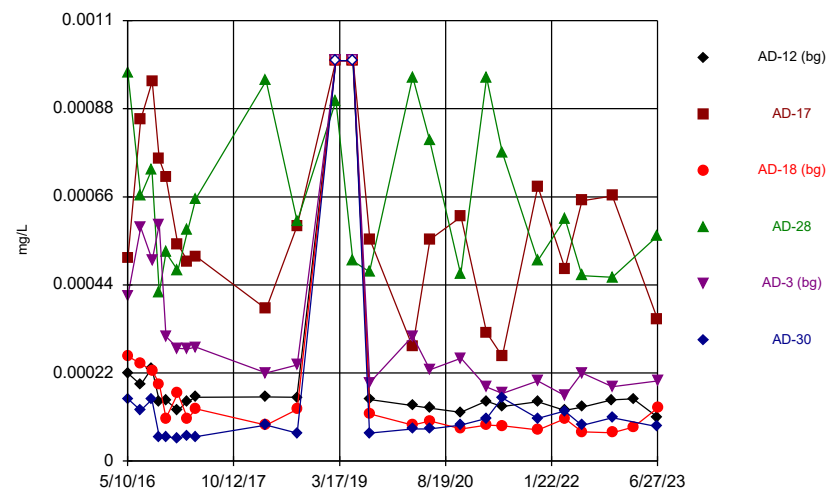
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Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



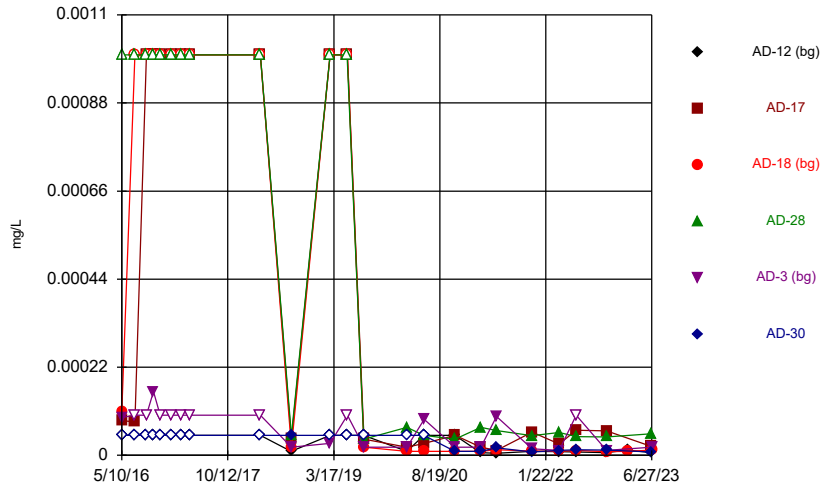
Constituent: Barium, total Analysis Run 9/18/2023 3:26 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



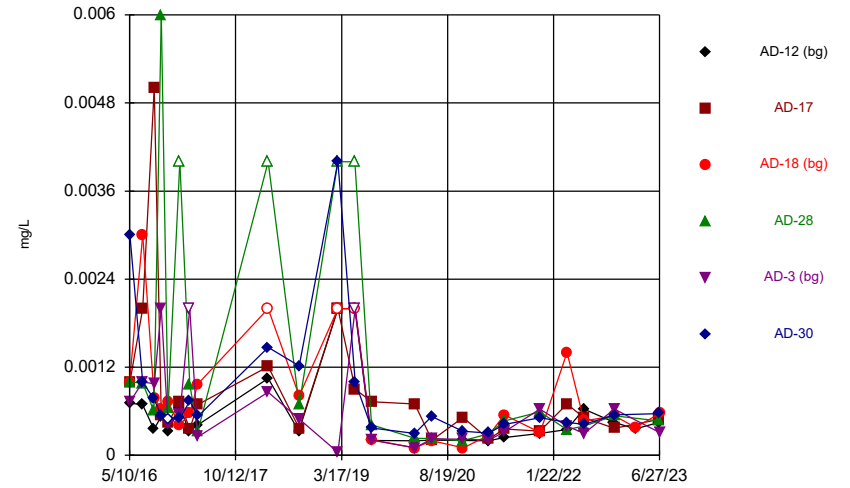
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Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



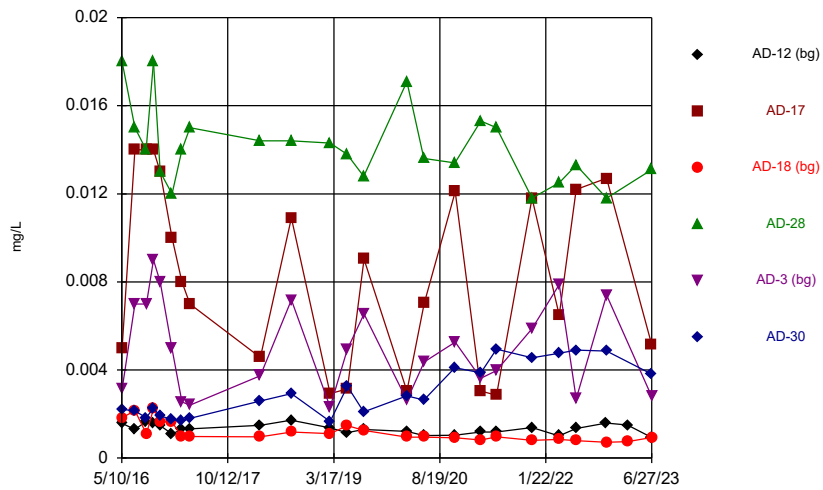
Constituent: Cadmium, total Analysis Run 9/18/2023 3:26 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



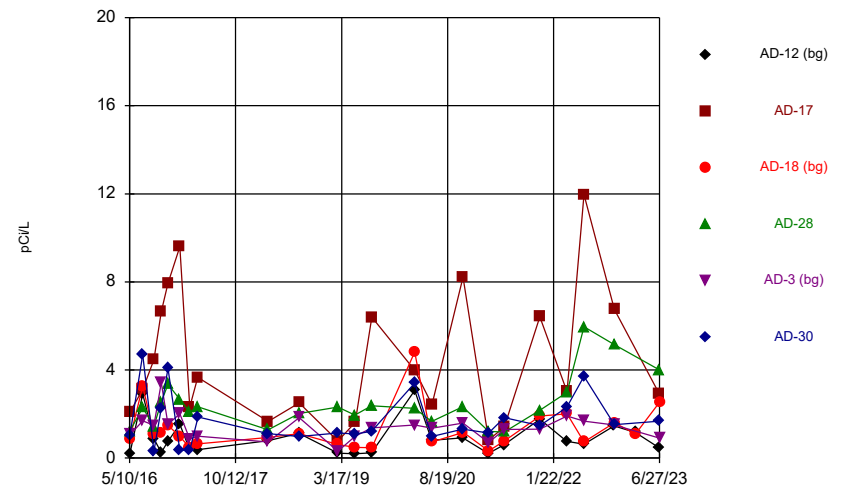
Constituent: Chromium, total Analysis Run 9/18/2023 3:26 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



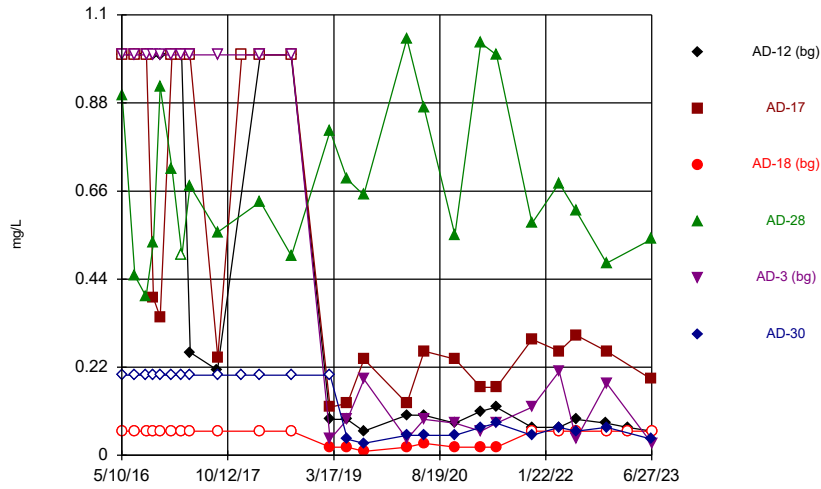
Constituent: Cobalt, total Analysis Run 9/18/2023 3:26 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



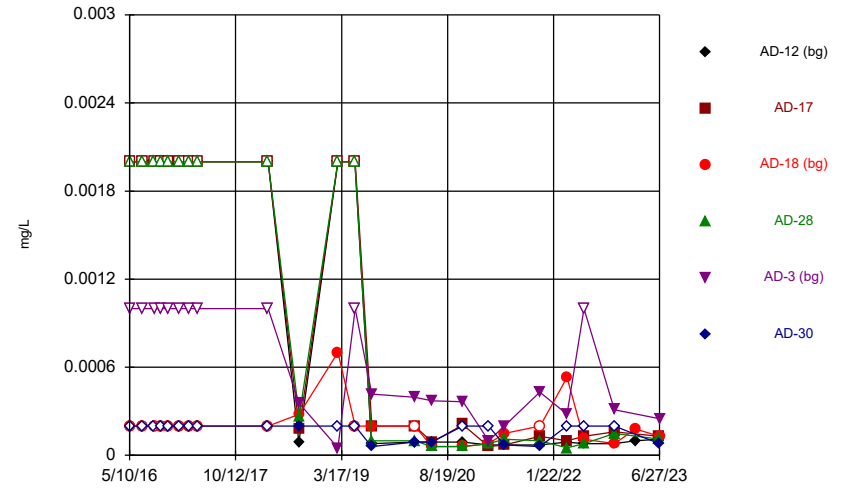
Constituent: Combined Radium 226 + 228 Analysis Run 9/18/2023 3:26 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



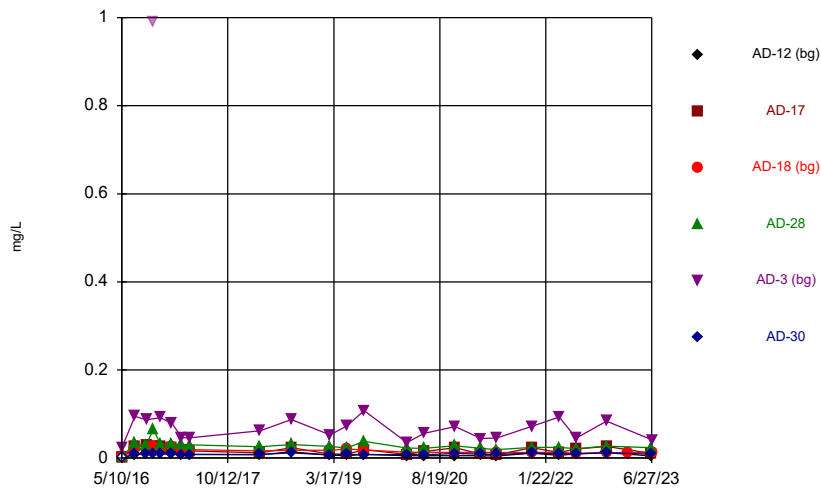
Constituent: Fluoride, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



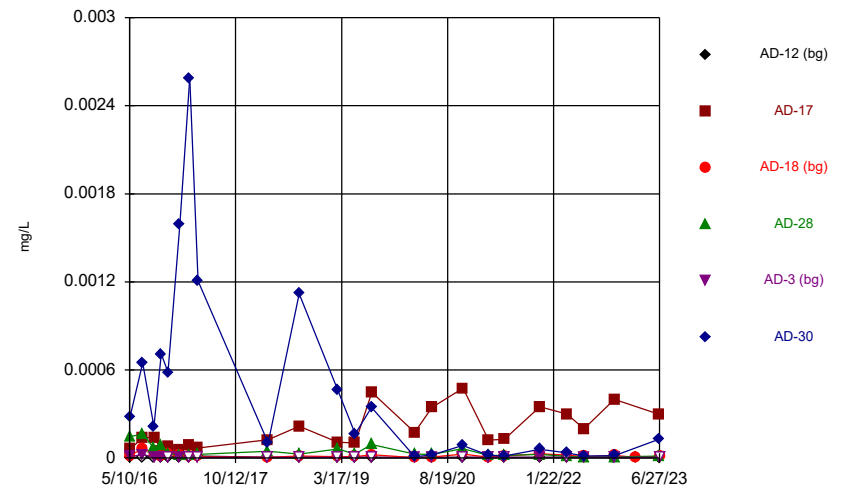
Constituent: Lead, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



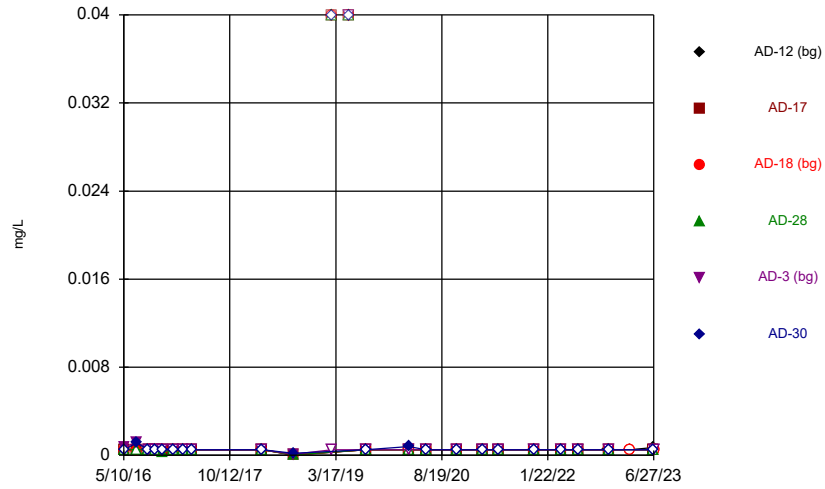
Constituent: Lithium, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



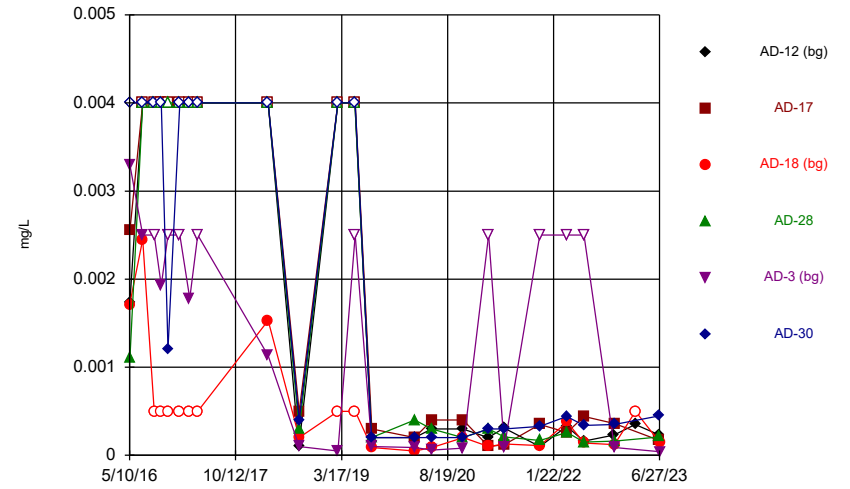
Constituent: Mercury, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



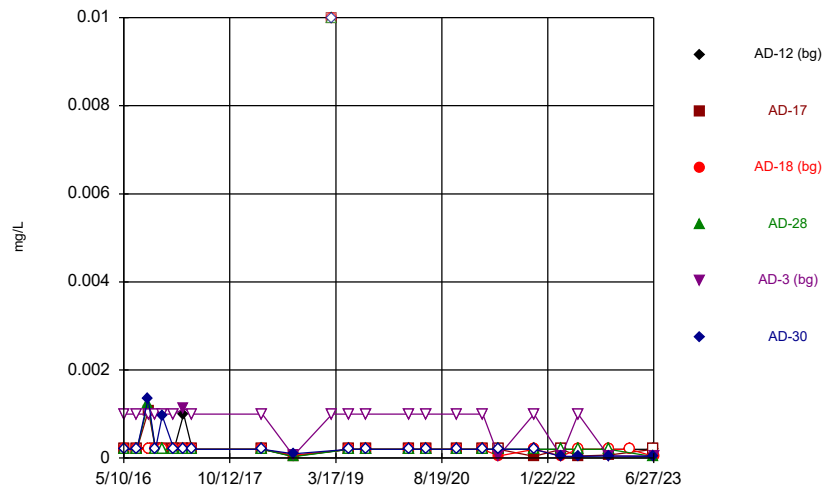
Constituent: Molybdenum, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Time Series



Constituent: Selenium, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

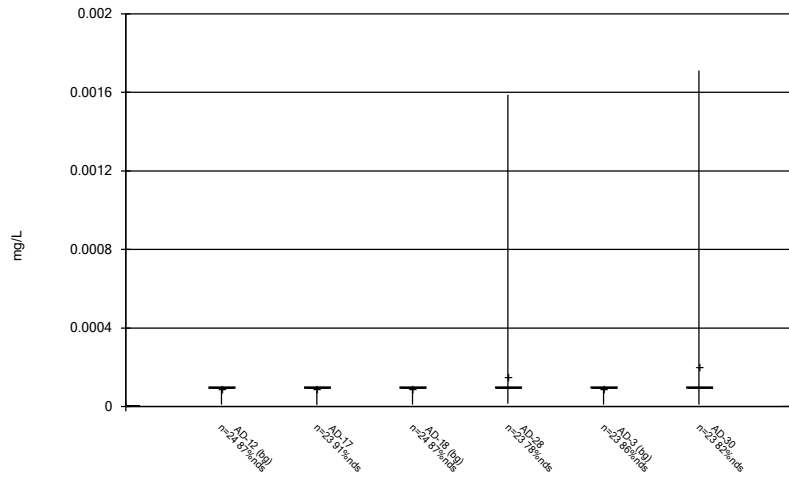
Time Series



Constituent: Thallium, total Analysis Run 9/18/2023 3:27 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

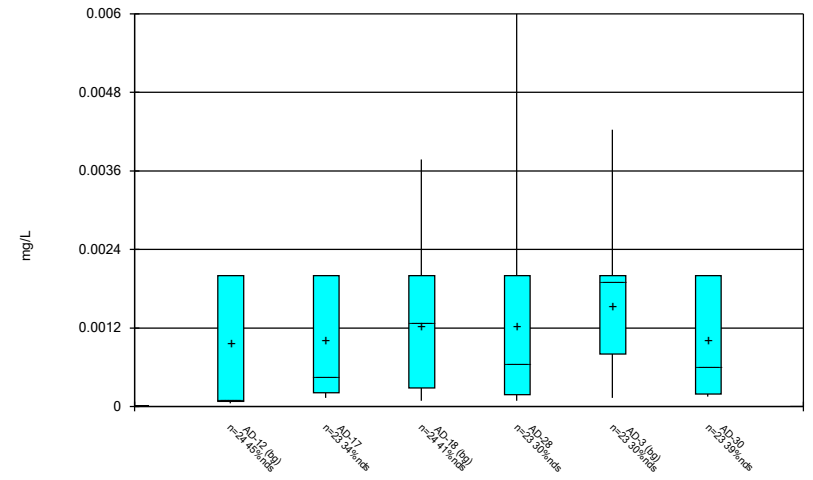
FIGURE B
Box Plots

Box & Whiskers Plot



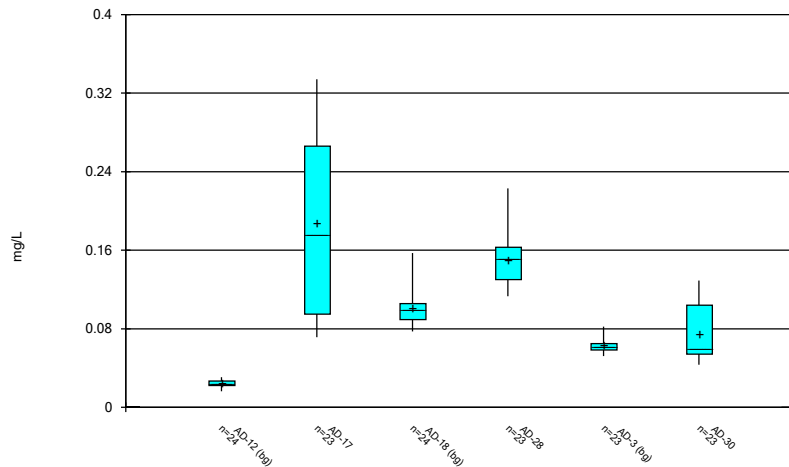
Constituent: Antimony, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



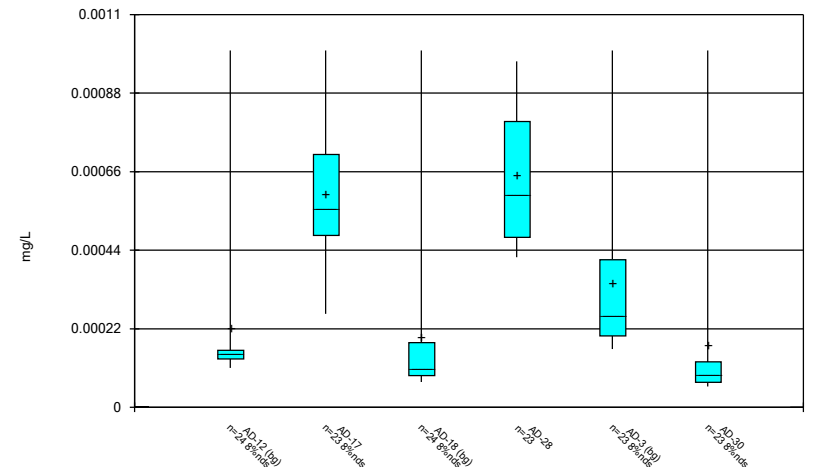
Constituent: Arsenic, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



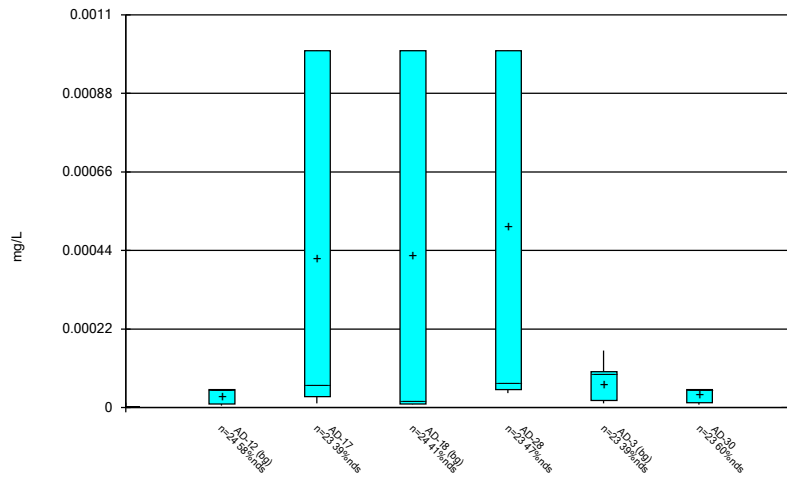
Constituent: Barium, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



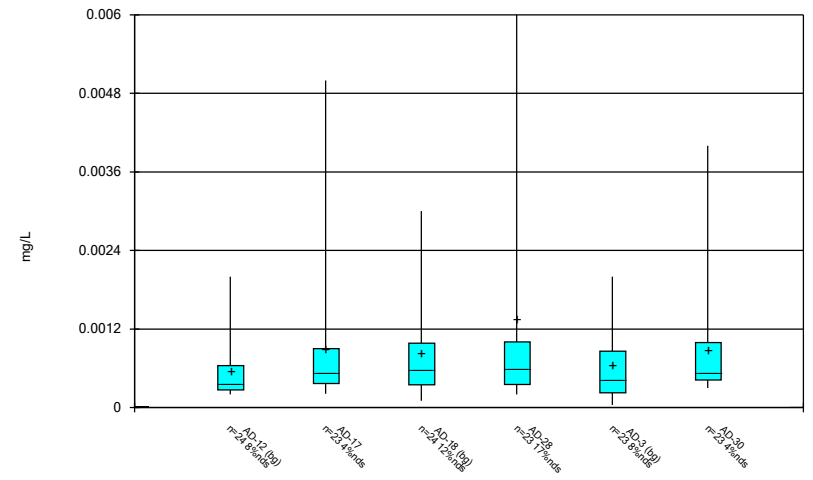
Constituent: Beryllium, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
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Box & Whiskers Plot



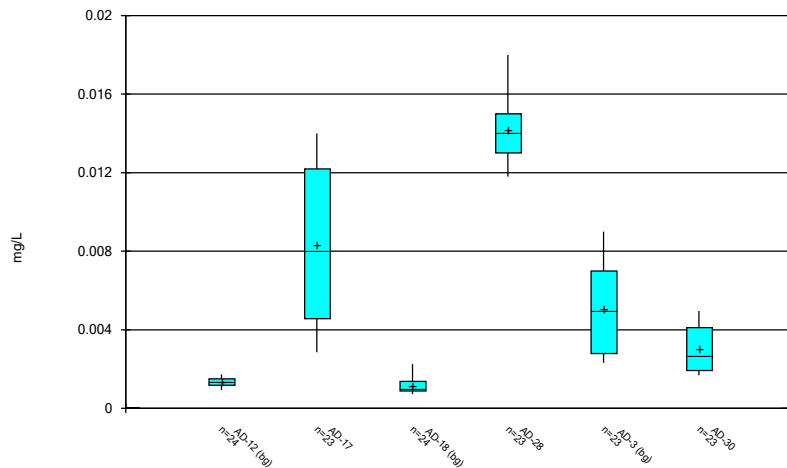
Constituent: Cadmium, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



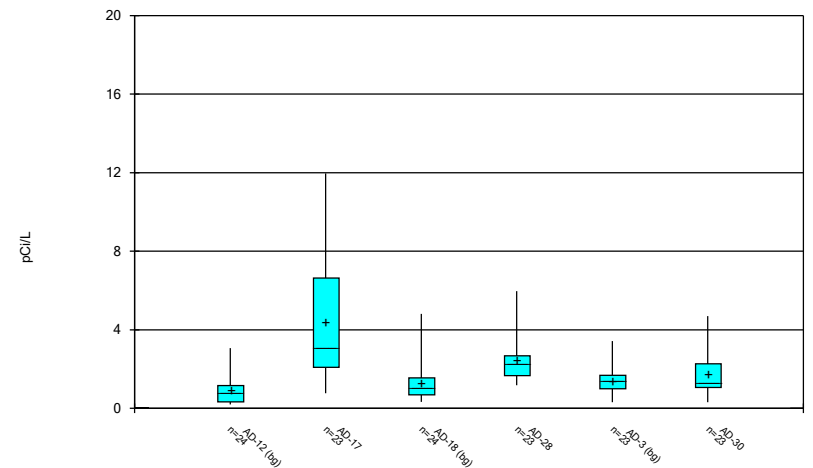
Constituent: Chromium, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



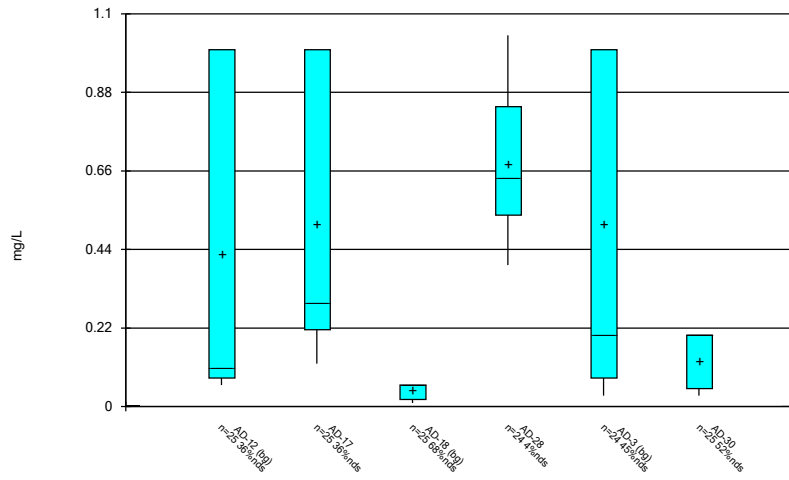
Constituent: Cobalt, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



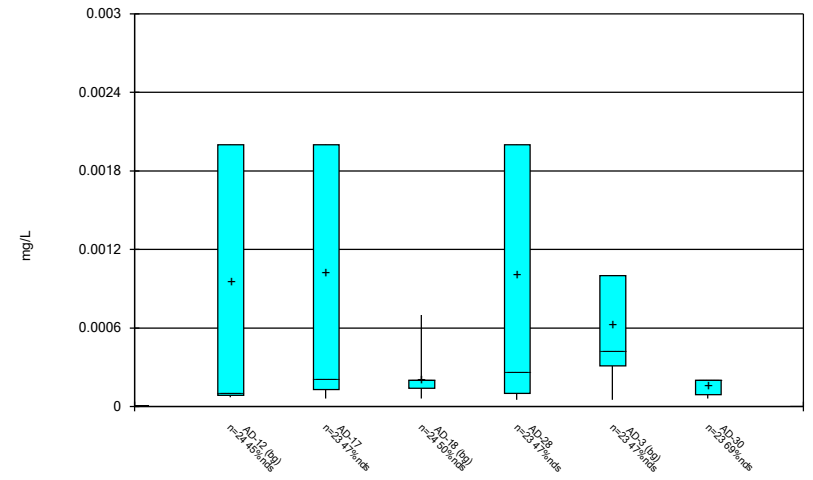
Constituent: Combined Radium 226 + 228 Analysis Run 9/18/2023 3:28 PM View: Constituents View
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



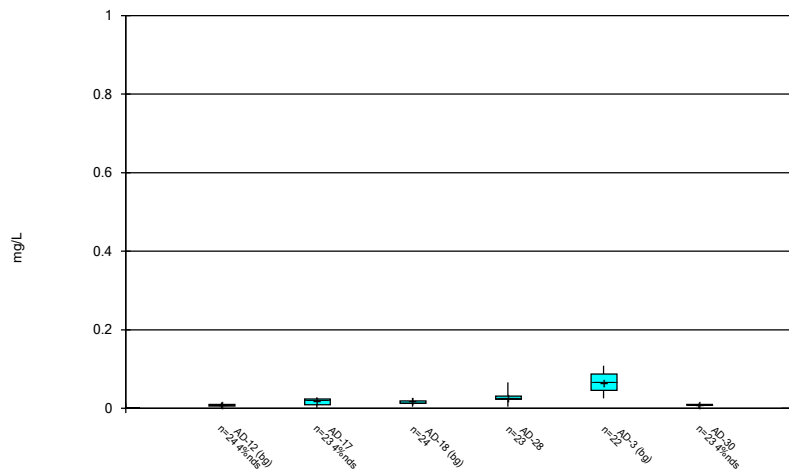
Constituent: Fluoride, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



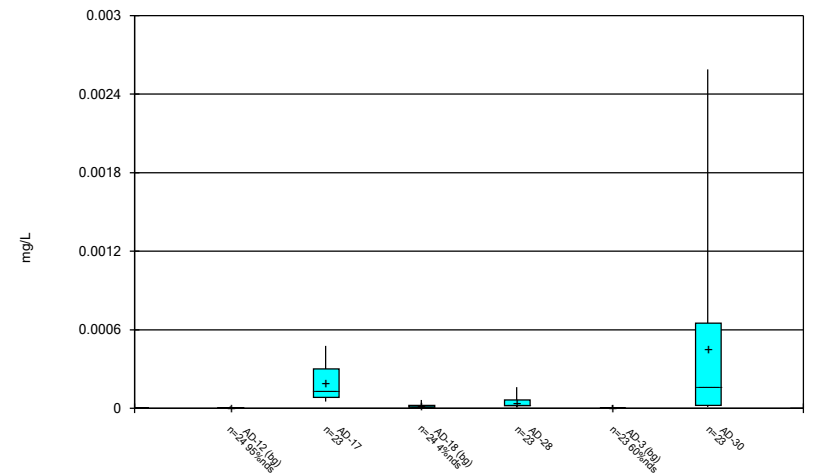
Constituent: Lead, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



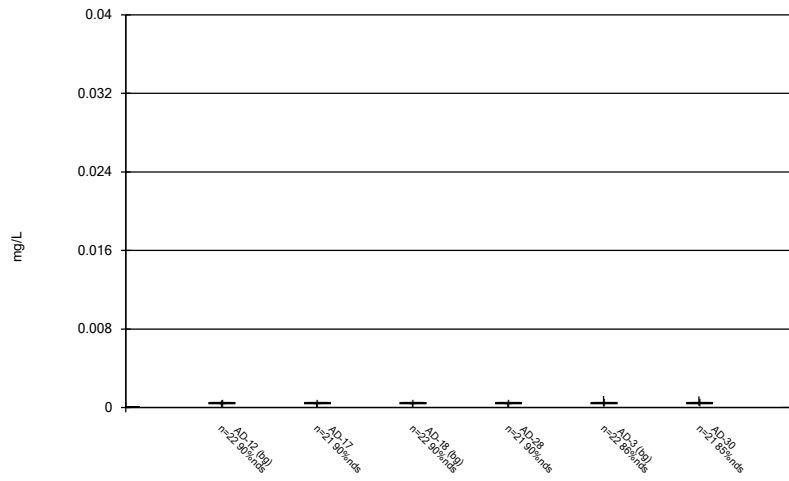
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Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



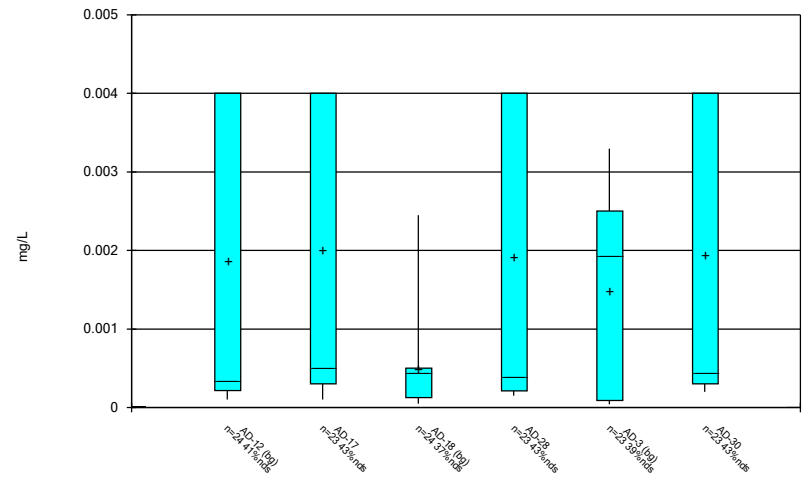
Constituent: Mercury, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



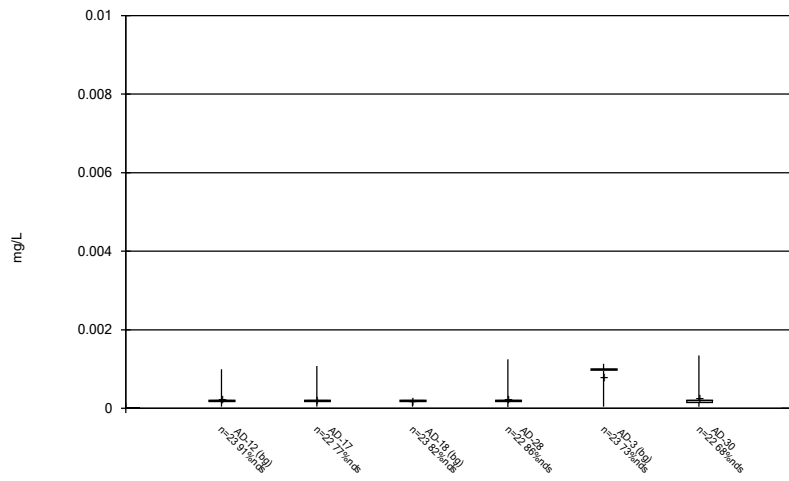
Constituent: Molybdenum, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



Constituent: Selenium, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 9/18/2023 3:28 PM View: Constituents View
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

FIGURE C
Outlier Summary

Outlier Summary

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 9/20/2023, 1:22 PM

AD-3 Lithium, total (mg/L)
 AD-12 Molybdenum, total (mg/L)
 AD-17 Molybdenum, total (mg/L)
 AD-18 Molybdenum, total (mg/L)
 AD-28 Molybdenum, total (mg/L)
 AD-3 Molybdenum, total (mg/L)
 AD-30 Molybdenum, total (mg/L)
 AD-12 Thallium, total (mg/L)
 AD-17 Thallium, total (mg/L)
 AD-18 Thallium, total (mg/L)

Date	AD-3 Lithium, total (mg/L)	AD-12 Molybdenum, total (mg/L)	AD-17 Molybdenum, total (mg/L)	AD-18 Molybdenum, total (mg/L)	AD-28 Molybdenum, total (mg/L)	AD-3 Molybdenum, total (mg/L)	AD-30 Molybdenum, total (mg/L)	AD-12 Thallium, total (mg/L)	AD-17 Thallium, total (mg/L)	AD-18 Thallium, total (mg/L)
10/13/2016	0.991 (o)									
2/27/2019		<0.04 (o)			<0.04 (o)			<0.01 (o)		
2/28/2019			<0.04 (o)	<0.04 (o)			<0.04 (o)		<0.01 (o)	<0.01 (o)
5/21/2019		<0.04 (o)								
5/22/2019					<0.04 (o)					
5/23/2019			<0.04 (o)	<0.04 (o)		<0.04 (o)	<0.04 (o)			

AD-28 Thallium, total (mg/L)
 AD-30 Thallium, total (mg/L)

Date	AD-28 Thallium, total (mg/L)	AD-30 Thallium, total (mg/L)
10/13/2016		
2/27/2019	<0.01 (o)	
2/28/2019		<0.01 (o)
5/21/2019		
5/22/2019		
5/23/2019		

FIGURE D
UTLs

Upper Tolerance Limits Summary

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 2/3/2023, 8:41 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 66	n/a	n/a	90.91	n/a	n/a	0.03387	NP Inter(NDs)
Arsenic, total (mg/L)	n/a	0.004229	n/a	n/a	n/a	n/a 66	n/a	n/a	42.42	n/a	n/a	0.03387	NP Inter(normality)
Barium, total (mg/L)	n/a	0.157	n/a	n/a	n/a	n/a 66	n/a	n/a	0	n/a	n/a	0.03387	NP Inter(normality)
Beryllium, total (mg/L)	n/a	0.001	n/a	n/a	n/a	n/a 66	n/a	n/a	9.091	n/a	n/a	0.03387	NP Inter(normality)
Cadmium, total (mg/L)	n/a	0.0001592	n/a	n/a	n/a	n/a 66	n/a	n/a	50	n/a	n/a	0.03387	NP Inter(normality)
Chromium, total (mg/L)	n/a	0.00277	n/a	n/a	n/a	n/a 66	-7.631	0.8724	10.61	None	ln(x)	0.05	Inter
Cobalt, total (mg/L)	n/a	0.009	n/a	n/a	n/a	n/a 66	n/a	n/a	0	n/a	n/a	0.03387	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	n/a	3.072	n/a	n/a	n/a	n/a 66	1.034	0.3597	0	None	sqrt(x)	0.05	Inter
Fluoride, total (mg/L)	n/a	0.2565	n/a	n/a	n/a	n/a 69	n/a	n/a	50.72	n/a	n/a	0.02904	NP Inter(NDs)
Lead, total (mg/L)	n/a	0.001	n/a	n/a	n/a	n/a 66	n/a	n/a	51.52	n/a	n/a	0.03387	NP Inter(NDs)
Lithium, total (mg/L)	n/a	0.2876	n/a	n/a	n/a	n/a 66	0.04429	0.1218	1.515	None	No	0.05	Inter
Mercury, total (mg/L)	n/a	0.000064	n/a	n/a	n/a	n/a 66	n/a	n/a	53.03	n/a	n/a	0.03387	NP Inter(NDs)
Molybdenum, total (mg/L)	n/a	0.001161	n/a	n/a	n/a	n/a 66	n/a	n/a	90.91	n/a	n/a	0.03387	NP Inter(NDs)
Selenium, total (mg/L)	n/a	0.003297	n/a	n/a	n/a	n/a 66	n/a	n/a	40.91	n/a	n/a	0.03387	NP Inter(normality)
Thallium, total (mg/L)	n/a	0.00113	n/a	n/a	n/a	n/a 66	n/a	n/a	84.85	n/a	n/a	0.03387	NP Inter(NDs)

FIGURE E
GWPS

PIRKEY WBAP GWPS			
Constituent Name	MCL	Background Limit	GWPS
Antimony, Total (mg/L)	0.006	0.0001	0.006
Arsenic, Total (mg/L)	0.01	0.0042	0.01
Barium, Total (mg/L)	2	0.16	2
Beryllium, Total (mg/L)	0.004	0.001	0.004
Cadmium, Total (mg/L)	0.005	0.00016	0.005
Chromium, Total (mg/L)	0.1	0.0028	0.1
Cobalt, Total (mg/L)	n/a	0.009	0.009
Combined Radium, Total (pCi/L)	5	3.07	5
Fluoride, Total (mg/L)	4	0.26	4
Lead, Total (mg/L)	n/a	0.001	0.001
Lithium, Total (mg/L)	n/a	0.29	0.29
Mercury, Total (mg/L)	0.002	0.000064	0.002
Molybdenum, Total (mg/L)	n/a	0.0012	0.0012
Selenium, Total (mg/L)	0.05	0.0033	0.05
Thallium, Total (mg/L)	0.002	0.0011	0.002

**MCL = Maximum Contaminant Level*

**GWPS = Groundwater Protection Standard*

FIGURE F
Confidence Interval

Confidence Intervals - Significant Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 9/26/2023, 9:08 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Lower Compl.</u>	<u>Sig.</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform Alpha</u>	<u>Method</u>
Cobalt, total (mg/L)	AD-28	0.01507	0.01325	0.009	n/a	Yes	23	0.01416	0.001737	0	None	No	0.01 Param.

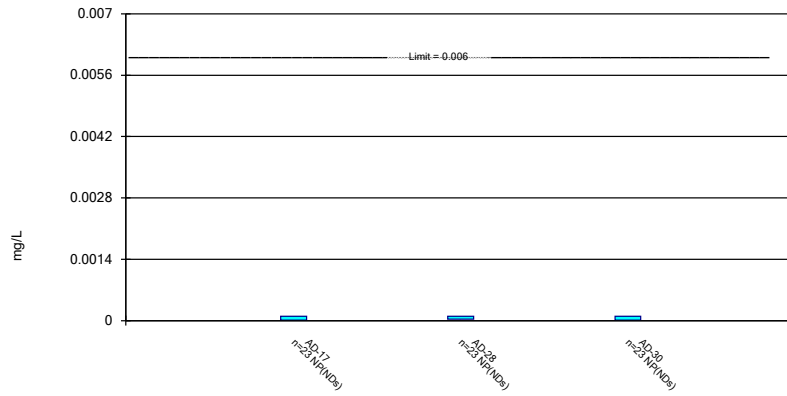
Confidence Intervals - All Results

Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP Printed 9/26/2023, 9:08 AM

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-17	0.0001	0.00001	0.006	n/a	No	23	0.00009209	0.00002622	91.3	None	No	0.01 NP (NDs)
Antimony, total (mg/L)	AD-28	0.0001	0.00003	0.006	n/a	No	23	0.000151	0.0003148	78.26	None	No	0.01 NP (NDs)
Antimony, total (mg/L)	AD-30	0.0001	0.00001	0.006	n/a	No	23	0.0002051	0.0003787	82.61	None	No	0.01 NP (NDs)
Arsenic, total (mg/L)	AD-17	0.002	0.00021	0.01	n/a	No	23	0.001027	0.0008301	34.78	None	No	0.01 NP (normality)
Arsenic, total (mg/L)	AD-28	0.002	0.00018	0.01	n/a	No	23	0.001236	0.001358	30.43	None	No	0.01 NP (normality)
Arsenic, total (mg/L)	AD-30	0.002	0.00019	0.01	n/a	No	23	0.001017	0.0008862	39.13	None	No	0.01 NP (normality)
Barium, total (mg/L)	AD-17	0.2365	0.1406	2	n/a	No	23	0.1885	0.09166	0	None	No	0.01 Param.
Barium, total (mg/L)	AD-28	0.1618	0.1367	2	n/a	No	23	0.1493	0.02406	0	None	No	0.01 Param.
Barium, total (mg/L)	AD-30	0.08347	0.05921	2	n/a	No	23	0.07417	0.02574	0	None	ln(x)	0.01 Param.
Beryllium, total (mg/L)	AD-17	0.0007077	0.0004844	0.004	n/a	No	23	0.000596	0.0002135	8.696	None	No	0.01 Param.
Beryllium, total (mg/L)	AD-28	0.0007378	0.0005464	0.004	n/a	No	23	0.0006511	0.0001892	0	None	sqrt(x)	0.01 Param.
Beryllium, total (mg/L)	AD-30	0.0001269	0.00007	0.004	n/a	No	23	0.0001739	0.0002625	8.696	None	No	0.01 NP (normality)
Cadmium, total (mg/L)	AD-17	0.001	0.00003	0.005	n/a	No	23	0.000418	0.0004775	39.13	None	No	0.01 NP (normality)
Cadmium, total (mg/L)	AD-28	0.001	0.00005	0.005	n/a	No	23	0.0005059	0.0004838	47.83	None	No	0.01 NP (normality)
Cadmium, total (mg/L)	AD-30	0.00005	0.000013	0.005	n/a	No	23	0.0000367	0.00001874	60.87	None	No	0.01 NP (NDs)
Chromium, total (mg/L)	AD-17	0.0009395	0.0004336	0.1	n/a	No	23	0.000886	0.001016	4.348	None	ln(x)	0.01 Param.
Chromium, total (mg/L)	AD-28	0.001	0.00035	0.1	n/a	No	23	0.001365	0.001694	17.39	None	No	0.01 NP (normality)
Chromium, total (mg/L)	AD-30	0.0009942	0.00042	0.1	n/a	No	23	0.0008709	0.0008937	4.348	None	No	0.01 NP (normality)
Cobalt, total (mg/L)	AD-17	0.0105	0.006194	0.009	n/a	No	23	0.008347	0.004116	0	None	No	0.01 Param.
Cobalt, total (mg/L)	AD-28	0.01507	0.01325	0.009	n/a	Yes	23	0.01416	0.001737	0	None	No	0.01 Param.
Cobalt, total (mg/L)	AD-30	0.003543	0.002341	0.009	n/a	No	23	0.003019	0.001188	0	None	sqrt(x)	0.01 Param.
Combined Radium 226 + 228 (pCi/L)	AD-17	5.97	2.787	5	n/a	No	23	4.379	3.043	0	None	No	0.01 Param.
Combined Radium 226 + 228 (pCi/L)	AD-28	2.946	1.828	5	n/a	No	23	2.47	1.198	0	None	sqrt(x)	0.01 Param.
Combined Radium 226 + 228 (pCi/L)	AD-30	2.171	1.043	5	n/a	No	23	1.734	1.189	0	None	sqrt(x)	0.01 Param.
Fluoride, total (mg/L)	AD-17	1	0.19	4	n/a	No	25	0.5097	0.3804	36	None	No	0.01 NP (normality)
Fluoride, total (mg/L)	AD-28	0.7772	0.5814	4	n/a	No	24	0.6793	0.1918	4.167	None	No	0.01 Param.
Fluoride, total (mg/L)	AD-30	0.2	0.05	4	n/a	No	25	0.1304	0.07464	52	None	No	0.01 NP (NDs)
Lead, total (mg/L)	AD-17	0.002	0.00013	0.001	n/a	No	23	0.001029	0.0009516	47.83	None	No	0.01 NP (normality)
Lead, total (mg/L)	AD-28	0.002	0.0001	0.001	n/a	No	23	0.001012	0.0009685	47.83	None	No	0.01 NP (normality)
Lead, total (mg/L)	AD-30	0.0002	0.00009	0.001	n/a	No	23	0.0001674	0.00005651	69.57	None	No	0.01 NP (NDs)
Lithium, total (mg/L)	AD-17	0.02135	0.01307	0.29	n/a	No	23	0.01721	0.007917	4.348	None	No	0.01 Param.
Lithium, total (mg/L)	AD-28	0.031	0.0226	0.29	n/a	No	23	0.02764	0.01068	0	None	No	0.01 NP (normality)
Lithium, total (mg/L)	AD-30	0.009959	0.008185	0.29	n/a	No	23	0.008849	0.002235	4.348	None	x^2	0.01 Param.
Mercury, total (mg/L)	AD-17	0.0002435	0.0001157	0.002	n/a	No	23	0.0001943	0.0001334	0	None	sqrt(x)	0.01 Param.
Mercury, total (mg/L)	AD-28	0.00005785	0.0000226	0.002	n/a	No	23	0.0000453	0.0000417	0	None	sqrt(x)	0.01 Param.
Mercury, total (mg/L)	AD-30	0.0005667	0.00009804	0.002	n/a	No	23	0.000453	0.0006399	0	None	sqrt(x)	0.01 Param.
Molybdenum, total (mg/L)	AD-17	0.0005	0.0004858	0.0012	n/a	No	21	0.0004765	0.0001046	90.48	None	No	0.01 NP (NDs)
Molybdenum, total (mg/L)	AD-28	0.0005	0.0002942	0.0012	n/a	No	21	0.0004688	0.0001059	90.48	None	No	0.01 NP (NDs)
Molybdenum, total (mg/L)	AD-30	0.0008	0.0002	0.0012	n/a	No	21	0.0005306	0.0001691	85.71	None	No	0.01 NP (NDs)
Selenium, total (mg/L)	AD-17	0.004	0.0003	0.05	n/a	No	23	0.002007	0.001848	43.48	None	No	0.01 NP (normality)
Selenium, total (mg/L)	AD-28	0.004	0.00021	0.05	n/a	No	23	0.001911	0.001882	43.48	None	No	0.01 NP (normality)
Selenium, total (mg/L)	AD-30	0.004	0.0003	0.05	n/a	No	23	0.001953	0.001846	43.48	None	No	0.01 NP (normality)
Thallium, total (mg/L)	AD-17	0.0002	0.00007	0.002	n/a	No	22	0.000213	0.0002012	77.27	None	No	0.01 NP (NDs)
Thallium, total (mg/L)	AD-28	0.001247	0.00003	0.002	n/a	No	22	0.0002322	0.0002322	86.36	None	No	0.01 NP (NDs)
Thallium, total (mg/L)	AD-30	0.000959	0.0001	0.002	n/a	No	22	0.0002535	0.0003038	68.18	None	No	0.01 NP (NDs)

Non-Parametric Confidence Interval

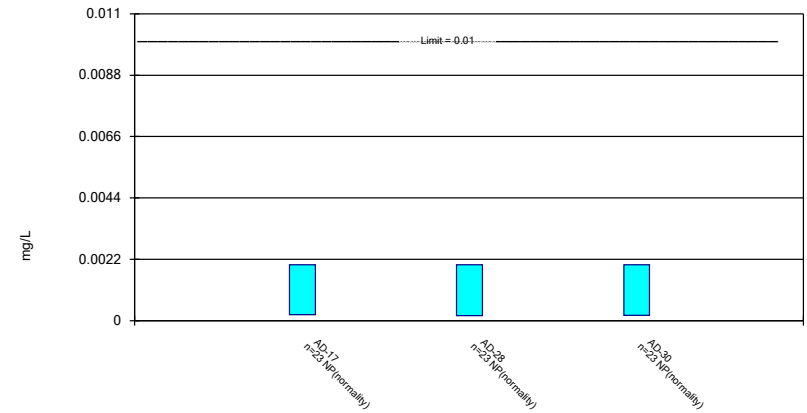
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Antimony, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

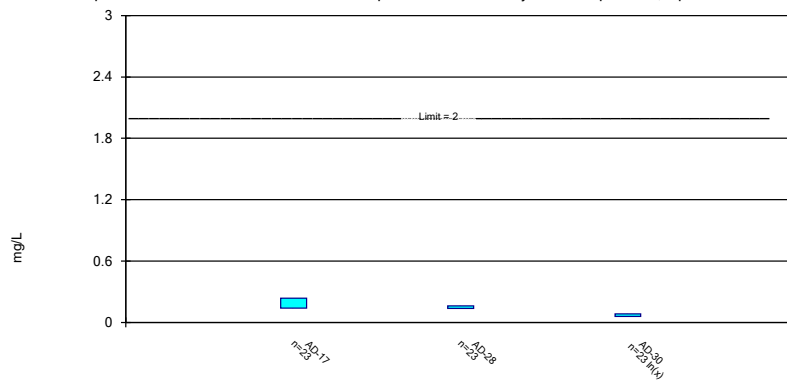
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Arsenic, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

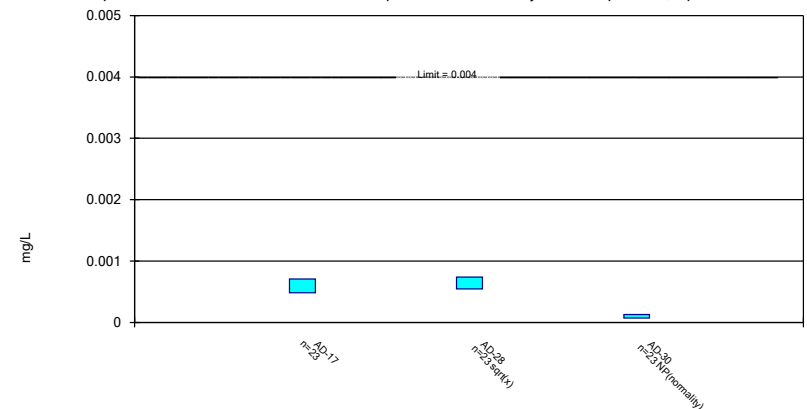
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

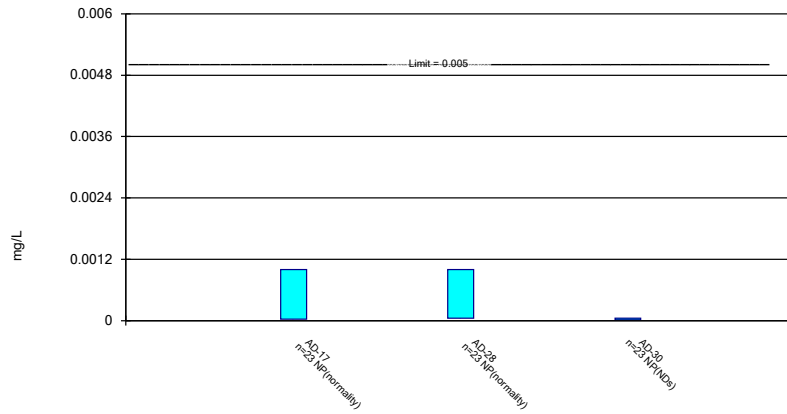
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

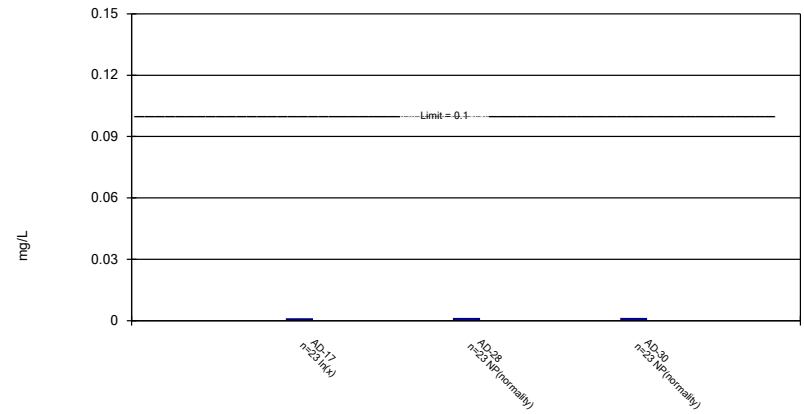
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Cadmium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

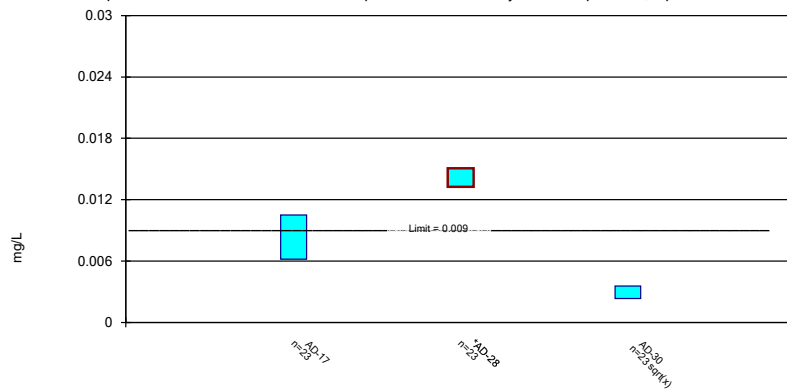
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

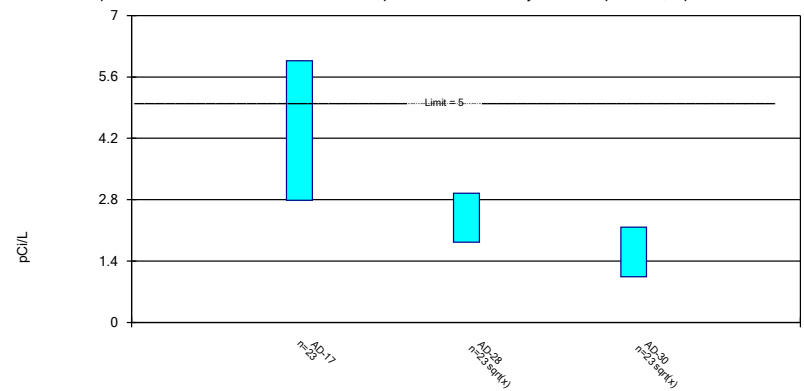
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

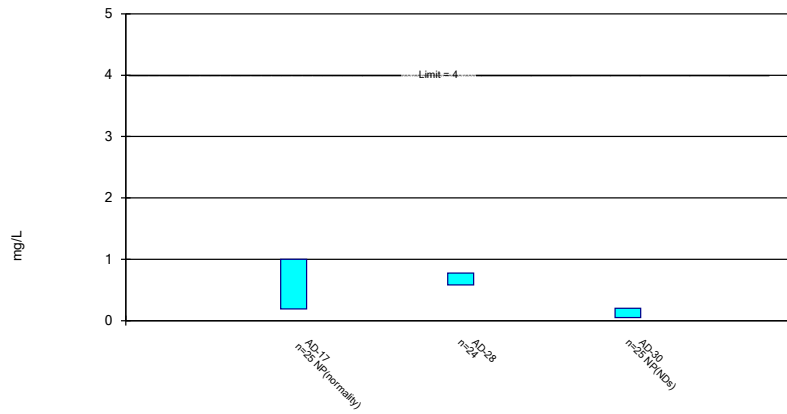
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

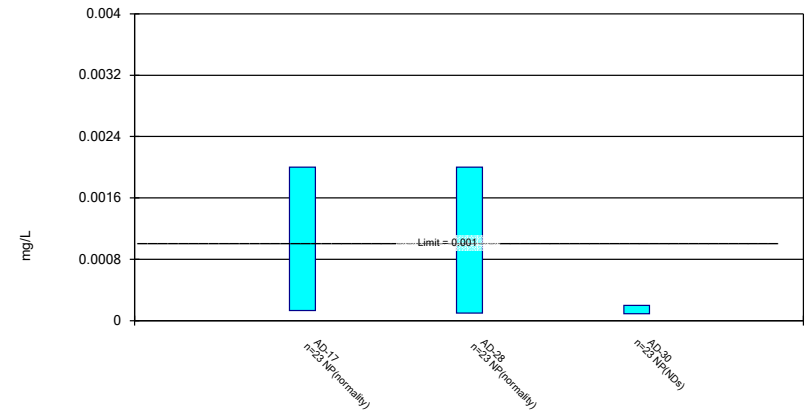
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

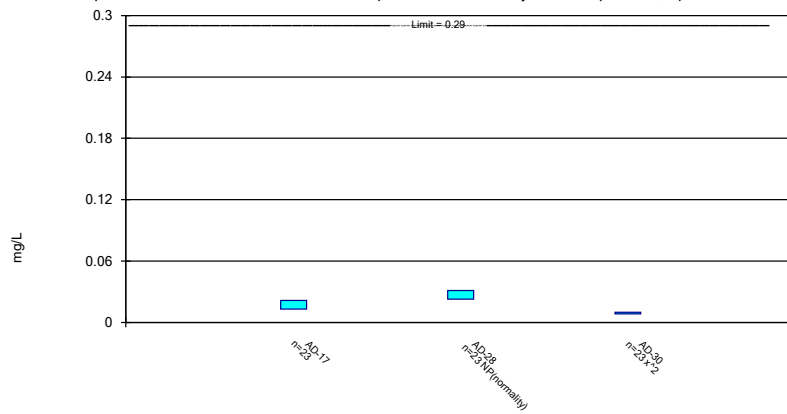
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Lead, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric and Non-Parametric (NP) Confidence Interval

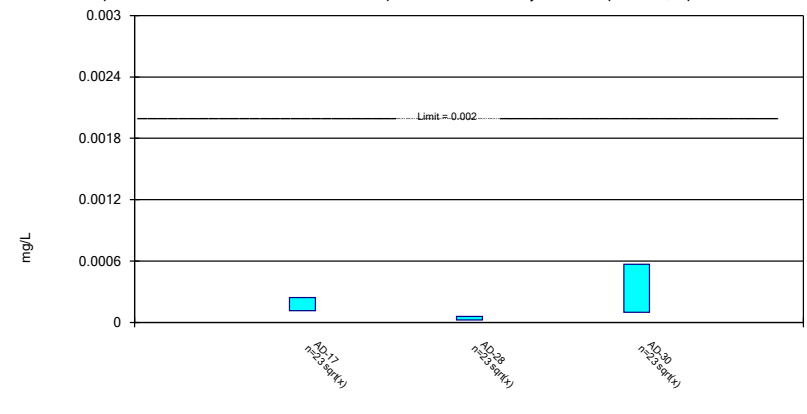
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Parametric Confidence Interval

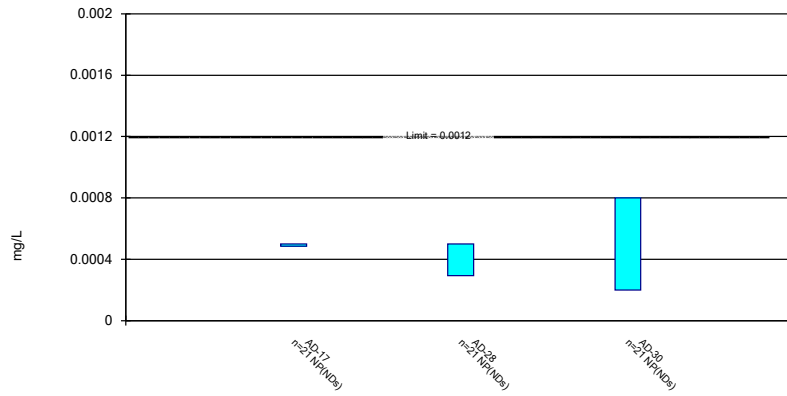
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Mercury, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
 Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

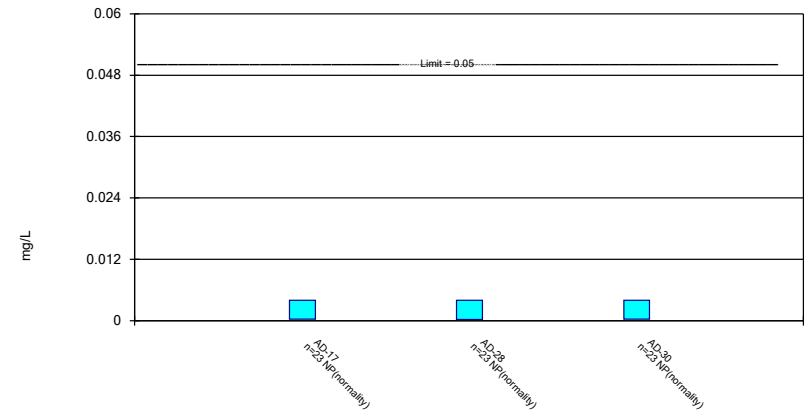
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Molybdenum, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

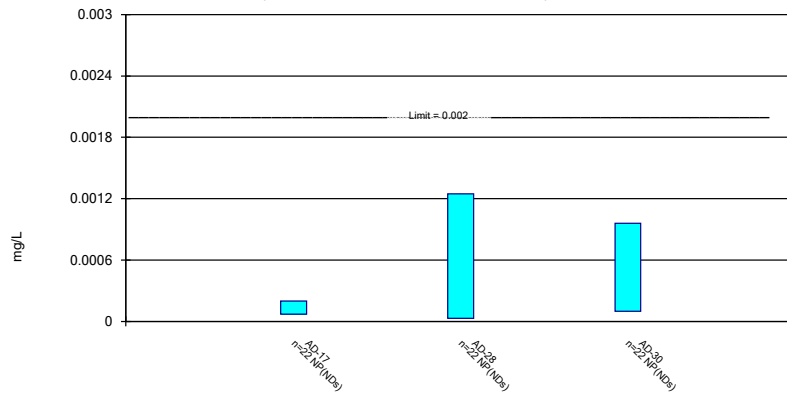
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Selenium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

Non-Parametric Confidence Interval

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



Constituent: Thallium, total Analysis Run 9/26/2023 9:05 AM View: Appendix IV
Pirkey WBAP Client: Geosyntec Data: Pirkey WBAP

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
West Bottom Ash Pond
Hallsville, Texas**

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



engineers | scientists | innovators

500 West Wilson Bridge Road, Suite 250
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March 2023

CHA8495

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ATTACHMENTS

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Attachment B	SB-28 Boring Log
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Attachment E	Certification by a Qualified Professional Engineer

LIST OF ACRONYMS

ASD	Alternative Source Demonstration
BGS	Below Ground Surface
CCR	Coal Combustion Residuals
EBAP	East Bottom Ash Pond
EDS	Energy Dispersive Spectroscopy Analyzer
EPRI	Electric Power Research Institute
GSC	Groundwater Stats Consulting, LLC
GWPS	Groundwater Protection Standard
LCL	Lower Confidence Limit
MCL	Maximum Contaminant Level
QA	Quality Assurance
QC	Quality Control
SEM	Scanning Electron Microscopy
SPLP	Synthetic Precipitation Leaching Procedure
SSL	Statistically Significant Level
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
UTL	Upper Tolerance Limit
USEPA	United States Environmental Protection Agency
VAP	Vertical Aquifer Profiling
WBAP	West Bottom Ash Pond
XRD	X-Ray Diffraction

SECTION 1

INTRODUCTION AND SUMMARY

This Alternative Source Demonstration (ASD) report has been prepared to address a statistically significant level (SSL) for cobalt in the groundwater monitoring network at the H.W. Pirkey Plant's West Bottom Ash Pond (WBAP), located 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 WBAP (**Figure 1**).

In November 2022, a semiannual assessment monitoring event was conducted at the WBAP in accordance with 30 TAC §352.951(a). The monitoring data were submitted to Groundwater Stats Consulting, LLC (GSC) for statistical analysis. Groundwater protection standards (GWPSs) were established for each Appendix IV parameter in accordance with the statistical analysis plan developed for the facility (Geosyntec, 2020a) and United States Environmental Protection Agency's (USEPA) *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* (Unified Guidance; USEPA, 2009). The GWPS for each parameter was established as the greater of either the background concentration or, for constituents with a maximum contaminant level (MCL), the MCL. To determine background concentrations, an upper tolerance limit (UTL) was calculated using pooled data from the background wells collected during the background monitoring and assessment monitoring events.

Confidence intervals were re-calculated for Appendix IV parameters at the compliance wells to assess whether these parameters were present at an SSL above the GWPSs. An SSL was concluded if the lower confidence limit (LCL) of a parameter exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). An SSL was identified for cobalt at well AD-28 at the WBAP, where the LCL of 0.0133 milligrams per liter (mg/L) exceeded the calculated GWPS of 0.00900 mg/L (Geosyntec, 2023a). No other SSLs were identified.

1.1 CCR Rule Requirements

TCEQ regulations regarding assessment monitoring programs for CCR landfills and surface impoundments (TCEQ, 2020a) provide owners and operators with the option to make an ASD when an SSL is identified (30 TAC §352.951(e)):

... 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.

Pursuant to 30 TAC §352.951(e), Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report to document that the SSL identified for cobalt at AD-28 is from a source other than the WBAP.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which the identified SSL could be attributed. Alternative sources were identified amongst five types, based on methodology provided by 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; and
- ASD Type V: Alternative Sources.

A demonstration was conducted to show that the SSL identified for cobalt at AD-28 was based on a Type IV cause (natural variation) and not by a release from the Pirkey WBAP.

SECTION 2

ALTERNATIVE SOURCE DEMONSTRATION

The TCEQ CCR rules allow the owner or operator 90 days from the determination of an SSL to demonstrate that a source other than the CCR unit caused the SSL. Descriptions of the WBAP design and construction, regional geology and site hydrogeology, methodology used to evaluate the SSLs, and proposed alternative source are presented below.

2.1 WBAP Design and Construction

The WBAP is a 30.9-acre CCR surface impoundment located at the north end of the Pirkey Plant, immediately west of the East Bottom Ash Pond (EBAP) (**Figure 1**). It was constructed while the Pirkey Plant was being developed in 1983 and 1984 and placed into operation in 1985 to receive bottom ash and economizer ash sluiced from the Plant boiler (Arcadis, 2016). The WBAP ceased receipt of CCR and non-CCR waste streams on March 30, 2022 (AEP, 2022a). At that time, the WBAP commenced closure by removal in accordance with the certified closure plan, with CCR material removal occurring from April to June of 2022. The final inspection for CCR material removal was completed on July 26, 2022.

The WBAP was constructed with compacted clay embankments around the pond perimeter and a compacted clay liner over the pond base (Arcadis, 2016). Multiple lithological borings advanced following installation of the clay liner confirm that at least 6 feet of clay is present below the base of the EBAP (Arcadis, 2016). The bottom elevation of the WBAP is approximately 347 feet above mean sea level, and the elevation of the top of the pond embankment is approximately 357 feet above mean sea level. The unit was designed to have a maximum storage capacity of 216.5 acre-feet (Arcadis, 2016).

2.2 Regional Geology/Site Hydrogeology

The WBAP is positioned on an outcrop of the Eocene-age 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 WBAP monitoring well network monitors groundwater within the uppermost aquifer, which was defined by Arcadis (2016) as very fine to fine grained clayey and silty sand with an average thickness of approximately 15 feet. Geologic cross-section A-A' from Arcadis (2016), provided as **Attachment A**, shows the subsurface structure of the uppermost aquifer (indicated on the figure as clayey silty sand, tan to gray) underlying the WBAP and the EBAP. Geologic cross-section A-A' demonstrates lateral continuity of the uppermost aquifer spanning the entire length of the WBAP.

Groundwater flow direction in the area of the WBAP is west-southwesterly (**Figure 1**). Seasonal variability in groundwater flow has not been observed since the monitoring well network was installed. Groundwater flow through the uppermost aquifer contains a hydraulic gradient of approximately 0.01 feet per foot. The WBAP monitoring well network consists of upgradient monitoring wells AD-3, AD-12, and AD-18, and compliance wells AD-17, AD-28, AD-29, and AD-30, all of which are screened within the uppermost aquifer.

2.3 Proposed Alternative Source

An initial review of site geochemistry, site historical data, and laboratory quality assurance/quality control (QA/QC) data did not identify alternative sources for cobalt due to Type I (sampling), Type II (laboratory), or Type III (statistical evaluation) 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, 2020b). A preliminary review did not identify any Type V (anthropogenic) causes. As described below, the SSL has been attributed to natural variation associated with the underlying geology, which is a Type IV (natural variation) issue.

Monitoring well AD-28 is located near the southwest corner of the WBAP, as shown in **Figure 1**. Previous ASDs for cobalt at the WBAP provided evidence that cobalt is present in the aquifer media at the site and that the observed cobalt concentrations in groundwater were due to natural variation (Geosyntec, 2019a; Geosyntec, 2019b; Geosyntec, 2020b; Geosyntec, 2020c; Geosyntec, 2021b; Geosyntec, 2022b; Geosyntec, 2023b). The previous ASDs discussed how the WBAP did not appear to be a source for cobalt in downgradient groundwater, based on observed concentrations of cobalt both in the ash material and in leachate from Synthetic Precipitation Leaching Procedure (SPLP) analysis (SW-864 Test Method 1312, [USEPA, 1994]) of the ash material. Cobalt was not detected in the SPLP leachate above the reporting limit of 0.01 mg/L, which is lower than the average concentration at AD-28 (**Table 1**).

Cobalt was detected at a concentration of 0.000501 mg/L in a surface water sample previously collected from the WBAP on November 4, 2020 to characterize total cobalt concentrations. The WBAP ceased receipt of waste on March 30, 2022 and initiated activities to close the pond via removal of CCR materials (AEP, 2022b). Cobalt was detected in a surface water sample collected on June 24, 2022 from the EBAP at a concentration of 0.00128 mg/L (**Table 1**). The EBAP and WBAP historically received the same process water, with the use of each pond dependent on available freeboard and cleaning schedule; thus, there is a basis for the equivalency between these two surface water samples. These concentrations are lower than the reported cobalt concentrations for in-network wells from the most recent sampling event, except for upgradient monitoring well AD-18 (0.000723 mg/L) (**Figure 2**). Both pond surface water samples were over an order of magnitude lower than the average concentration observed at AD-28 (**Table 1**). Thus, the WBAP is not the likely source of cobalt at AD-28.

As noted in the previous ASDs, soil samples collected across the site, including from locations near the WBAP, identified cobalt in the aquifer solids at concentrations ranging from non-detect to 23.5 milligrams per kilogram (mg/kg), with the highest value reported at AD-41, which is upgradient of the WBAP and EBAP (**Figure 3**). SB-28 was advanced in the vicinity of AD-28 in April 2020 to re-log the geology at AD-28 and collect samples for laboratory analysis of total metals and mineralogy. The SB-28 field boring log, which was generated by Auckland Consulting LLC, is provided as **Attachment B**. Cobalt was identified at SB-28 at concentrations of 4.53 mg/kg at 15.5-16 feet below ground surface (bgs) and 8.70 mg/kg at 40-41 feet bgs (**Table 2**). The 15.5-16 feet bgs interval at SB-28 correlates to the depth of the monitoring well screen of AD-28 (15-35 feet bgs), indicating that cobalt is present in aquifer solids within the AD-28 screened interval.

In addition to total cobalt, soil samples were submitted for mineralogical analysis to evaluate the presence of cobalt-containing minerals. X-ray diffraction (XRD) analysis of soils from SB-28 identified pyrite (an iron sulfide mineral) in samples collected at 25-30 feet bgs and 40-41 feet bgs at concentrations up to 3% by weight (**Table 3**). Cobalt is known to undergo isomorphic substitution for iron in crystalline iron minerals such as pyrite due to their similar ionic radii of approximately 1.56 angstrom (Å) for iron vs. 1.52 Å for cobalt (Clementi and Raimondi, 1963; Krupka and Serne, 2002; Hitzman et al., 2017).

The aquifer solids at SB-28 are distinctly red in color at shallow depths, as illustrated in the photolog of soil cores provided in **Attachment C**. Red color in soils is often associated with the presence of oxidized iron-bearing minerals such as hematite and goethite. Goethite, an iron oxide mineral (FeOOH), was present at depths up to 16 ft bgs at SB-28 as high as 37% of the total aquifer solids in more shallow intervals (6 ft bgs), where oxidation of pyrite minerals would be more pronounced (**Table 3**). The weathering of pyrite to goethite under oxidizing conditions is also a well-understood phenomenon, including in formations in east Texas (Senkayi et al., 1986; Dixon et al., 1982). It is likely that the pyrite weathering process is resulting in the release of isomorphically substituted cobalt from the pyrite crystal structure as it undergoes oxidative weathering to iron oxide minerals.

As described in an ASD previously generated for the EBAP, vertical aquifer profiling (VAP) was used to collect groundwater samples from upgradient locations B-2 and B-3 during the soil boring and sample collection process (Geosyntec, 2019b). A groundwater sample was also collected from AD-30, one of the existing compliance wells within the WBAP groundwater monitoring network. Solid phase materials within these groundwater samples were separated and submitted for analysis of chemical composition and mineralogy. For the VAP samples, separation was completed using a centrifuge due to the high abundance of solids. For the groundwater sample at AD-30, the sample was filtered using a 1.5-micron filter. Based on total metals analysis, cobalt was identified both in the centrifuged solid material collected from upgradient VAP location B-3 [VAP-B3-(40-45)] and in the material retained on the filter after processing groundwater from permanent monitoring wells AD-30, B-2, and B-3 (**Table 2**). The concentrations of cobalt in the solid material retained after filtration were comparable to the bulk soil samples collected from the same locations.

The solid sample [VAP-B3-(40-45)] was submitted for mineralogical analysis via XRD and scanning electron microscopy (SEM) using an energy dispersive spectroscopic analyzer (EDS). The XRD results identified pyrite as approximately 3% of the solid phase (**Table 4**). Pyrite was identified during SEM/EDS analysis of lignite which is mined immediately adjacent to the site. Logging completed while the VAP boring was advanced identified coal at several intervals, including 45 and 48 ft bgs (**Figure 4**). Furthermore, SEM/EDS of both centrifuged solid samples [VAP-B3-(40-45) and VAP-B3-(50-55)] identified pyrite in backscattered electron micrographs by the distinctive framboidal morphology (Harris et al., 1981; Sawlowicz, 2000). Major peaks involving iron and sulfur were identified in the EDS spectrum, which further support the identification of pyrite (**Attachment D**). While cobalt was not identified in the EDS spectrum, it is likely present at concentrations below the detection limit.

The WBAP was not identified as the source of cobalt at wells in the WBAP network based on the low concentrations of cobalt in the pond itself and the ubiquity of naturally occurring cobalt, especially in soil and groundwater samples upgradient from the WBAP. Cobalt in the WBAP network groundwater is believed to be a result of natural variability within the aquifer. Naturally occurring cobalt is known to substitute for iron in pyrite, which is then known to weather to iron oxides. The presence of pyrite and iron oxides has been confirmed at AD-28 and across the Site. The presence of these aquifer minerals suggests that weathering of pyritic minerals may be providing a source for aqueous cobalt in groundwater.

SECTION 3

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 SSL for cobalt identified at AD-28 during assessment monitoring in November 2022 was not due to a release from the WBAP. The identified SSL should instead be attributed to natural variation in the underlying geology, including the presence of pyrite and goethite in the solid aquifer material. Certification of this ASD by a qualified professional engineer is provided in **Attachment E**.

SECTION 4

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TABLES

**Table 1: Summary of Key Analytical Data
West Bottom Ash Pond - H.W. Pirkey Plant**

Geosyntec Consultants, Inc.

Sample	Sample Date	Unit	Cobalt Concentration
Bottom Ash (Solid Material)	2/11/2019	mg/kg	5.8
SPLP Leachate of Bottom Ash	2/11/2019	mg/L	<0.01
WBAP Pond Water	11/4/2020	mg/L	0.000501
EBAP Pond Water	6/24/2022	mg/L	0.00128
AD-28 - Average	May 2016 - November 2022	mg/L	0.0142

Notes:

mg/kg - milligram per kilogram

mg/L - milligram per liter

AD-28 - Average value was calculated using all cobalt data collected under 40 CFR 257 Subpart D.

**Table 2: Soil Cobalt and Mineralogy Data
West Bottom Ash Pond - H.W. Pirkey Plant**

Geosyntec Consultants, Inc.

Location ID	Location	Sample Depth (ft bgs)	Cobalt (mg/kg)
Bulk Soil Samples			
AD-28	WBAP Network	6-6.5	< 2.38
		15.5-16	4.53
		25-30	< 2.50
		40-41	8.70
AD-30	WBAP Network	7	1.00
		23	15.0
B-2	Upgradient	10	2.36
		16	3.62
		71	10.30
		82	7.21
		87	3.11
B-3	Upgradient	10	1.30
		20	0.59
		97	1.11
AD-41	Upgradient	15	<1.0
		35	23.5
		95	1.90
Solid Material Retained After Filtration			
AD-30	WBAP Network	15-25	9.3 J
B-2	Upgradient	38-48	4.3 J
B-3	Upgradient	29-34	12.0
		VAP 40-45	18.0

Notes:

mg/kg- milligram per kilogram

ft bgs - feet below ground surface

J = estimated value

For AD-28 and AD-30, samples were collected from additional boreholes advanced in the immediate area of the location identified by the well ID. Samples were not collected from the cuttings of the borings advanced for well installation. Samples at B-2, B-3, and AD-41 were collected from cores removed from the borehole during well lithology logging.

Depths for samples collected after filtration represent the screened interval for the permanent well where the sample was collected.

**Table 3 - AD-28 Mineralogy Results
West Bottom Ash Pond - H. W. Pirkey Plant**

Boring ID	SB-28 (AD-28)			
Sample Depth Interval	6-6.5	15.5-16	25-30	40-41
Sample Location	Above Screened Interval	Within Screened Interval		Below Screened Interval
Color	Red-brown to yellow-brown	Light gray, light red-brown	Brown, light red-brown	Gray to dark gray
Mineralogy				
Quartz	58%	46%	73%	34%
Pyrite	--	--	3%	3%
K-Feldspar	--	1%	1%	1%
Siderite	--	--	2%	52%
Goethite	37%	15%	--	--
Anhydrite	--	--	--	2%
Clay/Mica	5%	38%	21%	8%

Notes:

Sample depths are shown in feet below ground surface (bgs)

Well AD-28 is screened from 15-35 ft. below ground surface.

Mineralogical component results are shown in relative % abundance.

Table 4: X-Ray Diffraction Results
West Bottom Ash Pond - H. W. Pirkey Plant

Geosyntec Consultants, Inc.

Constituent	VAP-B3-(40-45)
Quartz	15
Plagioclase Feldspar	0.5
Orthoclase	ND
Calcite	ND
Dolomite	ND
Siderite	0.5
Goethite	ND
Hematite	2
Pyrite	3
Kaolinite	42
Chlorite	4
Illite/Mica	6
Smectite	12
Amorphous	15

Notes:

ND: Not detected

VAP-B3-(40-45) is the centrifuged solid material from the groundwater sample collected at that interval.

*Characterization completed by Mineralogy, Inc.

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

- 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.

1,000 500 0 1,000 Feet

Digitally signed by Beth Ann Gross
 Date: 2023.01.23 09:40:36 -05'00'
 Texas Eng Firm
 Registration No. 1182

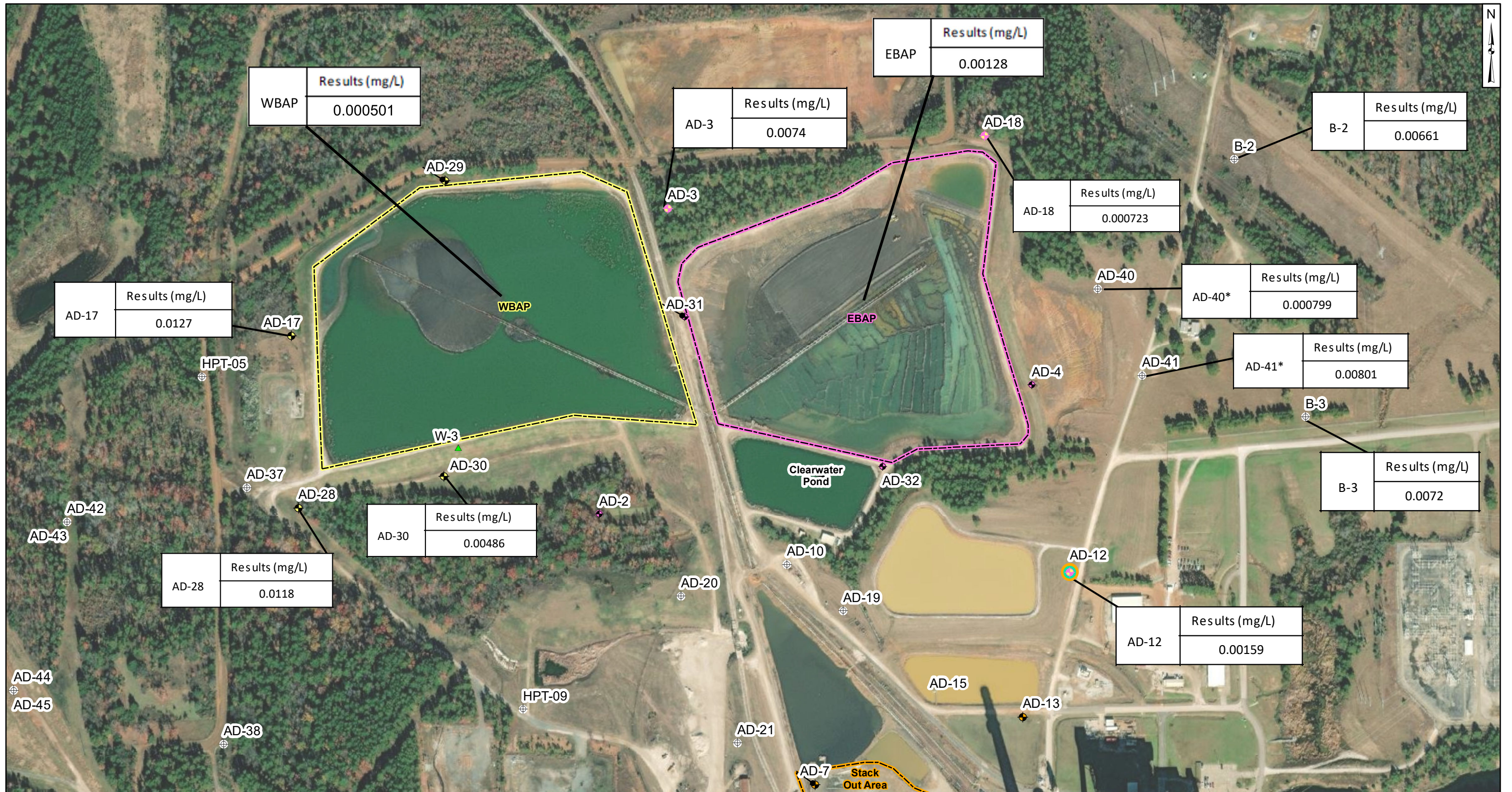
**Potentiometric Contours - Uppermost Aquifer
 November 2022**

AEP Pirkey Power Plant
 Hallsville, Texas

Geosyntec
 consultants

Columbus, Ohio 2023/01/17

Figure 1



WBAP	Results (mg/L)
	0.000501

AD-3	Results (mg/L)
	0.0074

EBAP	Results (mg/L)
	0.00128

B-2	Results (mg/L)
	0.00661

AD-17	Results (mg/L)
	0.0127

AD-18	Results (mg/L)
	0.000723

AD-40*	Results (mg/L)
	0.000799

AD-28	Results (mg/L)
	0.0118

AD-30	Results (mg/L)
	0.00486

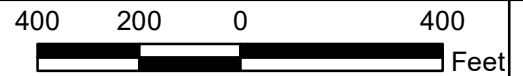
AD-41*	Results (mg/L)
	0.00801

B-3	Results (mg/L)
	0.0072

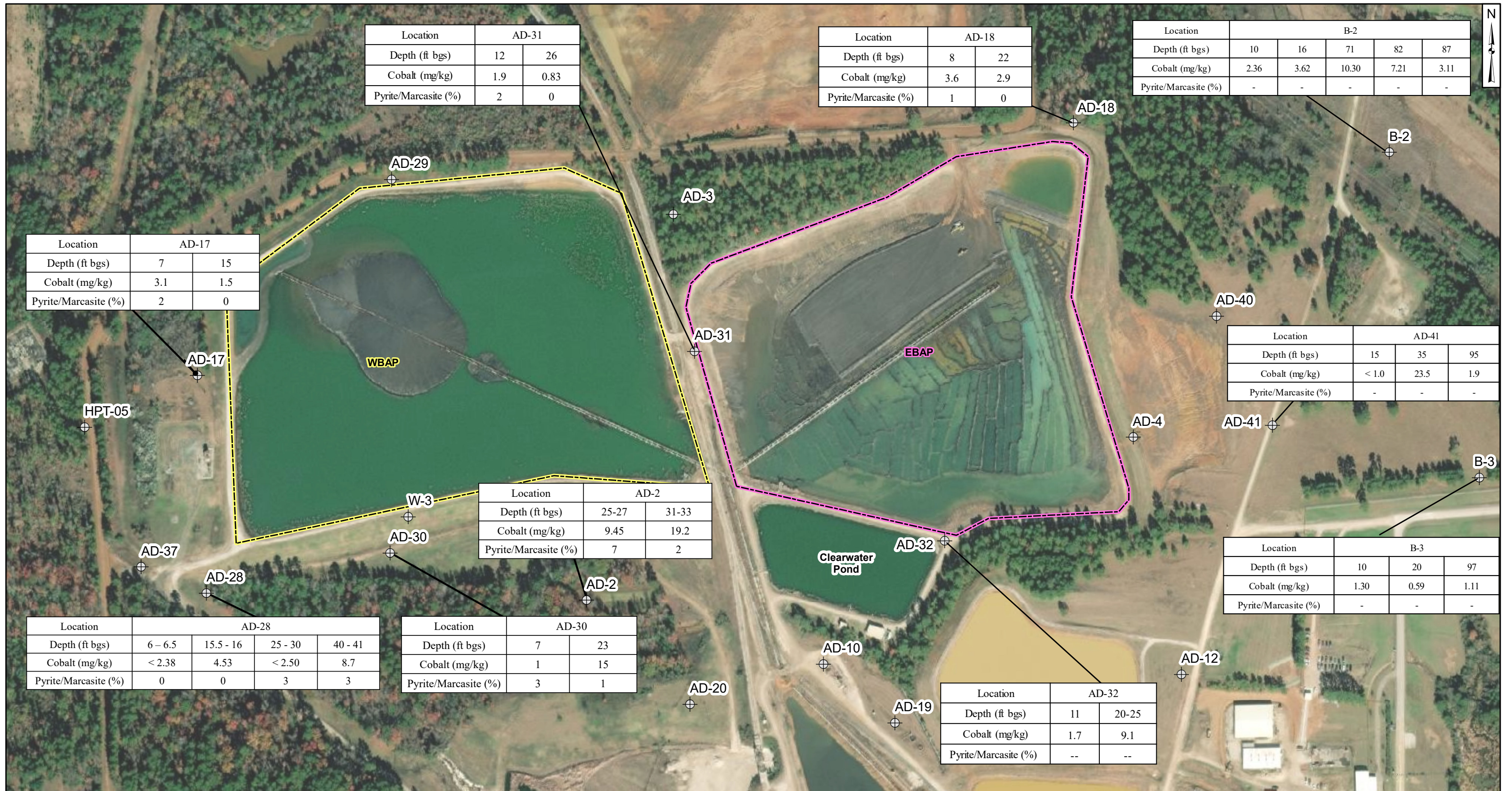
AD-12	Results (mg/L)
	0.00159

⊕ Out of Network	◆ Stackout Area	▭ EBAP
◆ EBAP	◆ EBAP and WBAP	▭ Stack Out Area
◆ WBAP	⊕ All CCR Unit Networks	▭ WBAP
◆ Landfill	▲ Piezometer	




Notes
 - Monitoring well coordinates, site features, and data provided by AEP.
 - AD-15 location is approximated
 - Samples collected in November 2022
 - * - Well most recently sampled August 2019
 - AD-29 included in the well network for water level measurements only
 - WBAP surface water results shown for November 2020 sample. EBAP surface water results shown for June 2022 sample.



Aqueous Cobalt Distribution	
AEP Pirkey Power Plant Hallsville, Texas	
Geosyntec consultants	
Columbus, Ohio	2022/02/07
Figure 2	



Legend

-  Monitoring Wells
-  EBAP
-  WBAP

Notes

- Monitoring well coordinates provided by AEP.
- AD-2 and AD-28 samples collected on April 20, 2020
- All other data provided by AEP, 2019.
- ft bgs: feet below ground surface.
- mg/kg: milligrams per kilogram.
- -- not analyzed.



Cobalt Distribution in Soil

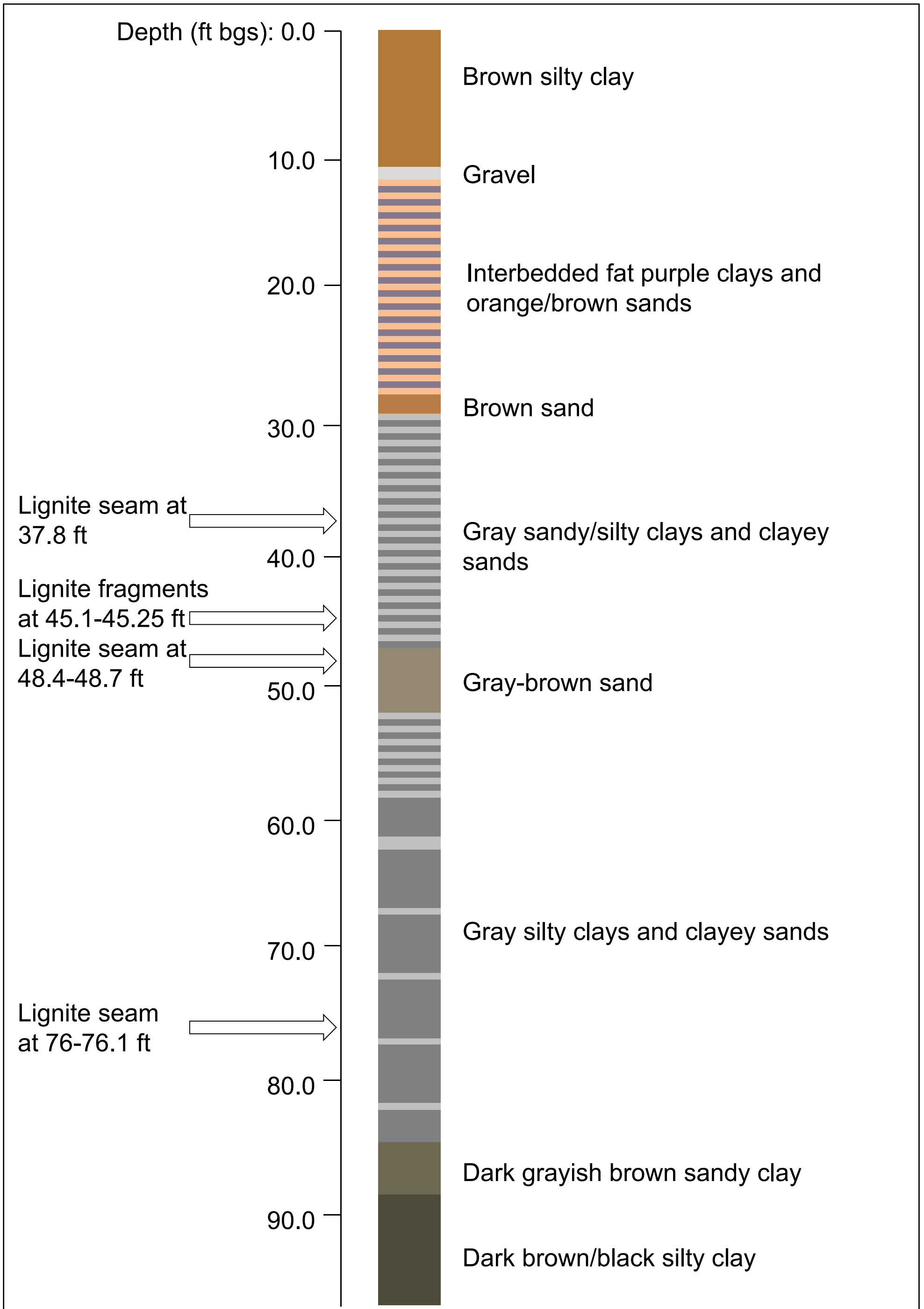
AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Figure
3

Columbus, Ohio

2020/12/22



Notes:

- Ft = feet
- Bgs = below ground surface
- Boring completed May 2019
- Total depth of 97.5 ft bgs
- Well installed in offset boring screened at 29-34 ft bgs

B-3 Visual Boring Log

AEP Pirkey Powerplant
Hallsville, TX

Geosyntec
consultants

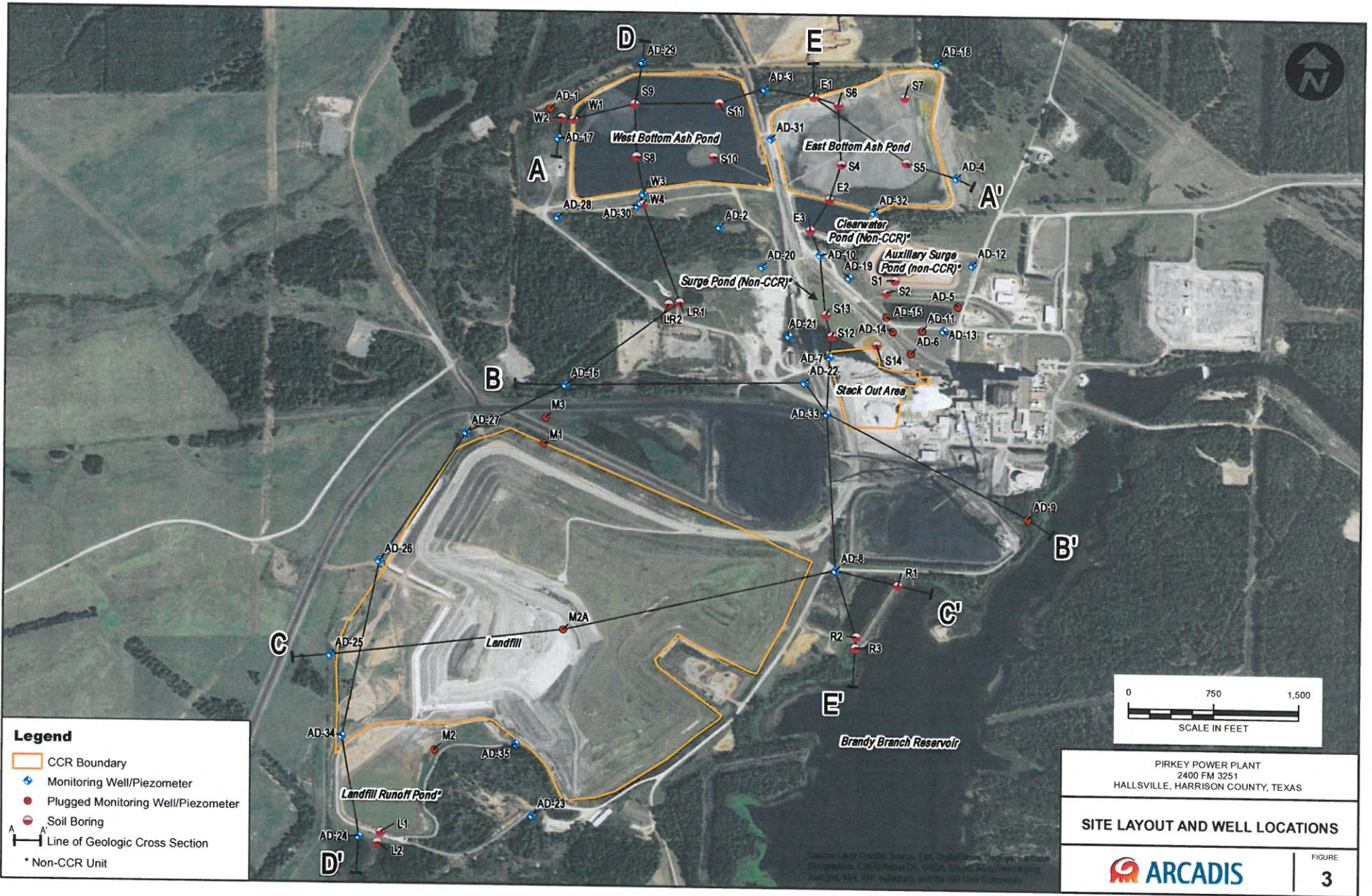
Figure

4

CHA8462

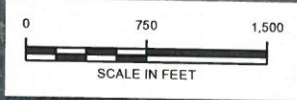
March 2020

ATTACHMENT A
Geologic Cross-Section A-A'



Legend

- CCR Boundary
- ◆ Monitoring Well/Piezometer
- Plugged Monitoring Well/Piezometer
- Soil Boring
- Line of Geologic Cross Section
- * Non-CCR Unit

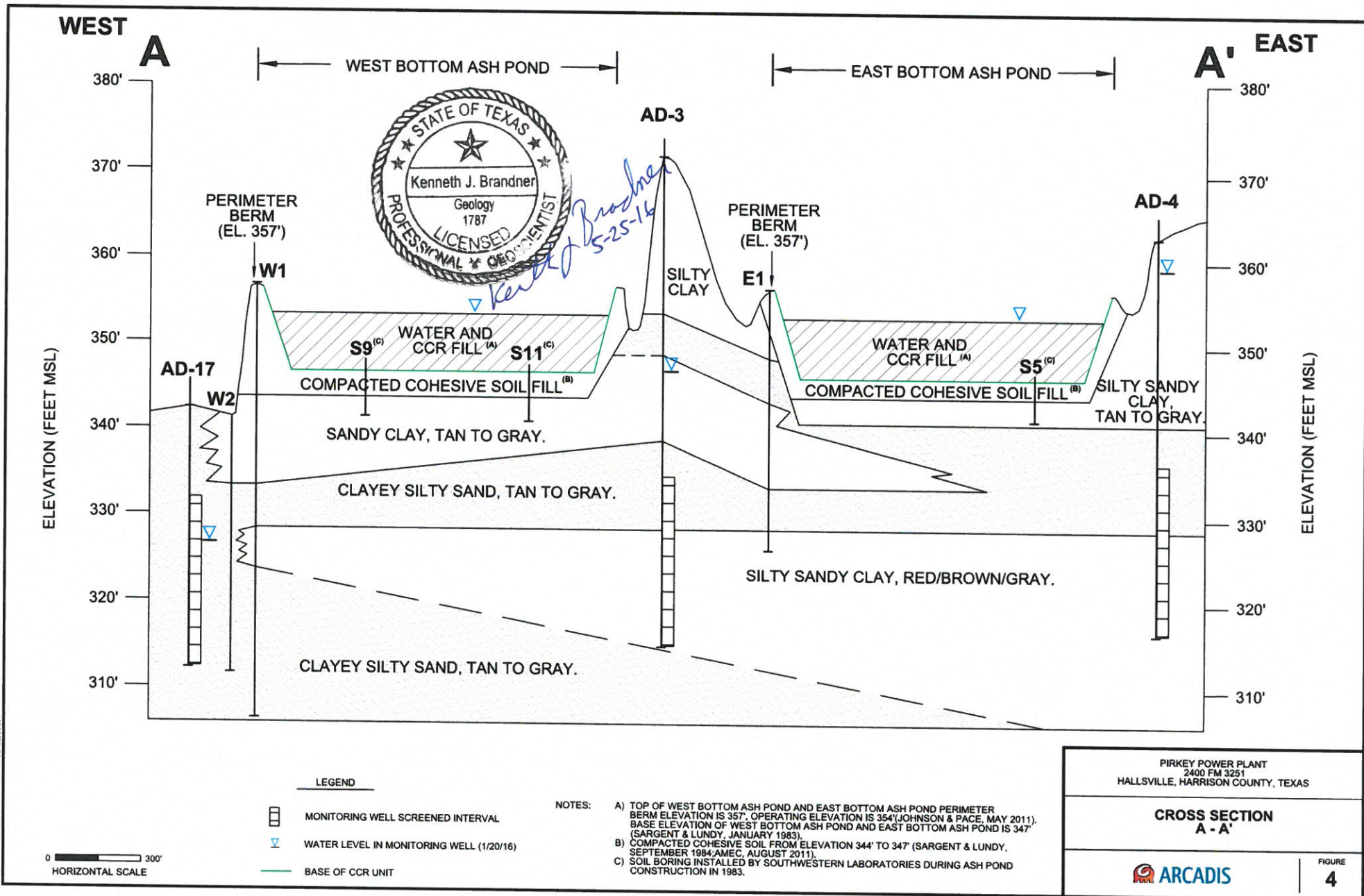


PIRKEY POWER PLANT
 2400 FM 3251
 HALLSVILLE, HARRISON COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

ARCADIS

CITY: DFW GROUP; DR: LD; AM: PD; TM: TR: LYNCH, OFFICE REF: PIRKEY POWER PLANT; DATE: 2/22/2016 11:17 AM; BY: LEASE, DANA; LAYOUT: MODEL: 2/19/2016 2:18 PM; ACADVER: 19.16 (LMS TECH); PAGESETUP: - PLOTSTYLETABLE; STATE OF TEXAS PROFESSIONAL GEOLOGIST LICENSED 1787 Kenneth J. Brandner



ATTACHMENT B
SB-28 Boring Log

PROJECT NO. _____ PROJ. _____ BOR. NO. SB-28
 LOCATION AD-28/MW-28 - Pirkey Power Plant ELEV. _____ DATE 4/20/20

SILTS & SANDS		COHESIVE SOILS - CLAYS			COLORS		MATERIALS		SAND ADJ.		CHARACTERISTICS	
CONDITION		CONSISTENCY		PENETROMETER	N - VALUE							
VLo Very Loose	0-4	Vso... Very Soft	0 - 0.25	0 - 0.25	< 2	Li ... Light	Br ... Brown	Cl ... Clay, Clayey	F.....Fine	Calc ... Calcareous		
Lo Loose	4-10	So... Soft	0.25 - 0.5	0.25 - 0.5	2 - 4	Dk ... Dark	Bk ... Black	Si ... Silt, Silty	M....Medium	Lig ... Lignite		
MDe Med. Dense	10-30	Mst... Stiff	0.5 - 1.0	0.5 - 1.0	4 - 8	G ... Grey	Bl ... Blue	Sa ... Sand, Sandy	Co....Coarse	Org ... Organic		
De Dense	30-50	St... Stiff	1.0 - 2.0	1.0 - 2.0	8 - 15	T Tan	Gr Green	Ls ... Limestone	Si....Silty	Lam ... Laminate		
VDe Very Dense	>50	VSt... Very Stiff	2.0 - 4.0	2.0 - 4.0	15 - 30	R Red	Y Yellow	Gr ... Gravel		SlS ... Siltstone		
		H..... Hard	> 4.0	> 4.0	>30	Rdish.Reddish	Wh ... White	SS ... Sandstone		Sh Shale, Shaley		
								Sh..... Shale, Shaley		Nod Nodules		

SAMPLE INTERVAL TEST ASSIGNMENT	SAMPLE NO. Recovery	DEPTH FT.	SAMPLES	STRATUM DESCRIPTION						STANDARD PENETROMETER			UNIFIED SOIL CLASSIFICATION	N - VALUE OR HAND PENETROMETER
				CONDITION OR CONSISTENCY	COLOR	MINOR MATERIALS OR ADJECTIVES	PREDOMINATE MATERIAL	CHARACTERISTICS OR MODIFICATIONS						
												SEAT - 6"		
SM 2'	4'	0-2	0-2	Br Lt Br	Si	Sa	Silty sand, trace clay & roots, trace fine iron ore gravel,						moist (0-2)	
		2-10	2-10	Rd Br, Yllw Br	Si, Gr	Cl	Clay - some silt, trace 1/4" sand, trace coarse iron ore concretions						moist (2-5)	
CL 10'	1.5'	5-10	5-10				- some v.f. sand, ironstone layer @ 6-6.5'						moist (5-10)	
SC-SM 10'	1'	10-15	10-15	Rd Br, Lt Gr	Si Cl	Sa	clayey v.f. t.f. Silty Sand with clay in thin lenses, trace cemented clayey sand						v. moist (10-15)	
SM 16'	1.5'	15-20	15-20	Lt. br & Lt. Rd Br			- clay lenses @ 15' (6") - ironstone layer @ 15.5' & cemented sand to 16'						v. moist (15-16)	
SM 40'	3"	20-25	20-25	Br, Lt. Rd Br	Si	Sa	Silty Sand - some ironstone - gray @ 20'						Saturated @ 16' to 40'	
	3'	25-30	25-30	Gray			= some cemented clayey sand (only recovery) @ 25-30'							
	NR	30-35	30-35											
	NR	35-40	35-40											
							R.T. @ 40'							
							* Split Spoon Driven from 40-41'							
SC 40'	1'	40-41	40-41	Gray, DK Gray	Cl	Sa	clayey sand w/ lenses of cemented sand @ 41.5-41.75' trace gypsum crystals @ 40-41'						v. moist 40-41'	
							* 6-6.5' collected @ 1140							
							* 15.5-16' collected @ 1215							
							* 25-30' collected @ 1230							
							* 40-41' collected @ 1300							

Type ASA Dry Auger Rotary Wash
 SEEPAGE @ 16 FT. WHILE DRILLING, W.L. @ _____ FT. ON COMPL. (OR) BAILED TO _____ FT. UPON COMPLETION.
 W.L. @ _____ FT AND CAVED TO _____ FT. ON _____.

* GPS: 32.46544°, -94.49432 (18' W-NW) of AD-28/MW-28

ATTACHMENT C
SB-28 Boring Photographic Log

GEOSYNTEC CONSULTANTS
Photographic Record



Client: American Electric Power

Project Number: CHA8495/12A/02

Site Name: H.W. Pirkey Plant WBAP

Site Location: Hallsville, Texas

Photograph 1

Date: 4/21/2020

Direction: N/A

Comments:
Multiple sections of core from soil boring SB-28 advanced near downgradient monitoring well AD-28 within the Western Bottom Ash Pond (WBAP) CCR unit. 5-foot pushes were used. Note the reddish color indicating the presence of oxidized iron-bearing minerals.



Photograph 2

Date: 4/21/2020

Direction: N/A

Comments:
0-5 foot interval of SB-28.

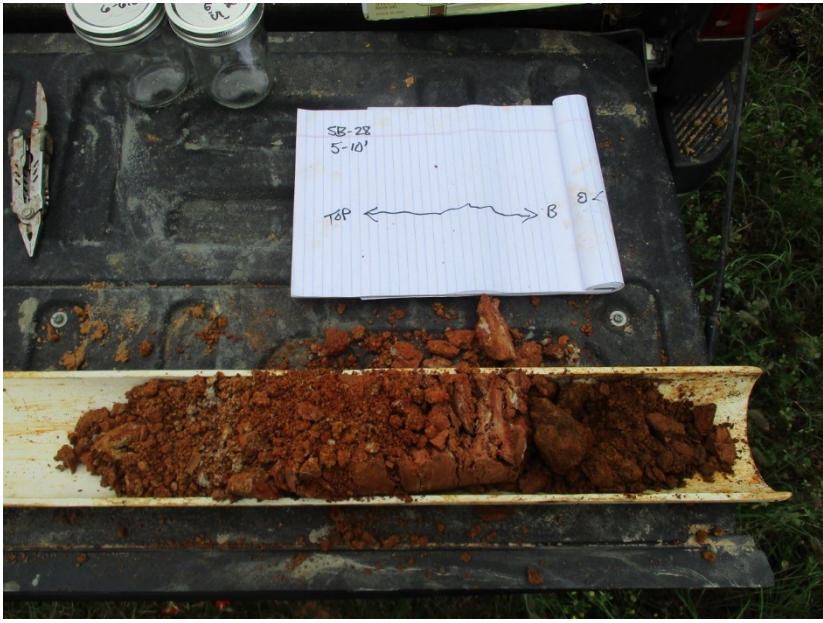


Photograph 3

Date: 4/21/2020

Direction: N/A

Comments:
5-10 foot interval of SB-28. Recovery of this interval was limited. A sample was collected from this interval from 6-6.5 ft. below ground surface (bgs).




Photograph 4

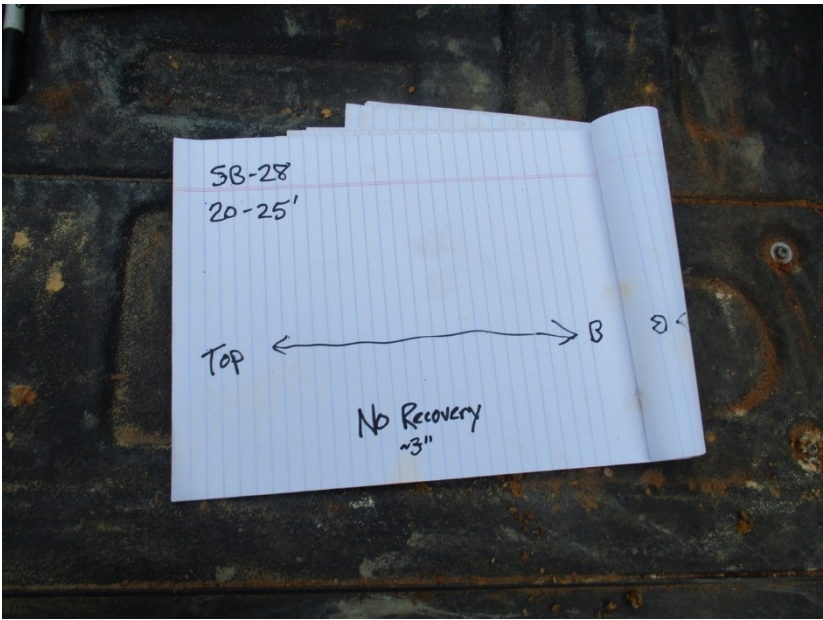
Date: 4/21/2020

Direction: N/A

Comments:
10-15 foot interval of SB-28. Recovery of this interval was limited.



Photograph 5	
Date: 4/21/2020	
Direction: N/A	
<p>Comments: 15-20 foot interval of SB-28. Recovery of this interval was limited. A sample was collected from this interval from 15.5-16 ft. bgs.</p>	

Photograph 6	
Date: 4/21/2020	
Direction: N/A	
<p>Comments: Field geologist's note indicating that very little of the 20-25 foot interval of SB-28 was recovered.</p>	

Photograph 7

Date: 4/21/2020

Direction: N/A

Comments:
25-30 foot interval of SB-28. Very little of this interval was recovered. Note the color change of the soil from red to dark brown/black. A sample was collected from this interval.



Photograph 8

Date: 4/21/2020

Direction: N/A

Comments:
Bottom of SB-28. The boring log indicates no recovery of soil from the 30-40 foot interval. A sample was collected from this interval.

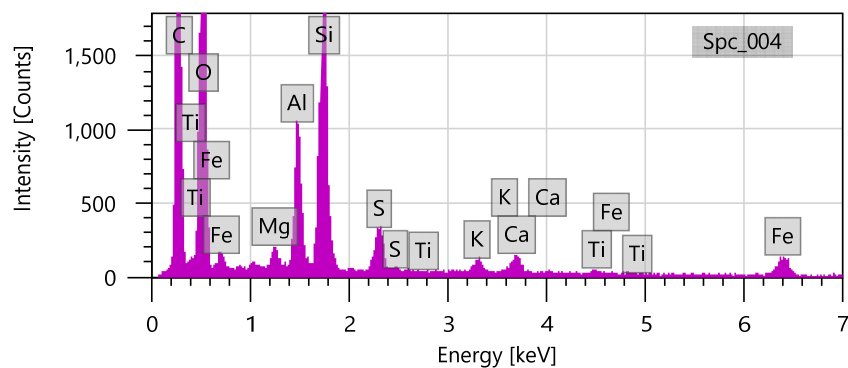
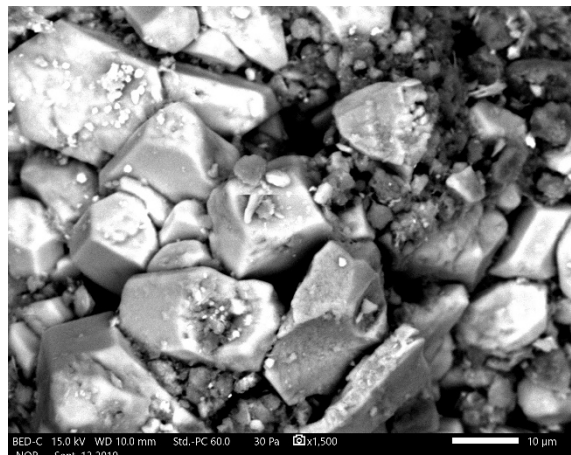
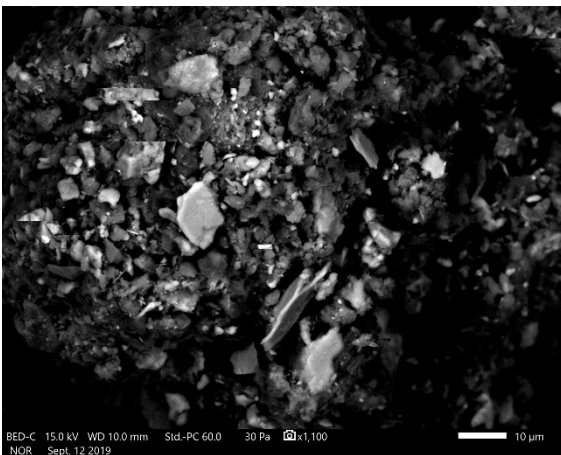
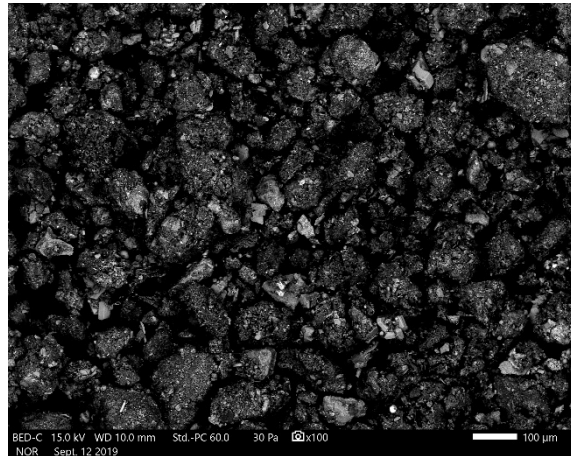
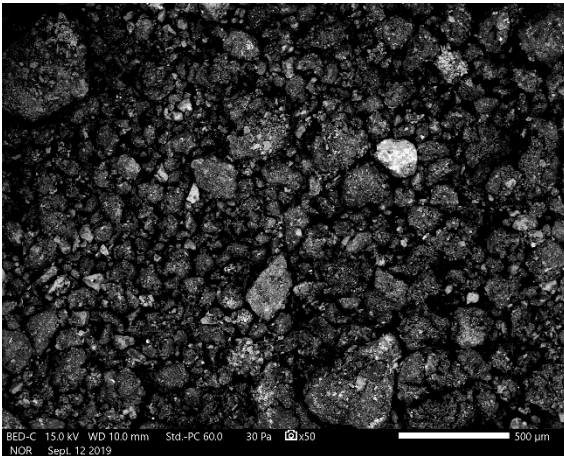


ATTACHMENT D
SEM/EDS Analysis

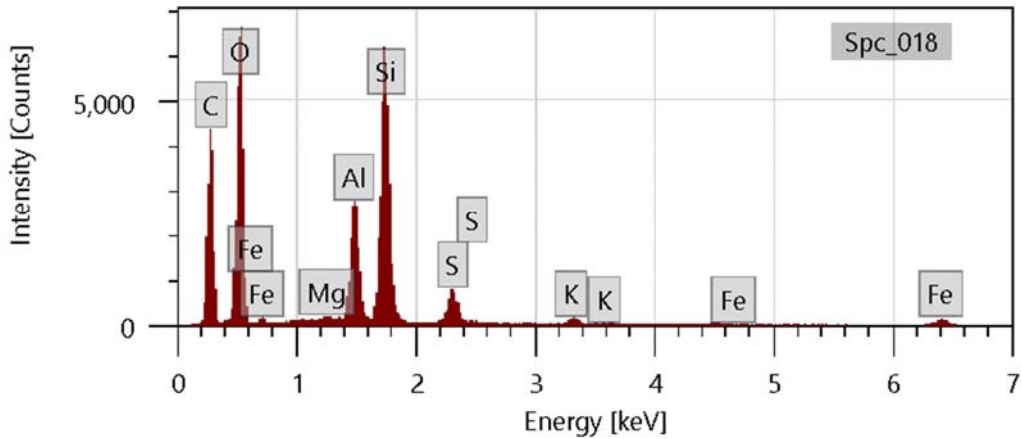
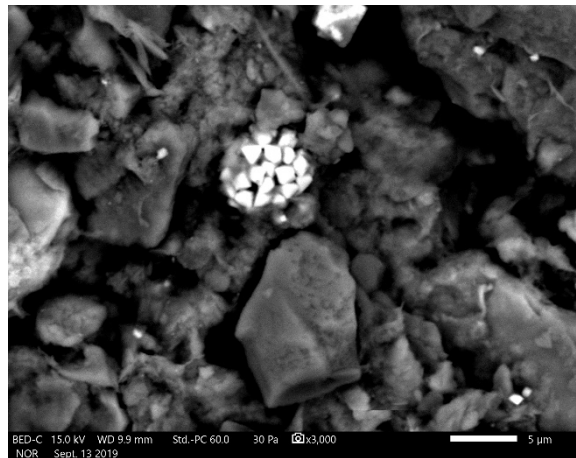
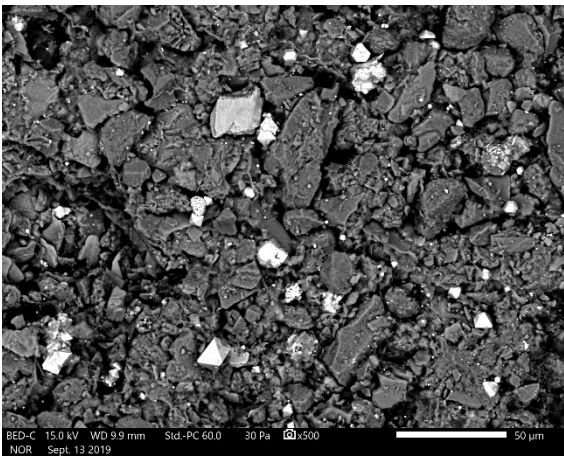
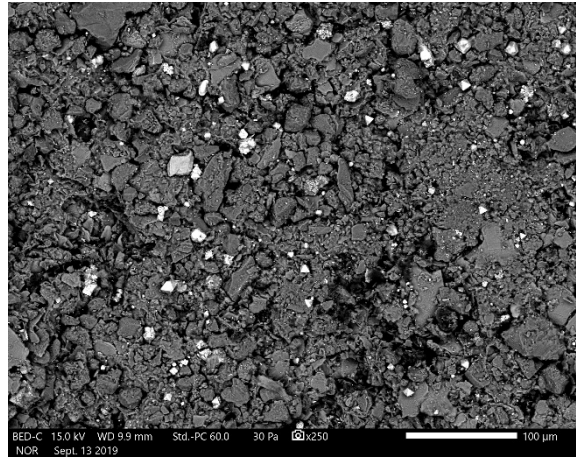
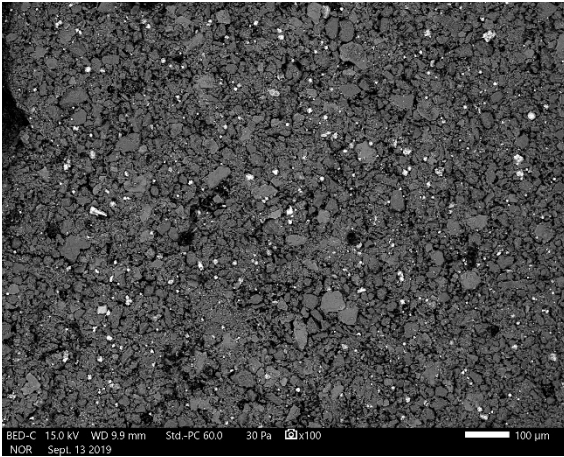
September 16, 2019

Dr. Bruce Sass
941 Chatham Lane, Suite 103, Columbus, OH 43221

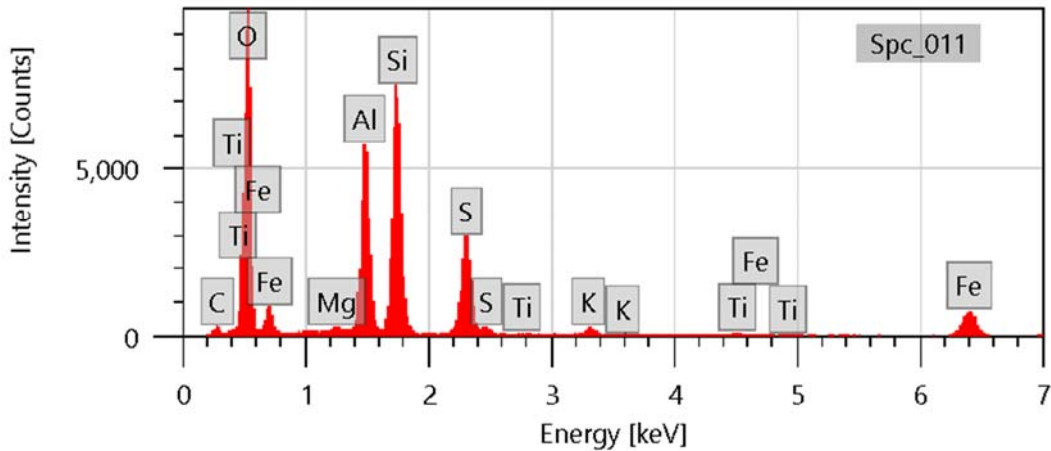
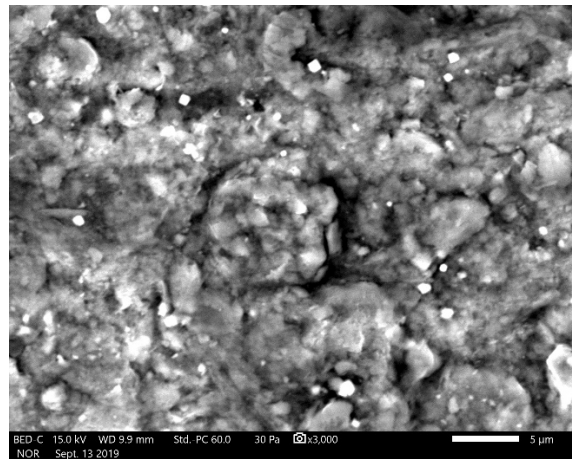
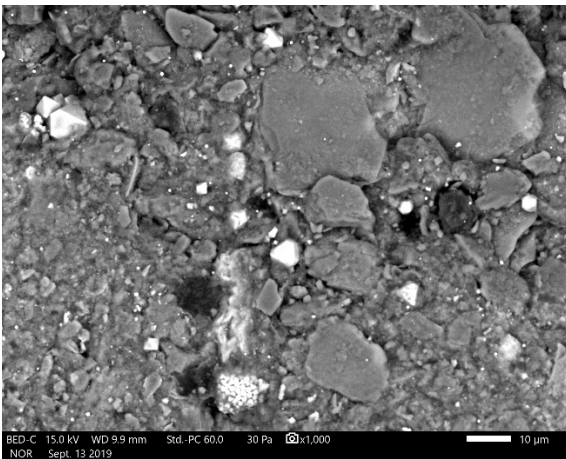
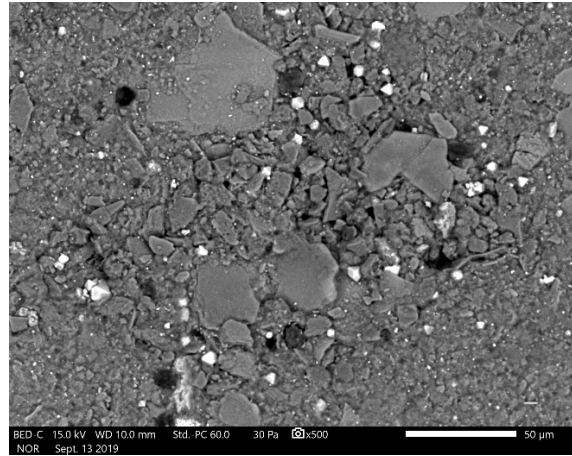
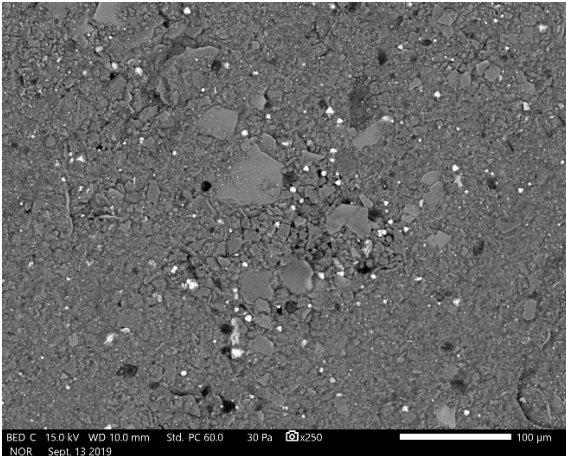
via Email: BSass@geosyntec.com



Lignite. Backscattered electron micrographs show the sample at 100X, 1,100X, and 1,500X. EDS spectrum at bottom is an area scan of the region shown in top right micrograph. Bright particles are mostly quartz and feldspar. Major peaks for carbon, oxygen, silicon, and aluminum suggest coal and clay.



Sample VAP B3 40-45. Backscattered electron micrographs show the sample at 100X, 250X, 500X, and 3000X. EDS spectrum at bottom is an area scan of the region shown at 500X. Bright particles are pyrite (framboid in bottom right micrograph). Major peaks for carbon, oxygen, silicon, and aluminum suggest coal and clay.



Sample VAP B3 50-55. Backscattered electron micrographs show the sample at 250X, 500X, 1000X, and 3000X. EDS spectrum at bottom is an area scan of the region shown at 3000X. Bright particles are mostly pyrite (framboid in bottom left micrograph); occasional particles of Fe-Ti oxide are detected. Major peaks for oxygen, silicon, and aluminum suggest clay. Large blocky particles are mostly quartz, feldspar, and clay.

ATTACHMENT E
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 West Bottom Ash Pond 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



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Texas Registered Engineering Firm
No. F-1182

79864
License Number

Texas
Licensing State

April 5, 2023
Date

**ALTERNATIVE SOURCE
DEMONSTRATION REPORT
TEXAS STATE CCR RULE**

**H.W. Pirkey Power Plant West Bottom Ash Pond
Registration No. CCR104
Hallsville, Texas**

Prepared for

American Electric Power
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Prepared by

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Project CHA8495B

January 2024

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LIST OF ACRONYMS

Å	angstrom
amsl	above mean sea level
ASD	alternative source demonstration
bgs	below ground surface
CCR	coal combustion residuals
EBAP	East Bottom Ash Pond
EDS	energy-dispersive spectroscopy
EPRI	Electric Power Research Institute
GSC	Groundwater Stats Consulting, LLC
GWPS	groundwater protection standard
LCL	lower confidence limit
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligram per liter
SEM	scanning electron microscopy
SPLP	Synthetic Precipitation Leaching Procedure
SSL	statistically significant level
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
UTL	upper tolerance limit
USEPA	United States Environmental Protection Agency
VAP	vertical aquifer profiling
WBAP	West Bottom Ash Pond
XRD	X-ray diffraction

1. INTRODUCTION AND SUMMARY

This Alternative Source Demonstration (ASD) report has been prepared to address a statistically significant level (SSL) for cobalt in the groundwater monitoring network at the H.W. Pirkey Plant West Bottom Ash Pond (WBAP), located 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 WBAP (**Figure 1**).

In June 2023, a semiannual assessment monitoring event was conducted at the WBAP in accordance with 30 TAC §352.951(a). The monitoring data were submitted to Groundwater Stats Consulting, LLC (GSC) for statistical analysis.

Confidence intervals were re-calculated for Appendix IV parameters at the compliance wells to assess whether these parameters were present at an SSL above the GWPSs. An SSL was concluded if the lower confidence limit (LCL) of a parameter exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). An SSL was identified for cobalt at AD-28 at the WBAP, where the LCL of 0.0133 milligrams per liter (mg/L) exceeded the calculated GWPS of 0.00900 mg/L (Geosyntec, 2023a). 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 SSL identified for cobalt at AD-28 is from a source other than the WBAP.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which the identified SSLs 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 SSL identified for cobalt at AD-28 was based on a Type IV cause and not by a release from the Pirkey WBAP.

2. SUMMARY OF SITE CONDITIONS

The WBAP design and construction, regional geology and site hydrogeology, and groundwater monitoring system and flow conditions are described below.

2.1 WBAP Design and Construction

The WBAP is a 30.9-acre CCR surface impoundment located at the north end of the Pirkey Plant, immediately west of the East Bottom Ash Pond (EBAP) (**Figure 1**). It was constructed while the Pirkey Plant was being developed in 1983 and 1984 and placed into operation in 1985 to receive bottom ash and economizer ash sluiced from the Plant boiler (Arcadis 2016). The WBAP ceased receipt of CCR and non-CCR waste streams on March 30, 2022 (AEP 2022). At that time, the WBAP commenced closure by removal in accordance with the certified closure plan, with CCR material removal occurring from April to June of 2022. The final inspection for CCR material removal was completed on July 26, 2022. On May 5, 2023, the WBAP was certified closed by removal in accordance with 30 TAC §352.1221 and the most recent Written Closure Plan, and notification was placed in the Operating Record (AEP 2023a).

The WBAP was constructed with compacted clay embankments around the pond perimeter and a compacted clay liner over the pond base (Arcadis 2016). Multiple lithological borings advanced following installation of the clay liner confirmed that at least 6 feet of clay was present below the base of the EBAP (Arcadis 2016). The bottom elevation of the WBAP was approximately 347 feet above mean sea level (amsl), and the elevation of the top of the pond embankment was approximately 357 feet prior to pond closure. amsl

2.2 Regional Geology / Site Hydrogeology

The WBAP is positioned on an outcrop of the Eocene-age 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.

2.3 Groundwater Monitoring History and Flow Conditions

The WBAP monitoring well network monitors groundwater within the Uppermost Aquifer, which was defined by Arcadis (2016) as very fine to fine grained clayey and silty sand with an average thickness of approximately 15 feet. Geologic cross-section A-A' from the Arcadis (2016), provided as **Attachment A**, shows the subsurface structure of the uppermost aquifer (indicated on the figure as clayey silty sand, tan to gray) underlying the WBAP and the EBAP. Geologic cross-section A-A' demonstrates lateral continuity of the uppermost aquifer spanning the entire length of the WBAP.

Groundwater flow direction in the area of the WBAP is west-southwesterly (**Figure 1**). Seasonal variability in groundwater flow has not been observed since the monitoring well network was installed. Groundwater flow through the Uppermost Aquifer contains a hydraulic gradient of approximately 0.01 feet per foot. The WBAP monitoring well network consists of upgradient monitoring wells AD-3, AD-12, and AD-18, and compliance wells AD-17, AD-28, and AD-30, all of which are screened within the Uppermost Aquifer at depths ranging from 10 to 57 feet below

ground surface (bgs) (301 to 348 ft amsl). Groundwater elevations at the unit have ranged from approximately 320 to 375 ft amsl (approximately 10 to 35 feet bgs depending on well location).

3. ALTERNATIVE SOURCE DEMONSTRATION

The ASD evaluation method and proposed alternative source of cobalt in AD-28 and the 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 cobalt due to Type I (sampling), Type II (laboratory), Type III (statistical evaluation), or Type V (anthropologic) 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 have been attributed to natural variation associated with the underlying geology, which is a Type IV (natural variation) issue.

Monitoring well AD-28 is located near the southwest corner of the WBAP, as shown in **Figure 1**. Previous ASDs for cobalt at the WBAP provided evidence that cobalt is present in the aquifer media at the site and that the observed cobalt concentrations in groundwater were due to natural variation (Geosyntec 2019a, Geosyntec 2019b, Geosyntec 2020b, Geosyntec 2020c, Geosyntec 2021b, Geosyntec 2022b, Geosyntec 2023b). The previous ASDs discussed how the WBAP did not appear to be a source for cobalt in downgradient groundwater, based on observed concentrations of cobalt both in the ash material and in leachate from Synthetic Precipitation Leaching Procedure (SPLP) analysis (SW-864 Test Method 1312, [USEPA 1994]) of the ash material. Cobalt was not detected in the SPLP leachate above the reporting limit of 0.01 mg/L, which is lower than the average concentration at AD-28 (**Table 1**).

Cobalt was detected at a concentration of 0.000501 mg/L in a surface water sample previously collected from the WBAP on November 4, 2020. Cobalt was detected in a surface water sample collected on June 24, 2022 from the EBAP at a concentration of 0.00128 mg/L (**Table 1**). The WBAP and EBAP have both been closed by removal since the samples were collected (AEP 2023a, AEP 2023b). The EBAP and WBAP historically received the same process water, with the use of each pond dependent on available freeboard and cleaning schedule; thus, there is a basis for the equivalency between these two surface water samples. These concentrations are lower than the reported cobalt concentrations for downgradient network wells from the most recent sampling event (**Figure 2**). Additionally, both pond surface water samples were over an order of magnitude lower than the average concentration observed at AD-28 (**Table 1**). Thus, the WBAP is not the likely source of cobalt at AD-28.

As noted in the previous ASDs, soil samples collected across the site, including from locations near the WBAP, identified cobalt in the aquifer solids at concentrations ranging from non-detect to 23.5 milligrams per kilogram (mg/kg) with the highest value reported at AD-41, which is upgradient of the WBAP and EBAP (**Figure 3**). SB-28 was advanced in the vicinity of AD-28 in April 2020 to re-log the geology at AD-28 and collect samples for laboratory analysis of total metals and mineralogy. The SB-28 field boring log, which was generated by Auckland Consulting

LLC, is provided as **Attachment B**. Cobalt was identified at SB-28 at concentrations of 4.53 mg/kg at 15.5-16 feet bgs and 8.70 mg/kg at 40-41 feet bgs (**Table 2**). The 15.5-16 feet bgs interval at SB-28 correlates to the depth of the monitoring well screen of AD-28 (15-35 feet bgs), indicating that cobalt is present in aquifer solids within the AD-28 screened interval.

In addition to total cobalt, soil samples were submitted for mineralogical analysis to evaluate the presence of cobalt-containing minerals. X-ray diffraction (XRD) analysis of soils from SB-28 identified pyrite (an iron sulfide mineral) in samples collected at 25-30 feet bgs and 40-41 feet bgs at concentrations up to 3% by weight (**Table 3**). Cobalt is known to undergo isomorphic substitution for iron in crystalline iron minerals such as pyrite due to their similar ionic radii of approximately 1.56 angstrom (Å) for iron vs. 1.52 Å for cobalt (Clementi and Raimondi 1963, Krupka and Serne 2002, Hitzman et al. 2017).

The aquifer solids at SB-28 are distinctly red in color at shallow depths, as illustrated in the photolog of soil cores provided in **Attachment C**. Red color in soils is often associated with the presence of oxidized iron-bearing minerals such as hematite and goethite. Goethite, an iron oxide mineral (FeOOH), was present at depths up to 16 ft bgs at SB-28 at up to 37% of the total aquifer solids (**Table 3**). The weathering of pyrite to goethite under oxidizing conditions is also a well-understood phenomenon, including in formations in east Texas (Senkayi et al. 1986, Dixon et al. 1982). It is likely that the pyrite weathering process is resulting in the release of isomorphically substituted cobalt from the pyrite crystal structure as it undergoes oxidative weathering to iron oxide minerals.

As described in an ASD previously generated for the WBAP, vertical aquifer profiling (VAP) was used to collect groundwater samples from upgradient locations B-2 and B-3 during the soil boring and sample collection process (Geosyntec 2019b). A groundwater sample was also collected from AD-30, one of the existing compliance wells within the WBAP groundwater monitoring network. Solid phase materials within these groundwater samples were separated and submitted for analysis of chemical composition and mineralogy. For the VAP samples, separation was completed using a centrifuge due to the high abundance of solids. For the groundwater sample at AD-30, the sample was filtered using a 1.5-micron filter. Based on total metals analysis, cobalt was identified both in the centrifuged solid material collected from upgradient VAP location B-3 [VAP-B3-(40-45)] and in the material retained on the filter after processing groundwater from permanent monitoring wells AD-30, B-2, and B-3 (**Table 2**). The concentrations of cobalt in the solid material retained after filtration were comparable to the bulk soil samples collected from the same locations.

The solid sample [VAP-B3-(40-45)] was submitted for mineralogical analysis via XRD and scanning electron microscopy (SEM) using an energy dispersive spectroscopic analyzer (EDS). The XRD results identified pyrite as approximately 3% of the solid phase (**Table 4**). Pyrite was identified during SEM/EDS analysis of lignite which is mined immediately adjacent to the site. Logging completed while the VAP boring was advanced identified coal at several intervals, including 45 and 48 ft bgs (**Figure 4**). Furthermore, SEM/EDS of both centrifuged solid samples [VAP-B3-(40-45) and VAP-B3-(50-55)] identified pyrite in backscattered electron micrographs

by the distinctive framboidal morphology (Harris et al. 1981, Sawlowicz 2000). Major peaks involving iron and sulfur were identified in the EDS spectrum, which further support the identification of pyrite (**Attachment C**). While cobalt was not identified in the EDS spectrum, it is likely present at concentrations below the detection limit.

The WBAP was not identified as the source of cobalt at wells in the WBAP monitoring well network based on the low concentrations of cobalt in the pond itself and the ubiquity of naturally occurring cobalt in the aquifer formation, especially in soil and groundwater samples upgradient from the WBAP. Cobalt in the WBAP network groundwater is believed to be a result of natural variability within the aquifer. Naturally occurring cobalt is known to substitute for iron in pyrite, which is then known to weather to iron oxides. The presence of pyrite and iron oxides has been confirmed at AD-28 and across the Site. The presence of these aquifer minerals suggests that weathering of pyritic minerals may be providing a source for aqueous cobalt in groundwater.

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 SSL for cobalt identified at AD-28 during assessment monitoring in June 2023 was not due to a release from the WBAP. The identified SSL should instead be attributed to natural variation in the underlying geology, including the presence of pyrite and goethite in the solid aquifer material. Therefore, no further action is warranted, and the Pirkey WBAP will remain in the assessment monitoring program. Certification of this ASD by a qualified professional engineer is provided in **Attachment D**.

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TABLES

**Table 1: Summary of Key Cobalt Analytical Data
West Bottom Ash Pond - H.W. Pirkey Plant**

Geosyntec Consultants, Inc.

Sample	Sample Date	Unit	Cobalt Concentration
Bottom Ash (Solid Material)	2/11/2019	mg/kg	5.8
SPLP Leachate of Bottom Ash	2/11/2019	mg/L	<0.01
WBAP Pond Water	11/4/2020	mg/L	0.000501
EBAP Pond Water	6/24/2022	mg/L	0.00128
AD-28 - Average	May 2016 - June 2023	mg/L	0.0142

Notes:

mg/kg - milligram per kilogram

mg/L - milligram per liter

AD-28 - Average value was calculated using all cobalt data collected under 40 CFR 257 Subpart D.

Table 2: Soil Cobalt Data
West Bottom Ash Pond - H.W. Pirkey Plant

Location ID	Location	Sample Depth (ft bgs)	Cobalt (mg/kg)
Bulk Soil Samples			
AD-28	WBAP Network	6-6.5	< 2.38
		15.5-16	4.53
		25-30	< 2.50
		40-41	8.70
AD-30	WBAP Network	7	1.00
		23	15.0
B-2	Upgradient	10	2.36
		16	3.62
		71	10.30
		82	7.21
		87	3.11
B-3	Upgradient	10	1.30
		20	0.59
		97	1.11
AD-41	Upgradient	15	<1.0
		35	23.5
		95	1.90
Solid Material Retained After Filtration			
AD-30	WBAP Network	15-25	9.3 J
B-2	Upgradient	38-48	4.3 J
B-3	Upgradient	29-34	12.0
		VAP 40-45	18.0

Notes:

1. For AD-28 and AD-30, samples were collected from additional boreholes advanced in the immediate area of the location identified by the well ID. Samples were not collected from the cuttings of the borings advanced for well installation.
2. Samples at B-2, B-3, and AD-41 were collected from cores removed from the borehole during well lithology logging.
3. Depths for samples collected after filtration represent the screened interval for the permanent well where the sample was collected.

WBAP: West Bottom Ash Pond
mg/kg: milligram per kilogram
ft bgs: feet below ground surface
J: estimated value

Table 3: AD-28 Mineralogy Results
West Bottom Ash Pond - H. W. Pirkey Plant

Boring ID	SB-28 (AD-28)			
Sample Depth Interval	6-6.5	15.5-16	25-30	40-41
Sample Location	Above Screened Interval	Within Screened Interval		Below Screened Interval
Color	Red-brown to yellow-brown	Light gray, light red-brown	Brown, light red-brown	Gray to dark gray
Mineralogy				
Quartz	58%	46%	73%	34%
Pyrite	--	--	3%	3%
K-Feldspar	--	1%	1%	1%
Siderite	--	--	2%	52%
Goethite	37%	15%	--	--
Anhydrite	--	--	--	2%
Clay/Mica	5%	38%	21%	8%

Notes:

1. Sample depths are shown in feet below ground surface (bgs)
2. Well AD-28 is screened from 15-35 ft. below ground surface.
3. Mineralogical component results are shown in relative % abundance.

Table 4: B-3 X-Ray Diffraction Results
West Bottom Ash Pond - H. W. Pirkey Plant

Geosyntec Consultants, Inc.

Constituent	VAP-B3-(40-45)
Quartz	15
Plagioclase Feldspar	0.5
Orthoclase	ND
Calcite	ND
Dolomite	ND
Siderite	0.5
Goethite	ND
Hematite	2
Pyrite	3
Kaolinite	42
Chlorite	4
Illite/Mica	6
Smectite	12
Amorphous	15

Notes:

1. Results given in units of relative % abundance VAP-B3-(40-45) is the centrifuged solid material from the groundwater sample collected at that interval.

ND: Not detected

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

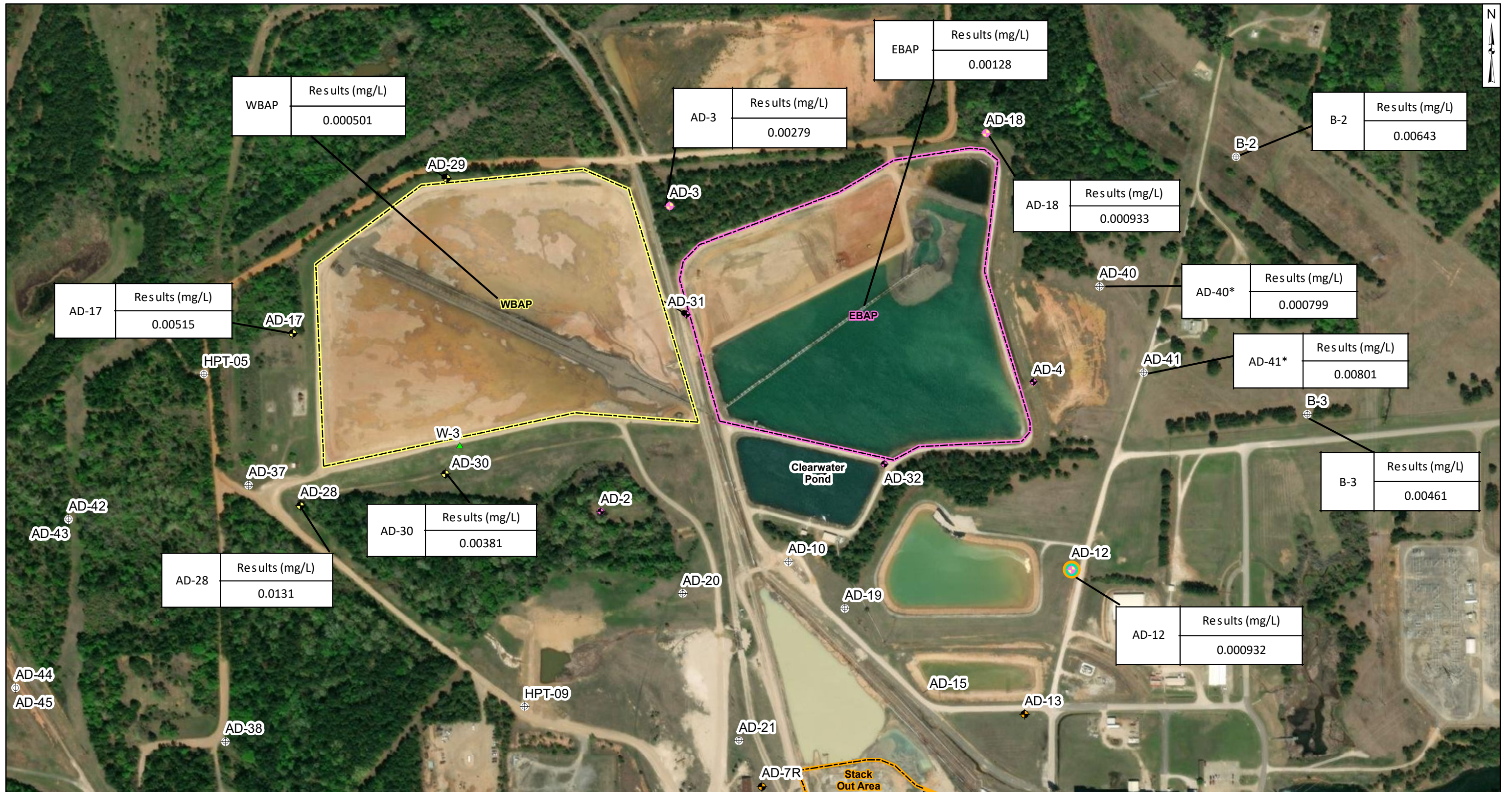
Geosyntec Consultants, Inc.
Texas Firm
Registration No. 1182

**Potentiometric Contours: Uppermost Aquifer
June 2023**

AEP Pirkey Power Plant
Hallsville, Texas

Figure
1

Columbus, Ohio	2023/10/06
----------------	------------

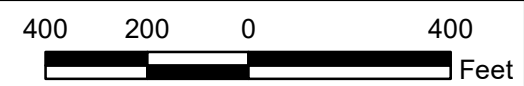


Legend

- ⊕ Out of Network
- ◆ Stackout Area
- ◆ EBAP
- ◆ WBAP
- ◆ Landfill
- ◆ EBAP and WBAP
- ⊕ All CCR Unit Networks
- ▲ Piezometer
- ▭ EBAP
- ▭ Stack Out Area
- ▭ WBAP

Notes

- Monitoring well coordinates, site features, and data provided by AEP.
- AD-15 location is approximated.
- Samples collected in June 2023.
- * - Well most recently sampled August 2019.
- AD-29 included in the well network for water level measurements only.
- WBAP surface water results shown for November 2020 sample. EBAP surface water results shown for June 2022 sample.



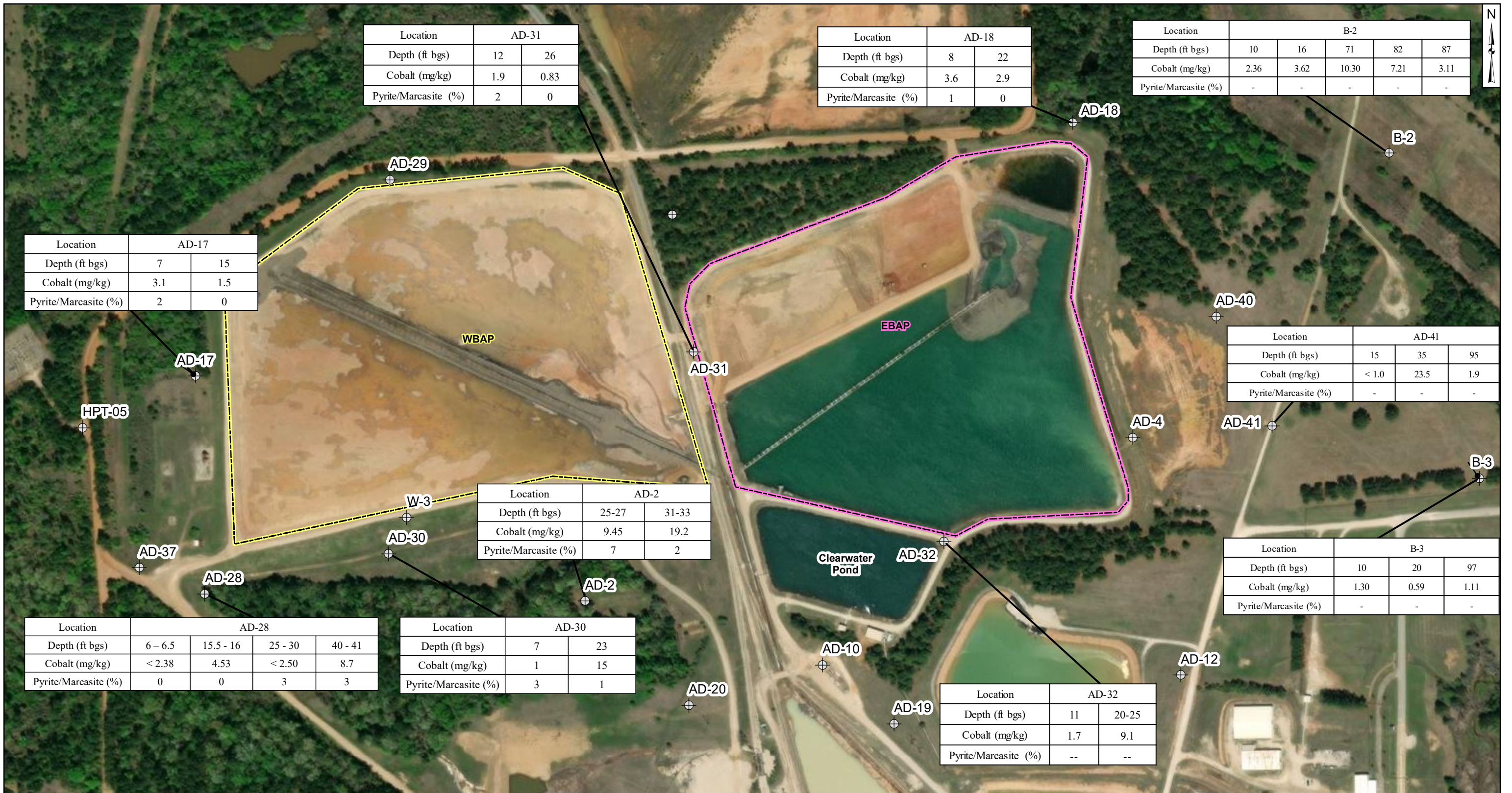
Aqueous Cobalt Distribution

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Figure
2

Columbus, Ohio 2024/01/16



Location	AD-31	
Depth (ft bgs)	12	26
Cobalt (mg/kg)	1.9	0.83
Pyrite/Marcasite (%)	2	0

Location	AD-18	
Depth (ft bgs)	8	22
Cobalt (mg/kg)	3.6	2.9
Pyrite/Marcasite (%)	1	0

Location	B-2				
Depth (ft bgs)	10	16	71	82	87
Cobalt (mg/kg)	2.36	3.62	10.30	7.21	3.11
Pyrite/Marcasite (%)	-	-	-	-	-

Location	AD-17	
Depth (ft bgs)	7	15
Cobalt (mg/kg)	3.1	1.5
Pyrite/Marcasite (%)	2	0

Location	AD-41		
Depth (ft bgs)	15	35	95
Cobalt (mg/kg)	< 1.0	23.5	1.9
Pyrite/Marcasite (%)	-	-	-

Location	AD-2	
Depth (ft bgs)	25-27	31-33
Cobalt (mg/kg)	9.45	19.2
Pyrite/Marcasite (%)	7	2

Location	B-3		
Depth (ft bgs)	10	20	97
Cobalt (mg/kg)	1.30	0.59	1.11
Pyrite/Marcasite (%)	-	-	-

Location	AD-28			
Depth (ft bgs)	6 - 6.5	15.5 - 16	25 - 30	40 - 41
Cobalt (mg/kg)	< 2.38	4.53	< 2.50	8.7
Pyrite/Marcasite (%)	0	0	3	3

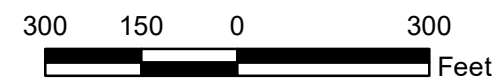
Location	AD-30	
Depth (ft bgs)	7	23
Cobalt (mg/kg)	1	15
Pyrite/Marcasite (%)	3	1

Location	AD-32	
Depth (ft bgs)	11	20-25
Cobalt (mg/kg)	1.7	9.1
Pyrite/Marcasite (%)	--	--

- Legend**
- Monitoring Wells
 - EBAP
 - WBAP

Notes

- Monitoring well coordinates provided by AEP.
- AD-2 and AD-28 samples collected on April 20, 2020
- All other data provided by AEP, 2019.
- ft bgs: feet below ground surface.
- mg/kg: milligrams per kilogram.
- -- not analyzed.



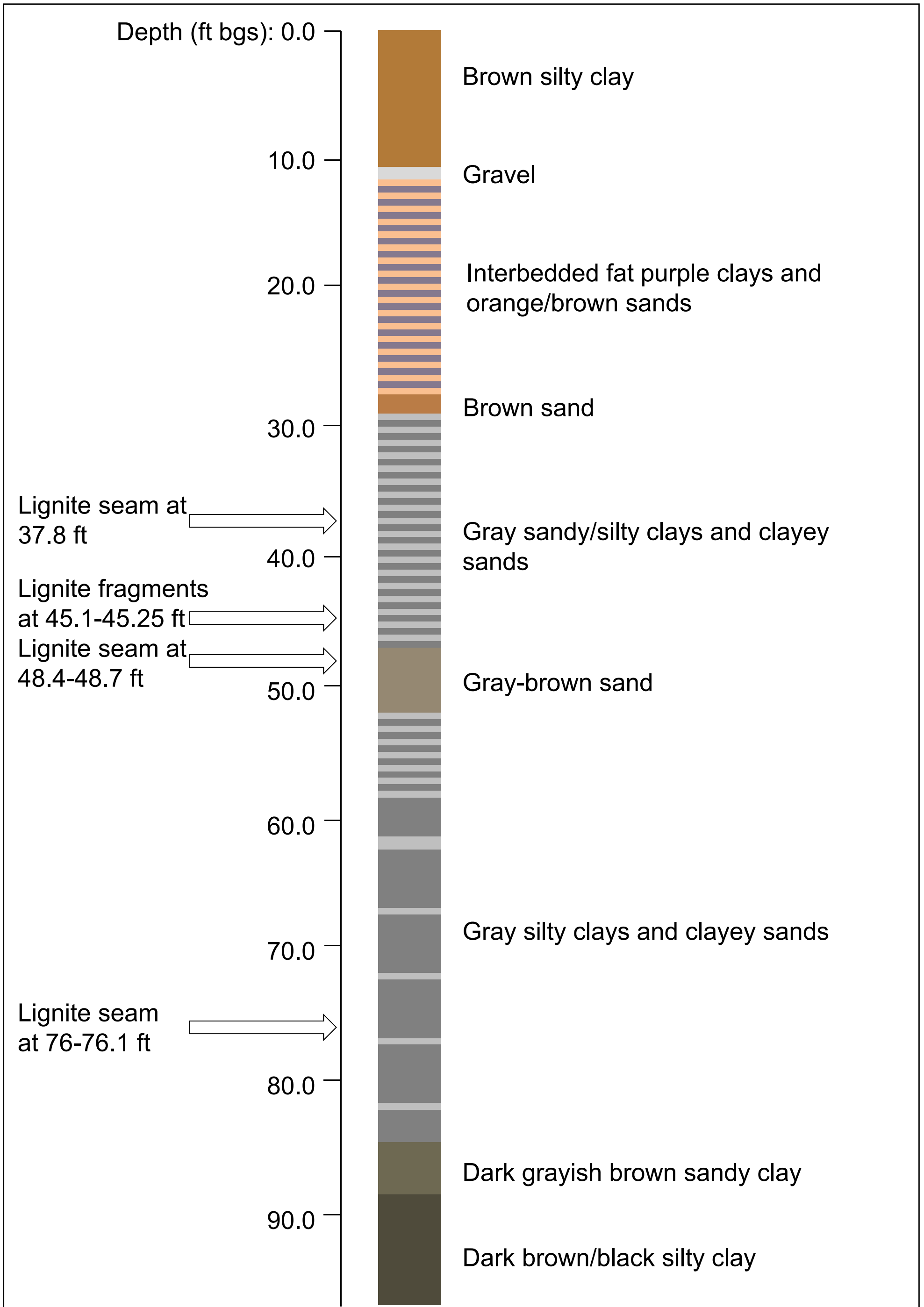
Cobalt Distribution in Soil

AEP Pirkey Power Plant
Hallsville, Texas

Geosyntec
consultants

Columbus, Ohio 2024/01/16

Figure 3



Notes:

- Ft = feet
- Bgs = below ground surface
- Boring completed May 2019
- Total depth of 97.5 ft bgs
- Well installed in offset boring screened at 29-34 ft bgs

B-3 Visual Boring Log

AEP Pirkey Powerplant
Hallsville, TX

Geosyntec
consultants

Figure

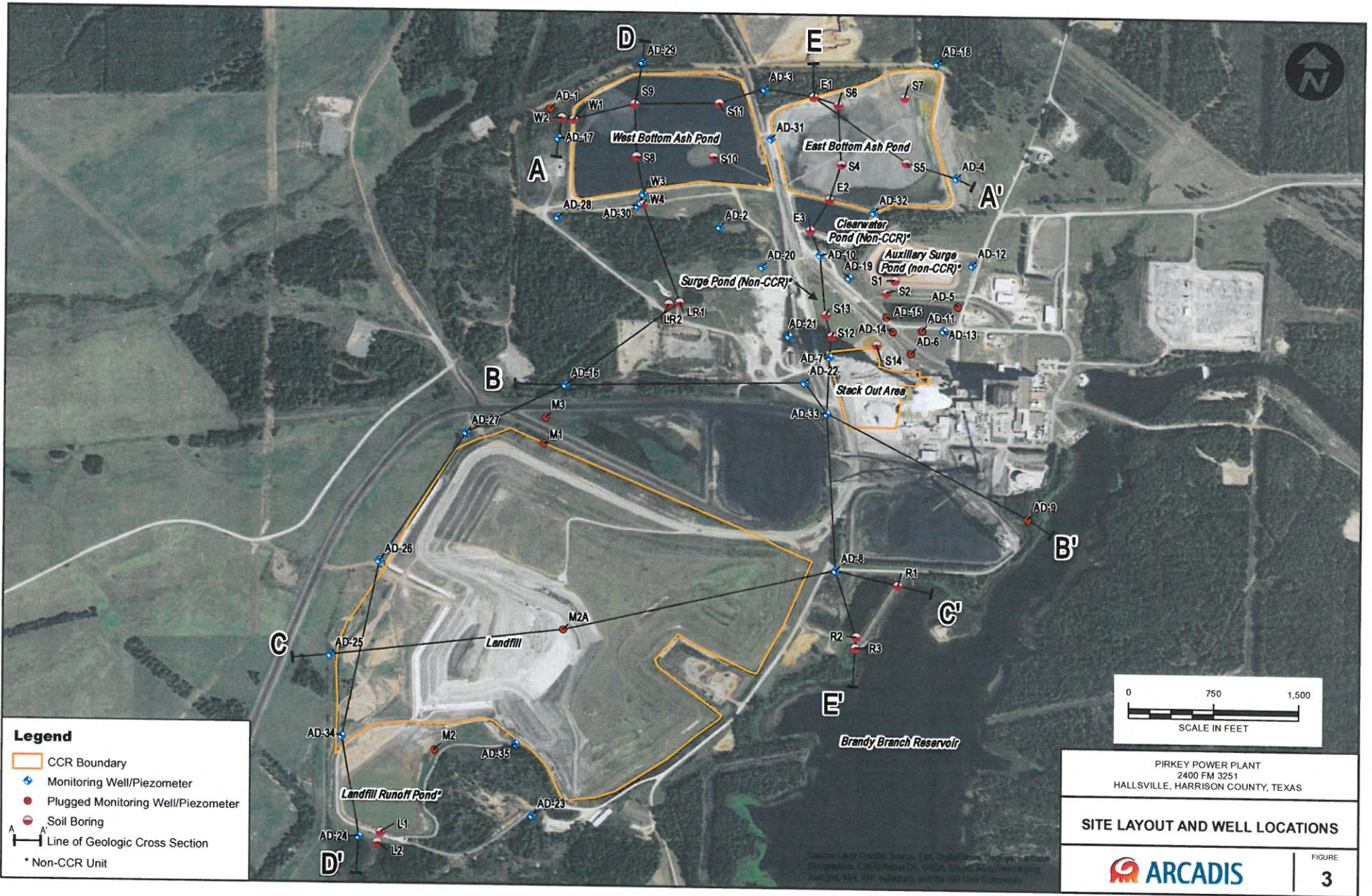
4

CHA8462

March 2020

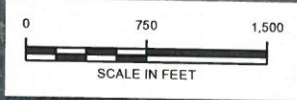
ATTACHMENT A

Geologic Cross Section A-A'



Legend

- CCR Boundary
- ◆ Monitoring Well/Piezometer
- Plugged Monitoring Well/Piezometer
- Soil Boring
- Line of Geologic Cross Section
- * Non-CCR Unit

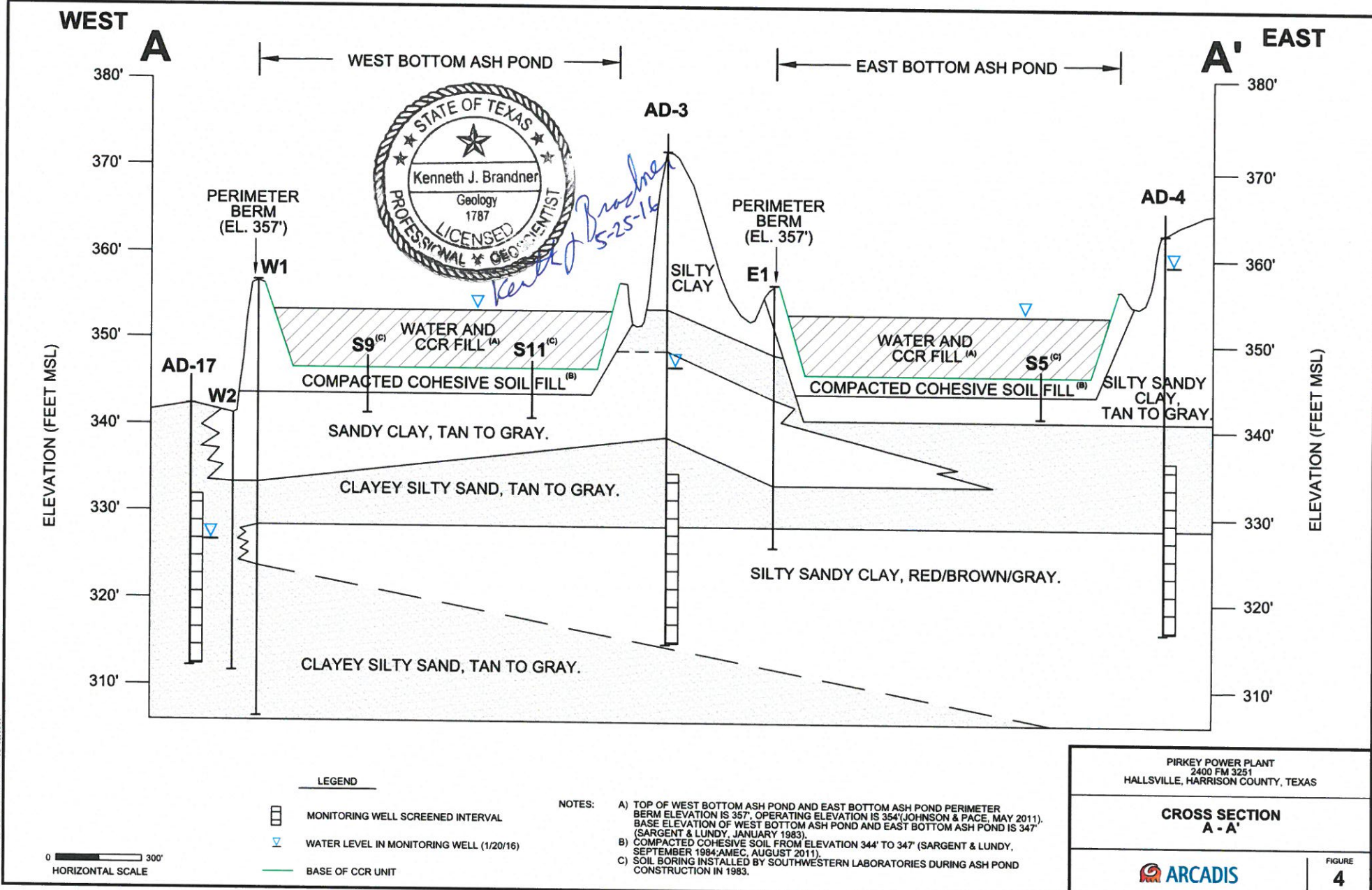


PIRKEY POWER PLANT
2400 FM 3251
HALLSVILLE, HARRISON COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

FIGURE
3

CITY: DFW GROUP; DR: LD; AM: PD; TM: TR: LYRCONM-SOFT-REF-
 PIRKEY Power Plant Phase 4
 PLOTTED: 2/22/2018 11:17 AM BY: LEASE, DANNA
 LAYOUT: MODEL: DATED: 2/19/2018 2:18 PM: ACADVER: 19.16 (LMS TECH) PAGESETUP: - PLOTSTYLETABLE: PAGESETUP: - PLOTSTYLETABLE:



ATTACHMENT B

SB-28 Boring Log

PROJECT NO. _____ PROJ. _____ BOR. NO. SB-28
 LOCATION AD-28/MW-28 - Pirkey Power Plant ELEV. _____ DATE 4/20/20

SILTS & SANDS		COHESIVE SOILS - CLAYS			COLORS		MATERIALS		SAND ADJ.		CHARACTERISTICS	
CONDITION		CONSISTENCY		PENETROMETER	N - VALUE	Li ... Light ... Br ... Brown	Cl ... Clay, Clayey	F ... Fine	Calc ... Calcareous			
VLo ... Very Loose	0-4	Vso ... Very Soft	0 - 0.25	0 - 0.25	< 2	Dk ... Dark ... Bk ... Black	Si ... Silt, Silty	M ... Medium	Lig ... Lignite			
Lo ... Loose	4-10	So ... Soft	0.25 - 0.5	0.25 - 0.5	2 - 4	G ... Grey ... Bl ... Blue	Sa ... Sand, Sandy	Co ... Coarse	Org ... Organic			
MDe ... Med. Dense	10-30	Mst ... Stiff	0.5 - 1.0	0.5 - 1.0	4 - 8	T ... Tan ... Gr ... Green	Ls ... Limestone	Si ... Silty	Lam ... Laminate			
De ... Dense	30-50	St ... Stiff	1.0 - 2.0	1.0 - 2.0	8 - 15	R ... Red ... Y ... Yellow	Gr ... Gravel		Sl ... Slickensided			
VDe ... Very Dense	>50	VSt ... Very Stiff	2.0 - 4.0	2.0 - 4.0	15 - 30	Rd ... Reddish, Wh ... White	SiS ... Siltstone		SL ... Slightly			
		H ... Hard	> 4.0	> 4.0	> 30		SS ... Sandstone		Sm(s) ... Seam(s)			
							Sh ... Shale, Shaley		Nod ... Nodules			

SAMPLE INTERVAL TEST ASSIGNMENT	SAMPLE NO. Recovery	DEPTH FT.	SAMPLES	STRATUM DESCRIPTION						STANDARD PENETROMETER			UNIFIED SOIL CLASSIFICATION	N - VALUE OR HAND PENETROMETER
				CONDITION OR CONSISTENCY	COLOR	MINOR MATERIALS OR ADJECTIVES	PREDOMINANT MATERIAL	CHARACTERISTICS OR MODIFICATIONS	SEAT - 6"	1st - 6"	2nd - 6"			
SM	4'	0-2	Br Lt Br	Si	Sa	Silty sand, trace clay & roots, trace fine iron ore gravel,						moist (0-2)		
		2-10	Rd Br, Yllw Br	Si, Gr	Cl	Clay - some silt, trace 1/4" sand, trace coarse iron ore concretions						moist (2-5)		
CL	1.5'	5-10				- some v.f. sand, ironstone layer @ 6-6.5'						moist (5-10)		
		10-15	10'-16'	Rd Br, Lt Gr	Si Cl	Sa	clayey v.f. f Silty Sand with clay in thin lenses, trace cemented clayey sand					v. moist (10-15)		
SC-SM	1.5'	15-20		Lt. br & Lt. Rd Br			- clay lenses @ 15' (6") - ironstone layer @ 15.5' & cemented sand to 16'					v. moist (15-16)		
SM	3"	20-25	16-40	Br, Lt. Rd Br	Si	Sa	Silty Sand - some ironstone - gray @ 20'					Saturated @ 16' to 40'		
	3'	25-30		Gray			= some cemented clayey sand (only recovery) @ 25-30'							
	NR	30-35												
	NR	35-40												
							R.T. @ 40'							
							* Split Spoon Driven from 40-41'							
SC	1'	40-41	40-41	Gray, DK Gray	Cl	Sa	clayey sand w/ lenses of cemented sand @ 41.5-41.75' trace gypsum crystals @ 40-41'					v. moist 40-41'		
							* 6-6.5' collected @ 1140 * 15.5-16' collected @ 1215 * 25-30' collected @ 1230 * 40-41' collected @ 1300							

Type ASA Dry Auger Rotary Wash
 SEEPAGE @ 16 FT. WHILE DRILLING, W.L. @ _____ FT. ON COMPL. (OR) BAILED TO _____ FT. UPON COMPLETION.
 W.L. @ _____ FT AND CAVED TO _____ FT. ON _____.

* GPS: 32.46544°, -94.49432 (18' W-NW) of AD-28/MW-28

ATTACHMENT C

SB-28 Boring Photographic Log

GEOSYNTEC CONSULTANTS
Photographic Record



Client: American Electric Power

Project Number: CHA8495/12A/02

Site Name: H.W. Pirkey Plant WBAP

Site Location: Hallsville, Texas

Photograph 1

Date: 4/21/2020

Direction: N/A

Comments:
Multiple sections of core from soil boring SB-28 advanced near downgradient monitoring well AD-28 within the Western Bottom Ash Pond (WBAP) CCR unit. 5-foot pushes were used. Note the reddish color indicating the presence of oxidized iron-bearing minerals.



Photograph 2

Date: 4/21/2020

Direction: N/A

Comments:
0-5 foot interval of SB-28.

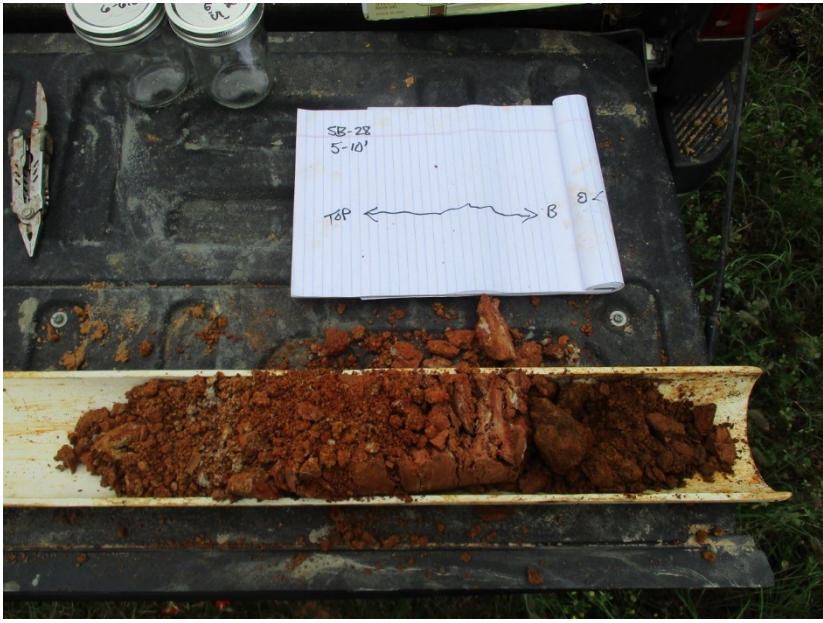


Photograph 3

Date: 4/21/2020

Direction: N/A

Comments:
5-10 foot interval of SB-28. Recovery of this interval was limited. A sample was collected from this interval from 6-6.5 ft. below ground surface (bgs).




Photograph 4

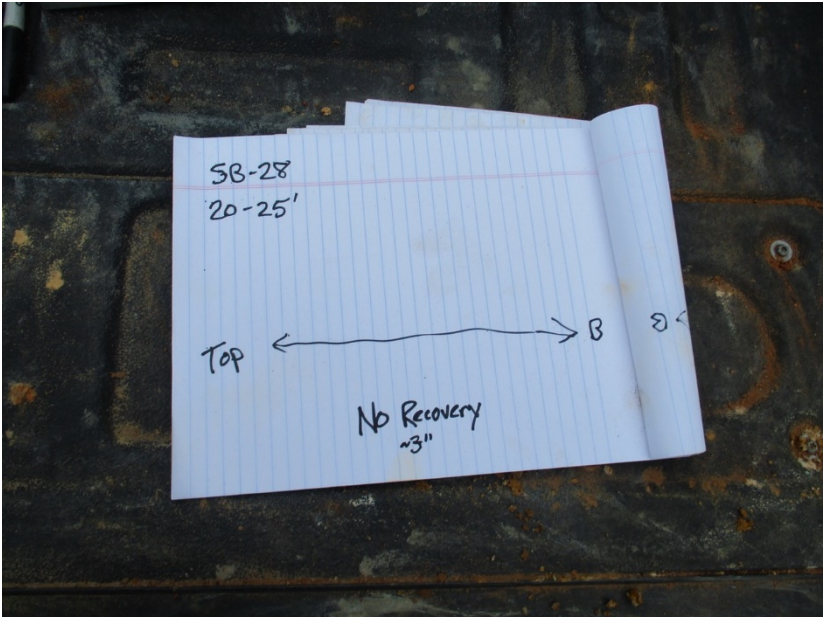
Date: 4/21/2020

Direction: N/A

Comments:
10-15 foot interval of SB-28. Recovery of this interval was limited.



Photograph 5	
Date: 4/21/2020	
Direction: N/A	
<p>Comments: 15-20 foot interval of SB-28. Recovery of this interval was limited. A sample was collected from this interval from 15.5-16 ft. bgs.</p>	

Photograph 6	
Date: 4/21/2020	
Direction: N/A	
<p>Comments: Field geologist's note indicating that very little of the 20-25 foot interval of SB-28 was recovered.</p>	

Photograph 7

Date: 4/21/2020

Direction: N/A

Comments:
25-30 foot interval of SB-28. Very little of this interval was recovered. Note the color change of the soil from red to dark brown/black. A sample was collected from this interval.



Photograph 8

Date: 4/21/2020

Direction: N/A

Comments:
Bottom of SB-28. The boring log indicates no recovery of soil from the 30-40 foot interval. A sample was collected from this interval.



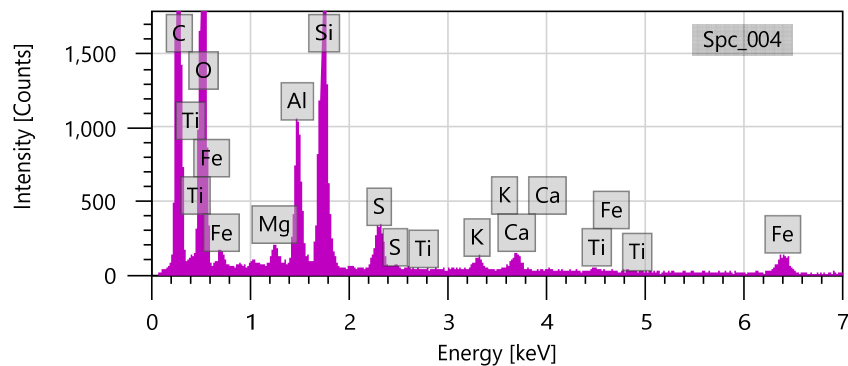
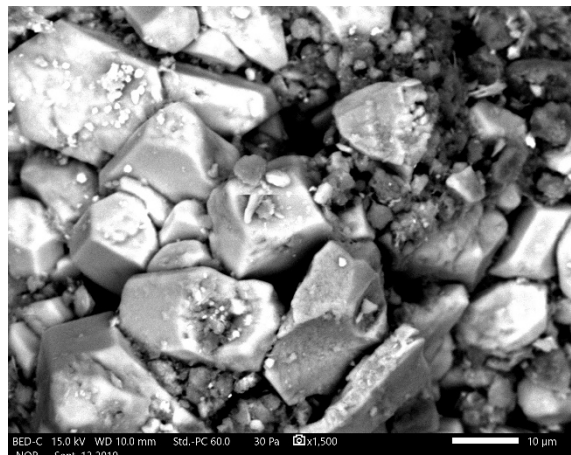
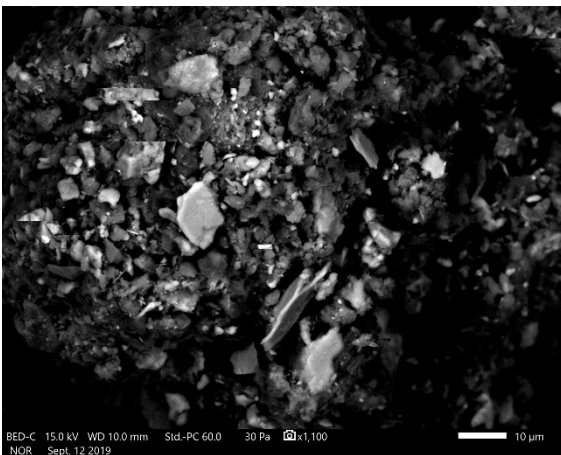
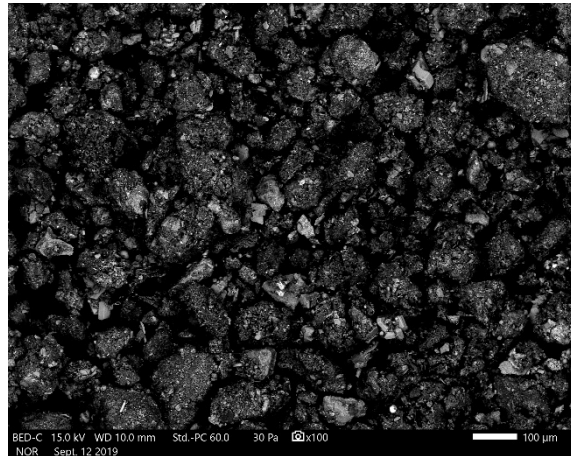
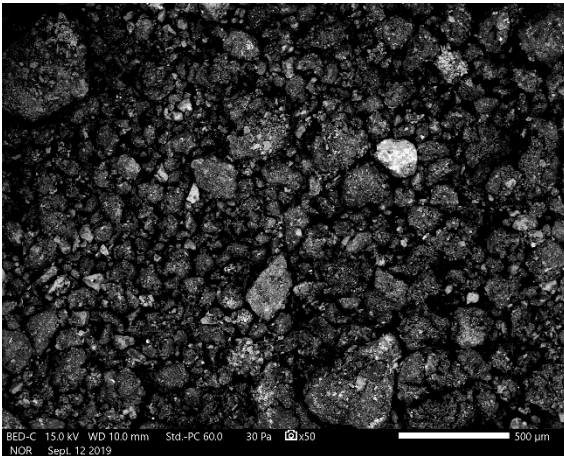
ATTACHMENT D

SEM/EDS Analysis

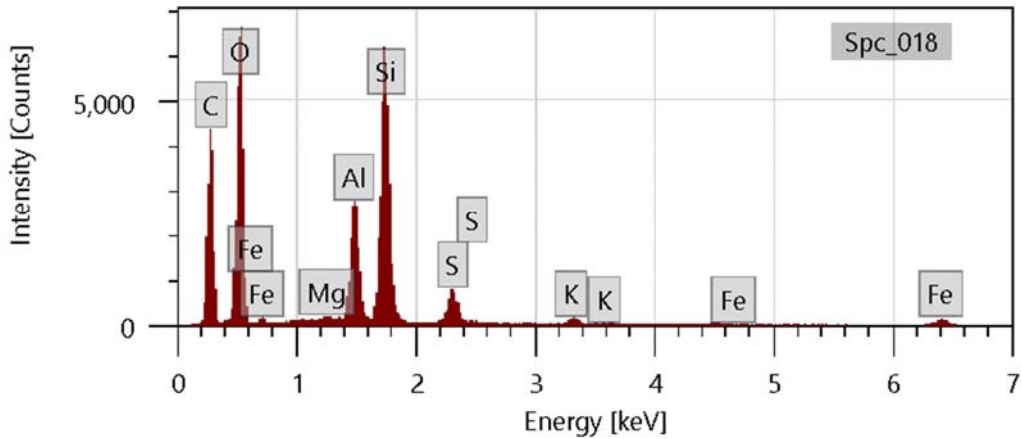
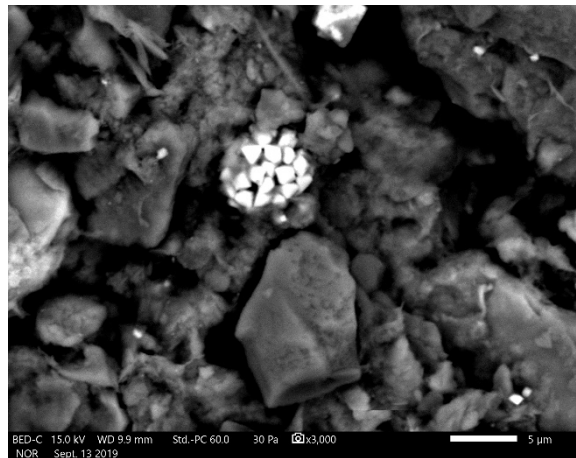
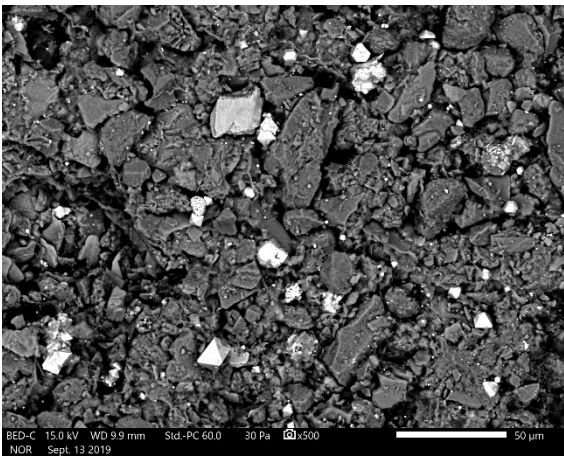
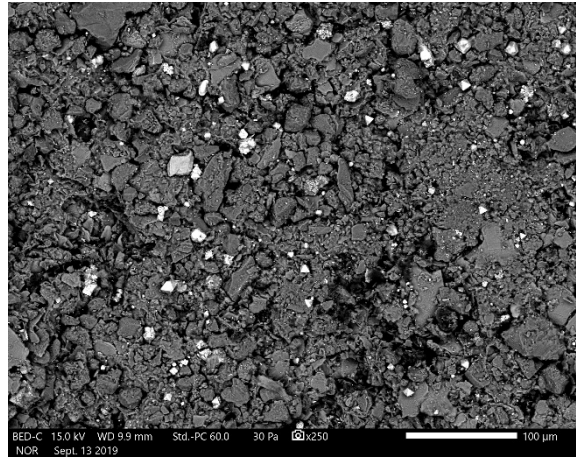
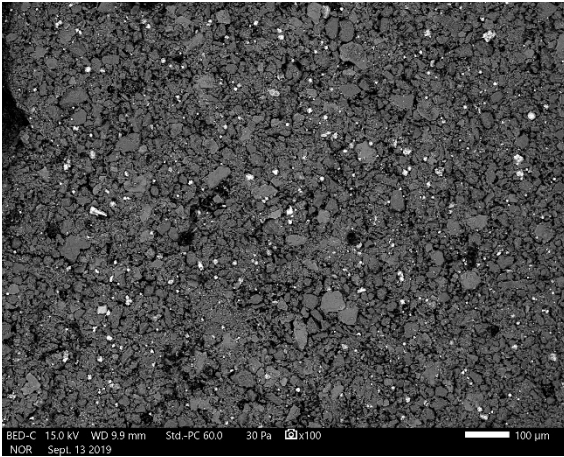
September 16, 2019

Dr. Bruce Sass
941 Chatham Lane, Suite 103, Columbus, OH 43221

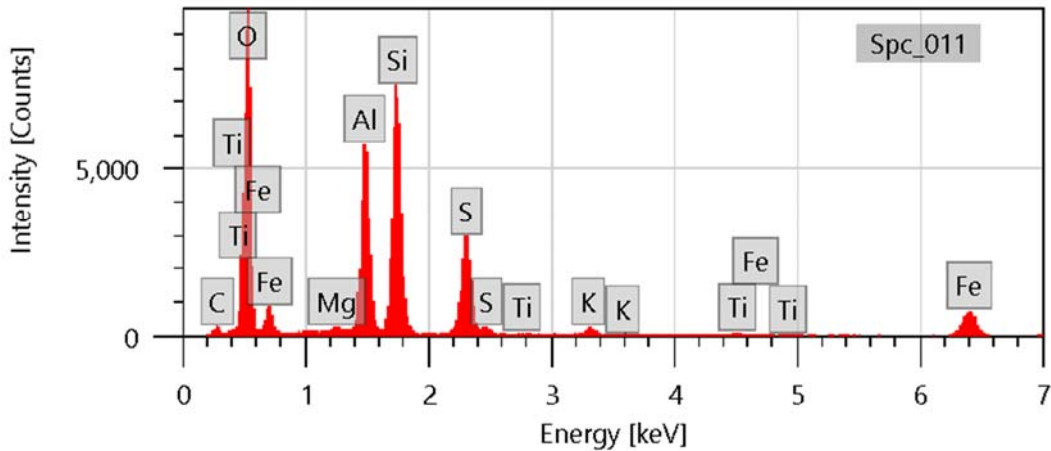
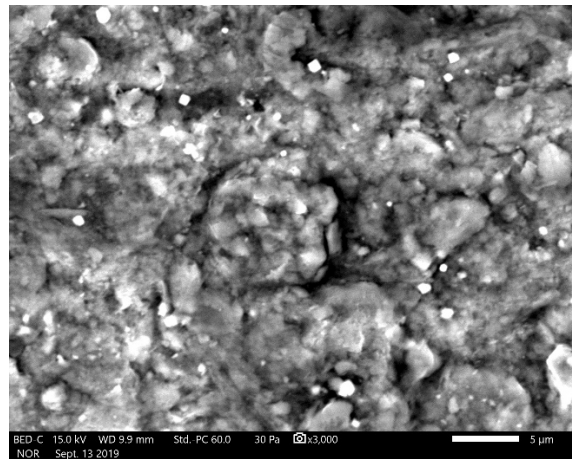
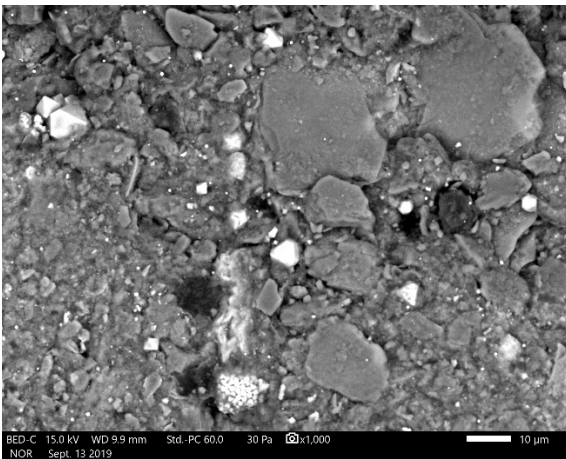
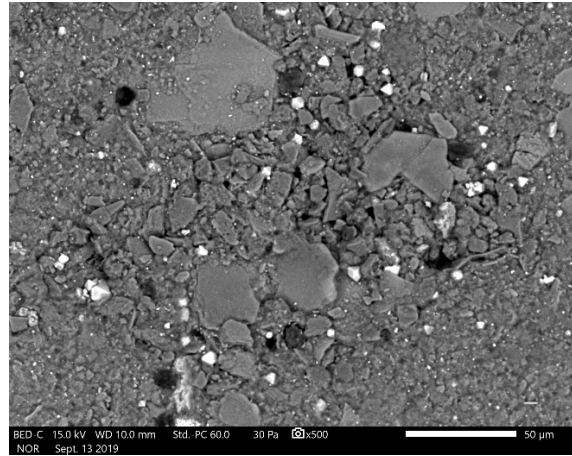
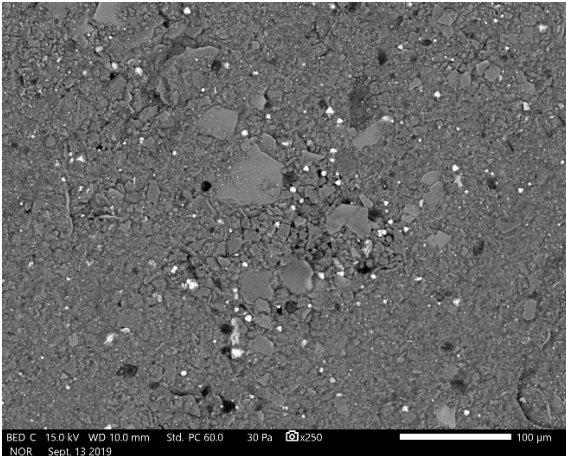
via Email: BSass@geosyntec.com



Lignite. Backscattered electron micrographs show the sample at 100X, 1,100X, and 1,500X. EDS spectrum at bottom is an area scan of the region shown in top right micrograph. Bright particles are mostly quartz and feldspar. Major peaks for carbon, oxygen, silicon, and aluminum suggest coal and clay.



Sample VAP B3 40-45. Backscattered electron micrographs show the sample at 100X, 250X, 500X, and 3000X. EDS spectrum at bottom is an area scan of the region shown at 500X. Bright particles are pyrite (framboid in bottom right micrograph). Major peaks for carbon, oxygen, silicon, and aluminum suggest coal and clay.



Sample VAP B3 50-55. Backscattered electron micrographs show the sample at 250X, 500X, 1000X, and 3000X. EDS spectrum at bottom is an area scan of the region shown at 3000X. Bright particles are mostly pyrite (framboid in bottom left micrograph); occasional particles of Fe-Ti oxide are detected. Major peaks for oxygen, silicon, and aluminum suggest clay. Large blocky particles are mostly quartz, feldspar, and clay.

ATTACHMENT E

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 West Bottom Ash Pond 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 29, 2024
Date

APPENDIX 4- Field Reports

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	APP PARKVIEW PD
Sample by	Kenny McDonald

Sample Location ID	A0-04
--------------------	-------

Depth to water, feet (TOC)	14.13
Measured Total Depth, feet (TOC)	47.29

Depth to water date	06/27/23
---------------------	----------

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)		
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
--------------------	-------

Depth to water, feet (TOC)	14.96
Measured Total Depth, feet (TOC)	41.98

Depth to water date	06/27/23
---------------------	----------

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)		
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	AED Pirkey
Sample by	BE3

Sample Location ID	AD-8
--------------------	------

Depth to water, feet (TOC)	12.56
Measured Total Depth, feet (TOC)	31.33

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)		
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	5.73	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 McDevitt

Sample Location ID	AD-7R
--------------------	-------

Depth to water, feet (TOC)	8.48
Measured Total Depth, feet (TOC)	33.03

Depth to water date	06/26/23
---------------------	----------

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)		
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 Pinsky
 BEB

Sample Location ID

AD-12

Depth to water, feet (TOC)
 Measured Total Depth, feet (TOC)

12.82
 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)		
0738	13.21	300	4.36	55	12.0	2.36	288	26.63		
0743	13.55	300	4.44	40	8.6	1.94	320	24.93		
0748	13.58	300	4.56	40	8.4	1.90	324	24.84		
0753	13.59	300	4.60	42	8.0	1.88	322	24.86		

Total volume purged
 Sample appearance
 Sample time
 Sample date

clear
 0755
 6/26/23

Facility Name	APP PIRNEY PD
Sample by	KERRY Mc DONALD

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 Mick Hamill

Depth to water, feet (TOC)	20.96
Measured Total Depth, feet (TOC)	33.05

Sample Location ID	AD-17
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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)
1130	21.11	200	4.06	181	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	ALP PIRNEY PP
Sample by	Kenny McDonald

Sample Location ID	A0-18
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Depth to water, feet (TOC)	5.46
Measured Total Depth, feet (TOC)	28.42

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)		
1138	6.24	108	4.52	50	21.9	2.27	264	25.13		
1143	7.09	108	4.40	51	18.6	1.93	284	25.16		

Total volume purged	
Sample appearance	Clear
Sample time	0742
Sample date	06/27/23

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 (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ 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. Riley
Plant Hamilton

Depth to water, feet (TOC) _____
 Measured Total Depth, feet (TOC) 25.97
38.20

Sample Location ID 41-23

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)
944	30.25	220	4.63	314	8.3	7.15	262	25.01
949	30.27	220	4.54	131	14.9	3.05	267	26.65
954	30.28	220	4.53	106	7.2	2.51	274	26.60
959	30.28	220	4.48	97	6.5	2.25	275	25.86
1004	30.28	220	4.47	92	6.3	2.18	277	25.72

Total volume purged _____
 Sample appearance clear
 Sample time 1006
 Sample date 6-27-23

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 (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)
8:55	8.77	120	4.42	875				
9:00	8.85	120	4.59	875	37.2	2.24	275	29.35
9:05	8.93	120	4.73	975	37.1	1.63	226	27.45
9:10	9.00	120	4.78	1,060	37.5	1.45	193	27.05
				1,024	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 Piracy
Sample by	BSB

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	0748
Sample date	6/27/23

Facility Name	
Sample by	Pirley MNT / Hamilton
Depth to water, feet (TOC)	19.95
Measured Total Depth, feet (TOC)	40.07

Sample Location ID	AD-27
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)		
8:08	20.28	300	4.25	266	113	2.41	262	27.60		
8:13	20.32	300	4.27	236	27.5	2.48	275	28.82		
8:18	20.34	300	4.26	235	12.2	2.22	280	25.31		
8:23	20.35	300	4.25	234	7.6	2.14	283	25.04		
8:28	20.36	300	4.24	233	7.4	2.11	283	24.91		

Total volume purged	
Sample appearance	Clear
Sample time	8:30
Sample date	6-27-23

Facility Name AEP D. W. Key
 Sample by BOS

Depth to water, feet (TOC) 13.95
 Measured Total Depth, feet (TOC) 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	19.28	220	4.43	119	7.3	10.69	337	26.51
11:03	19.44	220	4.32	42	5.1	2.53	345	24.61
11:08	19.56	220	4.25	111	3.7	3.45	350	24.55
11:23	19.52	220	4.23	111	3.6	3.20	355	24.53

Total volume purged
 Sample appearance clear
 Sample time 11:26
 Sample date 6/26/23

Facility Name	
Sample by	P. Kelly M. H. Hamilton

Depth to water, feet (TOC)	19.95
Measured Total Depth, feet (TOC)	27.15

Sample Location ID	AD-30
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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)		
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	26.79		

Total volume purged	
Sample appearance	clear
Sample time	11-3
Sample date	6-26-23

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	Pikev
Sample by	M-H Hamilton
Depth to water, feet (TOC)	37.23
Measured Total Depth, feet (TOC)	57.49

Sample Location ID	AD-3
Depth to water date	10-15-23

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)		
1125	37.51	220	4.42	156	116	7.76	285	23.28		
1130	37.64	226	4.77	131	88.3	1.29	225	21.92		
1135	37.75	226	4.75	126	35.1	0.78	204	21.54		
1140	37.86	226	4.76	124	29.8	0.70	191	21.45		
1145	37.94	226	4.77	121	24.5	0.67	185	21.37		

Total volume purged	
Sample appearance	clear
Sample time	1147
Sample date	10-15-23

Facility Name	AKP 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	AEP Pinnac 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 (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ 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	Mett Hamilton

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 ($\mu\text{S/cm}$)	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	11.7	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	Cloudy 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)	15.9
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 (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°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	CLAR
Sample time	0811
Sample date	10/17/23

Facility Name	APP Plant # PP
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 (μ S/cm)	Turbidity - (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ 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 Mark Hamill
Depth to water, feet (TOC)	23.16
Measured Total Depth, feet (TOC)	33.05

Sample Location ID	A10-17
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)
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 PIAKOMP
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	

WOM IT HOLD WATER K-M

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
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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)		
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	Pike
Sample by	Matt Hamble

Sample Location ID	AD-23
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Depth to water, feet (TOC)	29.75
Measured Total Depth, feet (TOC)	38.20

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)
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
838	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	Pirkey
Sample by	M. H. Jernigan

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	Piracy Mett / Hamill
Depth to water, feet (TOC)	16.30
Measured Total Depth, feet (TOC)	42.73

Sample Location ID	AD-26
Depth to water date	10-18-23

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)
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	Pailley Misty Hamilton

Sample Location ID	AD-27
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Depth to water, feet (TOC)	24.19
Measured Total Depth, feet (TOC)	4 10.07

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 ($\mu\text{S}/\text{cm}$)	Turbidity (N.T.U.)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}\text{C}$)		
1044	24.47	300	3.48	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		
1059	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 Mott Hamilt-n
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 ($\mu\text{S}/\text{cm}$)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}\text{C}$)		
1102	19.96	220	3.81	4020 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	351	21.52		

Total volume purged	
Sample appearance	clear
Sample time	1114
Sample date	10-17-23

Facility Name	
Sample by	P. Kelly M.H. Hamilton
Depth to water, feet (TOC)	20.74
Measured Total Depth, feet (TOC)	27.15

Sample Location ID	AD-30
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	KERRY 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 AP PIAHM PP
Sample by	Kristin 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 (µS/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature (°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 (μ S/cm)	Turbidity (N.T.U)	D.O. (mg/L)	ORP (mV)	Temperature ($^{\circ}$ C)		
0951	8.91	110	4.16	119	7.2	6.21	288	20.87		
0956	8.89	110	4.19	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

Facility Name	Pickley
Sample by	M-H Hamille

Sample Location ID	B-2
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Depth to water, feet (TOC)	28.45
Measured Total Depth, feet (TOC)	57.44

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)		
819	28.88	3cc	4.37	175	65.8	4.38	187	15.01		
824	29.00	3cc	4.44	126	23.9	1184	136	17.86		
828	29.05	3cc	4.56	124	14.8	1.10	108	18.40		
834	29.09	3cc	4.61	123	13.2	0.88	97	18.56		
839	29.11	3cc	4.66	122	6.8	0.81	90	18.65		
844	29.12	3cc	4.68	122	6.9	0.77	85	18.70		

Total volume purged	
Sample appearance	clear
Sample time	8:44
Sample date	10-17-23

Duplicate B
B15

Facility Name	APP PIRAM PP
Sample by	KIMMY McDRONALD

Sample Location ID	B-3
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Depth to water, feet (TOC)	17.67
Measured Total Depth, feet (TOC)	37.49

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)		
1211	18.72	102	4.80	226	8.4	2.41	368	22.41		
1216	19.63	102	4.91	209	6.3	2.30	288	21.93		

Total volume purged	
Sample appearance	clear
Sample time	0814
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: 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)

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
 Michael Ohlinger (614-836-4184)
 Contacts: Dave Conover (614-836-4219)

Project Name: Pirkey PP Semi-Annual CCR
 Contact Name: Leslie Fuerschbach
 Contact Phone: 319-673-2744

Sampler(s): Matt Hamilton Kenny McDonald

Sample Identification	Analysis Turnaround Time (in Calendar Days)		Site Contact:		Date:		COC/Order #:	For Lab Use Only:							
	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials			Field-filter 250 mL bottle, HNO3	250 mL bottle, pH<2, HNO3	1 L bottle, Cool, 0-6C	Three (six every 10th*) L bottles, pH<2, HNO3			
AD-2	6/26/2023	1042	G	GW	1										
AD-3	6/27/2023	1101	G	GW	1										
AD-4	6/27/2023	1110	G	GW	1										
AD-7	6/27/2023	951	G	GW	1										
AD-12	6/28/2023	755	G	GW	1										
AD-13	6/28/2023	728	G	GW	1										
AD-17	6/28/2023	1147	G	GW	1										
AD-18	6/27/2023	742	G	GW	1										
AD-22	6/28/2023	843	G	GW	1										
AD-28	6/28/2023	1126	G	GW	1										
AD-30	6/26/2023	1103	G	GW	1										
AD-31	6/26/2023	1001	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		
* Six 1L Bottles must be collected for Radium for every 10th sample.															
Special Instructions/QC Requirements & Comments:															
TG-32 needed															
Relinquished by:	Company: <i>Esc</i>		Date/Time: 1600		Received by:										
Relinquished by:	Company:		Date/Time: 6-28-23		Received by:										
Relinquished by:	Company:		Date/Time:		Received in Laboratory by: <i>Michael Ohlinger</i>										
Form COC-04, AEP Chain of Custody (COC) Record for Coal Combustion Residual (CCR) Sampling - Shreveport, Rev. 1, 1/10/17															

231960

6/29/23 10:45 AM

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Dolan Chemical Laboratory (DCL)
 4001 Bixby Road
 Groveport, Ohio 43125
Contacts: Michael Ohlinger (614-836-4184)
Dave Conover (614-836-4219)

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)

Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix		# of Cont.
			Matrix	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	

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) 1 L bottles, pH<2, HNO3

Sample Specific Notes	Field-filter	250 mL bottle, pH<2, HNO3	1 L bottle, Cool, 0-6C	Three (six every 10th) 1 L bottles, pH<2, HNO3	Date:	COC/Order #:	For Lab Use Only:
Mercury	Disolved Mercury						
TDS, SO4, Br, F, Cl, Alkalinity							

Sample Identification: AD-32, AD-33, Duplicate - 1, Field Blank

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 needed

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company: <i>Egg</i>	Date/Time: 6-28-23 1600	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: <i>Theresa Ohly</i>	Date/Time: 6/29/23 10:45 AM

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>MGR</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 properly? Y / N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y / N or N/A Initial & Date: MGR 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 M50 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] M50 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

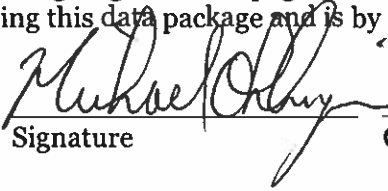
Municipal Solid Waste Laboratory Review Checklist

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	

Alkalinity Laboratory Review Checklist

Table 3. Exception Reports.

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

Exception Report No.	Description
ER1	CCB acceptance criteria is CCB<0.5*ML.

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		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:

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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 _____ 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

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-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

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

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	Analysis Turnaround Time (in Calendar Days) ☉ Routine (28 days for Monitoring Wells)	Site Contact:	Date:	For Lab Use Only: COC/Order #:										
Contact Name: Leslie Fuerschbach		<table border="1"> <tr> <td>250 mL bottle, pH<2, HNO₃</td> <td>Field-filter 250 mL bottle, then pH<2, HNO₃</td> <td>Three (six every 10th*) 1 L bottles, pH<2, HNO₃</td> <td>250 mL Glass bottle, HCL**, pH<2</td> <td>250 mL Glass bottle, HCL**, pH<2</td> </tr> <tr> <td>Sb, As, B, Ba, Be, Ca, Cd, Cr, Co, K, Li, Mg, Mo, Na, Pb, Se, Sr, Ti</td> <td>Dissolved Sb, As, Ba, Be, Cd, Cr, Co, Fe, Li, Mn, Mo, Pb, Se, Ti</td> <td>Ra-226, Ra-228</td> <td>Mercury</td> <td>Dissolved Mercury</td> </tr> </table>	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	Sb, As, B, Ba, Be, Ca, Cd, Cr, Co, K, Li, Mg, Mo, Na, Pb, Se, Sr, Ti	Dissolved Sb, As, Ba, Be, Cd, Cr, Co, Fe, Li, Mn, Mo, Pb, Se, Ti	Ra-226, Ra-228	Mercury	Dissolved Mercury		231985
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								
Sb, As, B, Ba, Be, Ca, Cd, Cr, Co, K, Li, Mg, Mo, Na, Pb, Se, Sr, Ti	Dissolved Sb, As, Ba, Be, Cd, Cr, Co, Fe, Li, Mn, Mo, Pb, Se, Ti	Ra-226, Ra-228	Mercury	Dissolved Mercury										
Contact Phone: 318-673-2744														

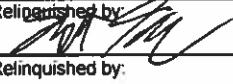
Sampler(s): Matt Hamilton Kenny McDonald	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	Sb, As, B, Ba, Be, Ca, Cd, Cr, Co, K, Li, Mg, Mo, Na, Pb, Se, Sr, Ti	Dissolved Sb, As, Ba, Be, Cd, Cr, Co, Fe, Li, Mn, Mo, Pb, Se, Ti	Ra-226, Ra-228	Mercury	Dissolved Mercury	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

* Six 1L Bottles must be collected for Radium for every 10th sample.

Special Instructions/QC Requirements & Comments:

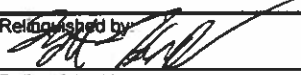
TG-32 needed

Relinquished by: 	Company: Engk	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>Esk</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>		

AEP WATER & WASTE SAMPLE RECEIPT FORM

Package Type				Delivery Type			
<input checked="" type="checkbox"/> Cooler	<input type="checkbox"/> Box	<input type="checkbox"/> Bag	<input type="checkbox"/> Envelope	<input type="checkbox"/> PONY	<input type="checkbox"/> UPS	<input checked="" type="checkbox"/> FedEx	<input type="checkbox"/> USPS
				Other _____			

Plant/Customer <u>Pirkey</u>	Number of Plastic Containers: <u>81</u>			
Opened By <u>WCG/MGR</u> <u>6/30/23</u>	Number of Glass Containers: <u>32</u>			
Date/Time <u>6/30/23</u> <u>11:30 AM</u>	Number of Mercury Containers: <u>-</u>			
Were all temperatures within 0-6°C? Y / N or <u>(N/A)</u> Initial: _____ on ice / <u>(no ice)</u> (IR Gun Ser# <u>2213689000</u> , Expir. <u>03/24/2024</u>) - If No, specify each deviation: _____				
Was container in good condition? <u>(Y)</u> / N Comments _____				
Was Chain of Custody received? <u>(Y)</u> / 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: MGR WCG 6/30/23

pH paper (circle one): MQuant, PN1.09535.0001, LOT# _____ (OR) Lab Rat, PN4801, LOT# X000RWG21 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# 231985 Initial & Date & Time : _____

Logged by MGO Comments: _____

Reviewed by WCG

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.

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	

Radium Laboratory Review Checklist

Table 3. Exception Reports.

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

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.”

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

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	
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: 08/03/2023

Laboratory Job Number: 231985

Prep Batch Number(s): PB23070502 PB23070503 QC2307072 QC2307106 QC2307184 QC2307222

Exception Report No.	Description
ER1	Linear Dynamic Range (LDR) study used to determine upper limit of analyte calibration.
ER2	CCB acceptance criteria is $CCB < 2.2 * MDL$.

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:

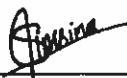
- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- 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

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	

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: 07/12/2023
Laboratory Job Number: 231985
Prep Batch Number(s): PB23070305, PB23070306, PB23070605

Exception Report No.	Description
ER1	PB23070605, RPD between a sample and duplicate sample was above acceptance 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.”

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 Bixby Road
 Groveport, Ohio 43125
 Jonathan Barnhill (318-673-3803)
 Contacts: Michael Ohlinger (814-836-4184)

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Site Contact: _____ Date: _____ For Lab Use Only:
 COC/Order #: **233 2079**

Project Name: Pirkey - CCR Metals
 Contact Name: Leslie Fuerschbach
 Contact Phone: 318-423-3805
 Sampler(s): Matt Hamilton Kenny McDonald

Analysis Turnaround Time (in Calendar Days)

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	Three (six every 10th*) L bottles, pH<2, HNO ₃	250 mL Glass bottle, HCL**, pH<2	250 mL Glass bottle, HCL**, pH<2	Hg	Hg	Sample Specific Notes:
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							4	F4	4	2	F2			

* 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: <i>Engle</i>	Date/Time: <i>10-19-23 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>[Signature]</i>	Date/Time: <i>10/23/23 1100</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>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} 10/25/23 ^{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

<u>Cooler</u> Cooler	<u>Box</u> Package Type Box Bag Envelope	<u>FedEX</u> Delivery Type PONY UPS FedEX USPS Other _____
Plant/Customer <u>P. Tracy</u>	Number of Plastic Containers: <u>16</u>	
Opened By <u>MSO</u>	Number of Glass Containers: <u>-</u>	
Date/Time <u>10/23/23</u> <u>MSO 10/24/23</u> <u>12:00PM</u>	Number of Mercury Containers: <u>-</u>	
Were all temperatures within 0-6°C? Y / N or <u>(N/A)</u> Initial: _____ on ice / <u>(no ice)</u> (IR Gun Ser# <u>2213689000</u> , Expir. <u>03/24/2024</u>) - If No, specify each deviation: _____		
Was container in good condition? <u>(Y)</u> / N Comments _____		
Was Chain of Custody received? <u>(Y)</u> / N Comments _____		
Requested turnaround: <u>Latim</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: MSO 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 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.

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.

<u>Susann Sulzmann</u>	<u><i>S. Sulzmann</i></u>	<u>Senior Chemist</u>	<u>12-7-2023</u>
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	

Mercury Laboratory Review Checklist

Table 3. Exception Reports.

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

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."

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

Version 3.0 of the Laboratory Report
This report is the property of the Laboratory. It is to be used only for the purpose
for which it was prepared. It is not to be distributed outside the Laboratory.
Municipal Solid Waste Laboratory
Date: 08/19/11

Lab Supervisor

Official Title

12/7/2023

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: 12/7/2023
Laboratory Job Number: 233279
Prep Batch Number(s): PB231102703 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

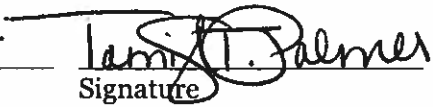
Municipal Solid Waste Laboratory Review Checklist

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

Table 3. Exception Reports.

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

Exception Report No.	Description
ER1	Both batches did not have samples available for duplicates.

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:

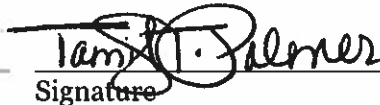
- This signature page, and the laboratory review checklist consisting of Table 1, Reportable Data (which includes the reportable data identified on this page), Table 2, Supporting Data, and Table 3, Exception Reports.
- R1 Field chain-of-custody documentation
- R2 Sample identification cross-reference
- 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

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	

Radium Laboratory Review Checklist

Table 3. Exception Reports.

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

Exception Report No.	Description
ER1	PB23111103- there was no MS, MSD associated with prep batch.

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: 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).

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						Site Contact:		Date:		For Lab Use Only:													
Contact Name: Leslie Fuerschbach						Analysis Turnaround Time (in Calendar Days)		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		COC/Order #:			
Contact Phone: 318-423-3805																				233267			
Sampler(s): Matt Hamilton Kenny McDonald						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 , Br, Alkalinity		Ra-226, Ra-228		Hg		Hg		Sample Specific Notes:			
Sample Identification						Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.													
AD-3						10/18/2023	1147	G	GW	1			X										
AD-7R						10/17/2023	908	G	GW	1			X										
AD-12						10/17/2023	941	G	GW	1			X										
AD-13						10/17/2023	811	G	GW	1			X										
AD-17						10/17/2023	1211	G	GW	1			X										
AD-18						10/18/2023	747	G	GW	1			X										
AD-22						10/17/2023	1015	G	GW	1			X										
AD-28						10/17/2023	1114	G	GW	1			X										
AD-30						10/17/2023	1034	G	GW	1			X										
AD-33						10/17/2023	1110	G	GW	1			X										
DUPLICATE A						10/17/2023	1400	G	GW	1			X										
EQUIPMENT BLANK						10/17/2023	1015	G	GW	1			X										
FIELD BLANK						10/17/2023	1018	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>JT Tomlinson</i>						Company: <i>Eagle</i>						Date/Time: <i>10-19-23 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 Ohly</i>				Date/Time: <i>10/20/23 10:00</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 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)
- NR 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 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

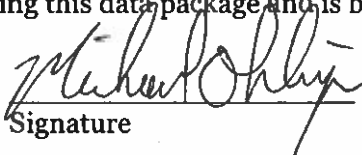
This data package consists of:

- 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

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	

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: 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**